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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	IMM301 (51851/376586)
First Inventor	David M. Birnbaum
Title	Systems and Methods for . . .
Express Mail Label No.	

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

1. ☐ Fee Transmittal Form (e.g., PTO/SB/17)
2. ☐ Applicant claims small entity status. See 37 CFR 1.27.
3. ☑ Specification [Total Pages 57]
   Both the claims and abstract must start on a new page
   (For information on the preferred arrangement, see MPEP 608.01(a))
4. ☑ Drawing(s) (35 U.S.C. 113) [Total Sheets 18]
5. Oath or Declaration [Total Sheets ____]
   a. ☐ Newly executed (original or copy)
   b. ☐ A copy from a prior application (37 CFR 1.63(d))
      (for continuation/divisional with Box 18 completed)
      i. ☐ DELETION OF INVENTOR(S)
      Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. ☑ Application Data Sheet. See 37 CFR 1.76
7. ☐ CD-ROM or CD-R in duplicate, large table or Computer Program (Appendix)
   ☐ Landscape Table on CD
8. Nucleotide and/or Amino Acid Sequence Submission
   (If applicable, items a. – c. are required)
   a. ☐ Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. ☐ CD-ROM or CD-R (2 copies); or
      ii. ☐ Paper
   c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. ☐ Assignment Papers (cover sheet & document(s))
   Name of Assignee ____
10. ☐ 37 CFR 3.73(b) Statement (when there is an assignee) ☑ Power of Attorney
11. ☐ English Translation Document (if applicable)
12. ☐ Information Disclosure Statement (PTO/SB/08 or PTO-1449)
    ☐ Copies of citations attached
13. ☐ Preliminary Amendment
14. ☐ Return Receipt Postcard (MPEP 503)
    (Should be specifically itemized)
15. ☐ Certified Copy of Priority Document(s)
    (if foreign priority is claimed)
16. ☐ Nonpublication Request under 35 U.S.C. 122(b)(2)(B)(i). Applicant must attach form PTO/SB/35 or equivalent.
17. ☑ Other Fee transmittal generated via EFS-Web

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in the first sentence of the specification following the title, or in an Application Data Sheet under 37 CFR 1.76:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No.: ____

Prior application information: Examiner ____ Art Unit: ____

19. CORRESPONDENCE ADDRESS

☑ The address associated with Customer Number 34300 OR ☐ Correspondence address below

Name					
Address					
City		State		Zip Code	
Country		Telephone		Email	

Signature		Date	7/14/2004
Name (Print/Type)	Michael Morlock	Registration No. (Attorney/Agent)	52,245

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	IMM351 (51851/378566)
	Application Number	
Title of Invention	Systems And Methods For Transmitting Haptic Messages	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Applicant Information:

Applicant 1

Applicant Authority: (•) Inventor ( ) Legal Representative under 35 U.S.C. 117 ( ) Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	David	M.	Birnbaum	

Residence Information (Select One): (•) US Residency ( ) Non US Residency ( ) Active US Military Service

City	Oakland	State/Province	CA	Country of Residence	US

Citizenship under 37 CFR 1.41(b): US

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Applicant 2

Applicant Authority: (•) Inventor ( ) Legal Representative under 35 U.S.C. 117 ( ) Party of Interest under 35 U.S.C. 118

Prefix	Given Name	Middle Name	Family Name	Suffix
	Chris		Ullrich	

Residence Information (Select One): (•) US Residency ( ) Non US Residency ( ) Active US Military Service

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Citizenship under 37 CFR 1.41(b): CA

Mailing Address of Applicant:

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Address 2	

City	Ventura	State/Province	CA
Postal Code	93003	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ An Address is being provided for the correspondence information of this application.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	IMM351 (51851/378580)
	Application Number	
Title of Invention	Systems And Methods For Transmitting Haptic Messages	

Customer Number	34300		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	Systems And Methods For Transmitting Haptic Messages		
Attorney Docket Number	IMM351 (51851/378580)	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Suggested Class (if any)		Sub Class (if any)	
Suggested Technology Center (if any)			
Total Number of Drawing Sheets (if any)	18	Suggested Figure for Publication (if any)	

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not be** the subject of an application filed in another country, or under a **multilateral** international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Enter either Customer Number or complete the Representative Name section below. If both sections are completed the Customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	34300		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78(a)(2) or CFR 1.78(a)(4), and need not otherwise be made part of the specification.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61060978	2008-07-15
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61060981	2008-07-15

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	IMM351 (51851/378580)
	Application Number	
Title of Invention	Systems And Methods For Transmitting Haptic Messages	

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61080985	2008-07-15
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61080987	2008-07-15
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61148312	2009-01-29
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	61181280	2009-05-26

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

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This section allows for the applicant to claim benefit of foreign priority and to identify any prior foreign application for which priority is not claimed. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(a).

Remove

Application Number	Country	Parent Filing Date (YYYY-MM-DD)	Priority Claimed
			○ Yes ◉ No

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Assignee Information:

Providing this information in the application data sheet does not substitute for compliance with any requirement of part 3 of Title 37 of the CFR to have an assignment recorded in the Office.

Assignee 1

If the Assignee is an Organization check here. ☒

Organization Name	Immersion Corporation		
Mailing Address Information:			
Address 1	801 Fox Lane		
Address 2			
City	San Jose	**State/Province**	CA
Country	US	Postal Code	95131
Phone Number		Fax Number	
Email Address			

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	IMM351 (51851/378586)
	Application Number	
Title of Invention	Systems And Methods For Transmitting Haptic Messages	

Signature:

A signature of the applicant or representative is required in accordance with 37 CFR 1.33 and 10.18. Please see 37 CFR 1.4(d) for the form of the signature.

Signature				Date (YYYY-MM-DD)	2009-07-14
First Name	Michael	Last Name	Matlock	Registration Number	62245

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SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

CROSS-REFERENCES TO RELATED APPLICATIONS

[0001] This utility patent application claims priority to: U.S. Provisional Patent Application No. 61/080,978, entitled "Systems and Methods for Physics-Based Tactile Messaging" filed July 15, 2008; U.S. Provisional Patent Application No. 61/080,981, entitled "Systems and Methods for Mapping Message Contents to Virtual Physical Properties for Vibrotactile Messaging" filed July 15, 2008; U.S. Provisional Patent Application No. 61/080,985, entitled "Systems and Methods for Shifting Sensor Haptic Feedback Function Between Passive and Active Modes" filed July 15, 2008; U.S. Provisional Patent Application No. 61/080,987, entitled "Systems and Methods for Gesture Indication of Message Recipients" filed July 15, 2008; U.S. Provisional Patent Application No. 61/148,312, entitled "Systems and Methods for Pseudo-Telepresence in a Shared Space" filed January 29, 2009; and U.S. Provisional Patent Application No. 61/181,280, entitled "Systems and methods for Transmitting Haptic Messages" filed May 26, 2009 the entirety of all of which are hereby incorporated by reference.

FIELD OF THE INVENTION

[0002] The present invention generally relates to messaging systems and, more particularly, to systems and methods for transmitting haptic messages.

BACKGROUND

[0003] Conventional messaging systems may utilize a multi-step process for selecting a message recipient and sending a message. A user may be required to navigate several menus to select a recipient and send a message. Furthermore, no information about how the message is

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sent, such as how the send button was pressed, is preserved. Accordingly, there is a need for systems and methods for transmitting haptic messages

SUMMARY

[0004] Embodiments of the present invention provide systems and methods for transmitting haptic messages. For example, one embodiment of the present invention is a method comprising: receiving at least one sensor signal from at least one sensor of a mobile device, the at least one sensor signal associated with a movement of the mobile device; determining a message to be displayed in a user interface based at least in part on the at least one sensor signal; and causing the message to be displayed. In another embodiment, a computer readable medium comprises processor-executable program code for carrying out such a method.

[0005] These illustrative embodiments are mentioned not to limit or define the invention but rather to provide examples to aid understanding thereof. Illustrative embodiments are discussed in the Detailed Description, where further description of the invention is provided . The advantages offered by various embodiments of this invention may be further understood by examining this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] These and other features, aspects, and advantages of the present invention are better understood when the following Detailed Description is read with reference to the accompanying drawings, wherein:

[0007] Figure 1 is a block diagram of a system for transmitting haptic messages according to one embodiment of the present invention;

[0008] Figure 2 is an illustration of a system for transmitting haptic messages according to one embodiment of the present invention;

FITBIT 1002
Fitbit v. Immersion

[0009] Figure 3 is a flow diagram of a method for transmitting haptic messages according to another embodiment of the present invention;

[0010] Figure 4 is another flow diagram of a method for transmitting haptic messages according to another embodiment of the present invention;

[0011] Figures 5a and 5b are illustrations of generating haptic messages according to one embodiment of the present invention;

[0012] Figure 6 is an illustration of generating haptic messages according to one embodiment of the present invention;

[0013] Figure 7 is an illustration of generating haptic messages according to one embodiment of the present invention;

[0014] Figures 8a and 8b are illustrations of deleting haptic messages according to one embodiment of the present invention;

[0015] Figure 9 is a flow chart illustrating a process of generating and transmitting haptic messages according to one embodiment of the present invention;

[0016] Figure 10 is a flow chart illustrating a process of generating and transmitting haptic messages according to one embodiment of the present invention;

[0017] Figures 11a and 11b are illustrations of generating haptic messages according to one embodiment of the present invention;

[0018] Figures 12a and 12b are illustrations of transmitting haptic messages according to one embodiment of the present invention;

[0019] Figure 13 is a flow chart for a process for generating and transmitting a haptic message according to one embodiment of the present invention;

FITBIT 1002
Fitbit v. Immersion

[0020] Figures 14 is an illustration of transmitting haptic messages according to one embodiment of the present invention;

[0021] Figure 15 is a flow chart illustrating a process of transmitting haptic messages according to one embodiment of the present invention;

[0022] Figure 16a, 16b, and 16c are illustrations of transmitting haptic messages according to one embodiment of the present invention;

[0023] Figure 17 is an illustration of transmitting haptic messages according to one embodiment of the present invention; and

[0024] Figure 18 is a flow chart illustrating a process of transmitting haptic messages according to one embodiment of the present invention.

DETAILED DESCRIPTION

[0025] Embodiments of the present invention provide systems and methods for transmitting haptic messages.

Illustrative Embodiment of Transmitting haptic messages

[0026] One illustrative embodiment of the present invention comprises a mobile device such as a mobile phone. In the illustrative embodiment, the mobile device comprises the Samsung SGH-i710 mobile computer equipped with Immersion Corporation's VibeTonz® vibrotactile feedback system. In another embodiment, the messaging device comprises Immersion Corporations TouchSense® Technology system also known as Immersion TouchSense® vibrotactile feedback system. Other mobile devices and haptic feedback systems may be utilized.

[0027] The mobile device comprises a display, a user interface device, memory, and a processor in communication with each of these elements. The display comprises a touch-

FITBIT 1002
Fitbit v. Immersion

sensitive display, or a touch-screen. The illustrative mobile device also comprises a sensor and an actuator, both of which are in communication with the processor. The sensor is configured to sense a user's physical interaction with the mobile device, and the actuator is configured to output a haptic effect to the user.

[0028] In the illustrative embodiment, a multi-dimensional message inbox in the form of a virtual message environment is shown on the display. The virtual message environment contains electronic messages represented as virtual message objects. A message may be for example comprise text, data, pictures, video, or audio. A message may be displayed as a virtual message object which comprises the message. A virtual message object may take the form of: a scroll, a capsule, a ball, a balloon, or any other object that the display is capable of displaying. Each type of virtual message object may correspond to a specific type of message. For example, virtual message objects in the form of a cube or a cylindrical scroll may represent text messages or chat conversations. A short message intended to convey emotion, such as intimacy, may be represented as a virtual message object in the form of a heart. The virtual message environment also comprises a virtual gateway. Virtual message objects may enter or leave the virtual message environment through the virtual gateway.

[0029] In the illustrative embodiment, the virtual message object comprises a token. A token is a type of virtual message object that displays the same characteristics in both the sending and receiving mobile devices. Thus, when a virtual message object is sent from one mobile device to another, the virtual message object displays the same characteristics in the recipient device as it displayed in the sending device. The characteristics which are maintained may comprise the virtual message object's size, shape, color, and any haptic effect associated with the

FITBIT 1002
Fitbit v. Immersion

virtual message object. In some embodiments, a token may be a business token, a personal token, or some other type of token.

[0030] With the illustrative device, users can interact with the virtual message environment and/or virtual message objects by using the touch-screen and/or by manipulating the mobile device, for example, by rotating or shaking the device. Through such interactions, users can create, manipulate, send, and/or receive virtual message objects. In the illustrative device, a user makes a gesture directed toward the virtual gateway to transmit a virtual message object. Example gestures include: engaging the touch-screen and dragging or flicking a virtual message object toward a virtual gateway, tilting the mobile device in the direction of the virtual gateway, or shaking the virtual mobile device.

[0031] The sensor detects the user's gesture and, based on this gesture, sends a sensor signal to the processor. The sensor may comprise: a gyroscope, an accelerometer, a GPS, or other sensors capable of detecting movement, orientation, or location of the mobile device. The sensor may be configured to detect when a user moves or tilts the device. Based at least in part on the sensor signal, the processor determines a virtual force to apply to the virtual message object. For example, when the device is tilted, the processor may determine a virtual force representing gravity, and move the virtual message object in the direction the device is tilted. As another example, a sensor may detect that the device has been jabbed or thrust toward a virtual gateway. The sensor will then send a corresponding signal to the processor, which may determine a virtual force and apply it to the virtual message object.

[0032] After receiving a sensor signal, the processor determines a transmission characteristic of a virtual message object based, at least in part, on the sensor signal. In the illustrative embodiment, a transmission characteristic comprises a characteristic or property

FITBIT 1002
Fitbit v. Immersion

associated with the user's gesture or how the virtual message object was sent through the virtual gateway. This transmission characteristic is preserved and may be included as a part of the message. In one example, a user sends an urgent message by forcefully pushing the virtual message object through the virtual gateway. The transmission characteristic of the virtual message object will comprise its velocity as it passes through the virtual gateway. In another example, after a user slowly drags or flicks a virtual message object toward the virtual gateway, the processor determines a slow transmission characteristic. Additionally, the processor may determine other transmission characteristics based on the sensor signal, such as an approach angle transmission characteristic based on the angle of the user's gesture. The processor then includes the virtual transmission characteristic as a part of the virtual message object. In some embodiments, the processor may further include a determined haptic effect.

[0033] Next, the processor determines whether to transmit the virtual message object based, at least in part, on the virtual force. This determination may include a calculation of whether the gesture was sufficiently directed toward the virtual gateway. If a gesture is not directed toward the virtual gateway, the processor may determine that the virtual message object should not be transmitted, but rather it should stay inside the local virtual message environment. If the gesture is sufficiently directed toward the virtual gateway, the processor will determine that the virtual message object should be transmitted.

[0034] Finally, the processor transmits the virtual message object, as well as the transmission characteristic. The processor may send the virtual message object and the transmission characteristic to a network interface, such as a cellular network interface or a Wi-Fi network interface. The network interface then transmits the virtual message object and the

FITBIT 1002
Fitbit v. Immersion

transmission characteristic over a network, such as a cellular network, intranet, or the Internet, to another mobile device.

[0035] In another embodiment of the illustrative device, virtual message objects are transmitted to the recipient device at substantially real time. For example, a user may create a virtual message object on the sending device, and at substantially the same time the same virtual message object may appear on the recipient device. In this embodiment, the sender may manipulate characteristics of the virtual message object and those modifications may appear at substantially the same time on the recipient device. For example, a user may modify the color or haptic effect associated with a virtual message object on the sending mobile device, and at the same time, the virtual message object may be modified on the recipient device's screen. Thus, a virtual message object may form a direct real-time connection between two mobile devices. In this embodiment, signals associated with virtual message objects are sent, even though the user has not used a send function, or moved the virtual message object through the virtual gateway.

[0036] When the illustrative device receives a virtual message object, its transmission characteristic may be preserved and interpreted by the receiving mobile device. In the illustrative embodiment, the user's indicative gesture comprises a fast flick toward the virtual gateway. A fast transmission characteristic is determined by the processor and transmitted along with the virtual message object. Then, when the illustrative device receives the virtual message object, it displays the virtual message object entering its graphical user interface through a virtual gateway. The virtual message travels through the receiving device's virtual gateway with a velocity and haptic effect corresponding to its transmission characteristic. In the illustrative embodiment, a user sent the message with a fast flick, thus the receiving device's processor will determine a strong haptic effect, such as a heavy thud or a bounce. The processor may further

FITBIT 1002
Fitbit v. Immersion

determine a violent collision inside the virtual message environment when the virtual message object enters. In an alternative embodiment, if a user sent the virtual message object with a gentle thrust or tilt, the virtual message object may arrive at a slower speed accompanied by a gentle haptic effect, such as a soft vibration.

[0037] This illustrative example is given to introduce the reader to the general subject matter discussed herein; the invention is not limited to this example. The following sections describe various additional embodiments and examples of methods and systems for transmitting haptic messages.

Transmitting haptic messages

[0038] Embodiments of the invention presented herein provide systems and methods for transmitting haptic messages. By incorporating a physical model into a virtual message environment, embodiments can leverage a user's everyday tactile experience and motor-sensory skills to intuitively navigate the user interface in order to control the transmission of messages. Conventional messaging systems may provide little or no intuitive gesture navigation. Text messaging systems using a conventional email metaphor, with a one-dimensional inbox showing subject lines, drafts, etc., may be visually and cognitively intensive, requiring a user's heightened attention for creating, sending, and receiving messages. Further, conventional messaging systems may retain little or no contextual information associated with how the message was sent. Transmitting messages haptically, however, can facilitate non-linguistic communication of content by tying physical effects to a message.

[0039] In one embodiment, the mobile device's graphical user interface displays a virtual message environment. This virtual message environment incorporates a physical model, which allows users to directly manipulate its contents. The virtual message environment comprises

FITBIT 1002
Fitbit v. Immersion

electronic messages which are displayed as virtual message objects. A virtual message object may take the form of a ball, a scroll, a capsule, an arrow, a heart, or other shapes. Users can manipulate virtual message objects and the virtual message environment through motions or gestures detected by various sensors. These sensors may comprise one or more of a gyroscope, GPS, accelerometer, touch-screen, or other sensors configured to detect motion. The user's gestures or movements are translated into virtual forces acting on virtual message objects. These forces may cause the virtual message objects to move and collide inside the virtual message environment or to exit the environment through a virtual gateway.

[0040] Further, using a physical modeling engine, virtual boundaries may be programmed to correspond to the physical boundaries of the screen of the device. In such an environment, a virtual message object can bounce against the boundaries of the virtual message environment without traveling off the screen. A virtual gateway in the environment may be created by replacing part of the virtual physical boundary with a gateway or portal to one or more recipients. When a virtual object moves through the virtual gateway, it is transmitted to one or more recipient devices, and "leaves" the host's virtual message environment. Additionally, the virtual gateway may be closed, disabling the ability to send messages and keeping unsent messages in the virtual message environment. Thus, embodiments of the present invention may utilize a spatial metaphor for sending messages, thereby facilitating a more intuitive messaging process.

[0041] In some embodiments, a user may move a virtual message object through the virtual gateway by making an indicative gesture toward the virtual gateway. The gesture may be made by contacting the virtual message object on the touch-screen, moving the entire mobile device, or through some other means. In one example, a user sends a virtual message object by

FITBIT 1002
Fitbit v. Immersion

selecting it on the touch-screen and using a flicking gesture to move the object toward the virtual gateway. The processor may determine a transmission characteristic, such as the speed of the virtual message object as it travels through the virtual gateway. The transmission characteristic may be preserved as the virtual message object is transmitted to another mobile device. When the virtual message object is received by a recipient device, it may arrive in the virtual message environment and behave or interact with other objects and/or the environment based, at least in part, on its transmission characteristic.

[0042] In other embodiments, the virtual message environment itself may comprise a virtual gateway to the recipient device. For example, when a virtual message object is created in a sending virtual message environment, it may appear substantially simultaneously in the recipient virtual message environment. In another embodiment, if a user modifies a virtual message object by adding text or a haptic effect to the virtual message object, these changes may take place substantially simultaneously in the receiving virtual message environment.

Illustrative Systems for Transmitting haptic messages

[0043] In reference to the drawings in which like numerals indicate like elements throughout the several figures, Figure 1 is a block diagram of a system for transmitting haptic messages according to one embodiment of the present invention. As shown in Figure 1, the system 100 comprises a mobile device 102, such as a mobile phone, portable digital assistant (PDA), portable media player, or portable gaming device. The mobile device 102 comprises a processor 110 in communication with a network interface 112, a sensor 114, a display 116, an actuator 118, a speaker 120, and a track ball 122.

[0044] The processor 110 is configured to generate a graphical user interface which is shown on display 116. Processor 110 is in communication with network interface 112, which

US 7982 1

FITBIT 1002
Fitbit v. Immersion

may comprise one or more methods of mobile communication, such as infrared, radio, Wi-Fi, or cellular network communication. In other variations, network interface 112 comprises a wired network interface, such as Ethernet. The mobile device 102 can be configured to exchange messages or virtual message objects with other devices (not shown in Figure 1) via network interface 112. Embodiments of messages exchanged between devices may comprise voice messages, text messages, data messages, or other types of messages.

[0045] The processor 110 is also in communication with one or more sensors 114. Sensor 114 may comprise a position sensor, location sensor, rotational velocity sensor, image sensor, pressure sensor, or another type of sensor. For example, sensor 114 may comprise an accelerometer, a gyroscope, a GPS sensor, a touch-sensitive input device (e.g. touch screen, touch-pad), or some other type of sensor. The one or more sensors 114 may be configured to detect changes in, for example, acceleration, inclination, inertia, or location. For example, the mobile device 102 may comprise an accelerometer 114 configured to measure the acceleration of the mobile device 102. The one or more sensors 114 are configured to detect a user interaction and send a signal representing the user interaction to processor 110. The mobile device 102 may comprise additional forms of input, such as track ball 122, buttons, keys, a scroll wheel, and/or a joystick (not shown in Figure 1).

[0046] Users may interact with the user interface through movements or gestures, the one or more sensors 114 detect these movements. As the user tilts, shakes, thrusts, or otherwise moves mobile device 102, the one or more sensors 114 detect these movements. The sensors 114 generate sensor signals based, at least in part, on these movements and send those signals to processor 110. The signals may comprise one or more of: angle of the movement, speed of the movement, distance covered by the movement, or X-Y orientation of the movement. In one

FITBIT 1002
Fitbit v. Immersion

embodiment, an accelerometer sensor is configured to detect the inclination and acceleration of the mobile device 102. As the mobile device 102 is tilted, an accelerometer can be configured to send signals to the processor 110 based, at least in part, on the tilt and/or acceleration of the mobile device 102.

[0047] Signals received from the sensor 114 may be associated with an interaction with the graphical user interface shown on display 116. In one embodiment, a sensor signal comprises an indicative gesture oriented toward a virtual gateway in a virtual message environment. For example, an indicative gesture may comprise a poking motion which moves the mobile device 102 in a certain direction. An accelerometer 114 may detect the poking motion and send a sensor signal to the processor 110 representing the motion. As another example, an indicative gesture may comprise dragging or flicking a virtual message object toward a virtual gateway. A touch-screen display 116 may detect the drag or flick and send a representative sensor signal to the processor 110.

[0048] In the embodiment shown in Figure 1, processor 110 is also in communication with display 116, which is configured to display a graphical user interface. Display 116 may comprise a touch-sensitive input device, such as a touch-screen, configured to send/receive signals to/from processor 110. The graphical user interface shown on the touch-screen display 116 facilitates the user's interaction with the messages. The graphical user interface comprises a virtual message environment, in which messages are represented as virtual message objects. A virtual message object may be selected and manipulated by contacting it directly via touch-screen display 116. In one mode of interaction, two-dimensional finger gestures on a touch screen display may select, drag, flick, throw, and/or move a virtual object within the virtual message environment.

FITBIT 1002
Fitbit v. Immersion

[0049] Signals received from a touch-screen display 116 may be associated with a transmission characteristic of a virtual message object in a graphical user interface. In one variation, a predetermined gesture on touch-screen 116, such as flicking or dragging a virtual message object, may be associated with a transmission characteristic, such as speed and/or angle of transmission of the virtual message object. In one embodiment, a quick flick is associated with a fast transmission characteristic of a virtual message object, while in another embodiment, a slow drag is associated with a slow transmission characteristic.

[0050] The processor 110 may determine a haptic feedback effect based, at least in part, on a virtual message object's transmission characteristic. In one variation, a user indicates that a virtual message object should be sent to another user by quickly jabbing the mobile device 102 in the direction of a virtual gateway. Based on the quick jab, processor 110 determines a fast transmission characteristic and that the virtual message object should be transmitted. Then the processor 110 determines a haptic effect, such as a quick vibration, based at least in part on the fast transmission characteristic. Finally, processor 110 transmits a haptic signal representing the haptic effect to actuator 118.

[0051] As shown in Figure 1, the processor 110 is also in communication with one or more actuators 118. Actuator 118 is configured to receive a haptic signal from processor 110 and output a haptic effect. After processor 110 determines a haptic effect, it sends a haptic signal to actuator 118. The haptic signal is configured to cause actuator 118 to output the determined haptic effect. Actuator 118 may be, for example, a piezoelectric actuator, an electric motor, an electro-magnetic actuator, a voice coil, a linear resonant actuator, a shape memory alloy, an electro-active polymer, a solenoid, an eccentric rotating mass motor (ERM) or a linear resonant actuator (LRA).

FITBIT 1002
Fitbit v. Immersion

[0052] Processor 110 is also in communication with a track ball 122. Processor 110 may receive signals representing user interaction from track ball 122. For example, track ball 122 may be used to scroll or navigate through a menu of message recipients in an address book. After a recipient has been selected, the track ball may be pressed to confirm the selection of a recipient. When the track ball 122 is pressed, a virtual gateway associated with the selected recipient may be displayed in the virtual message environment. When a virtual gateway is displayed, the processor 110 is ready to send the virtual message object to a particular recipient.

[0053] Figure 2 is an illustration of a system for transmitting haptic messages according to one embodiment of the present invention. The elements of system 200 are described with reference to the block diagram depicted in Figure 1. A variety of implementations other than that shown in Figure 1 are possible.

[0054] As shown in Figure 2, system 200 comprises a mobile device 102, such as a mobile phone, PDA, portable media player, or portable gaming device. The mobile device 102 is configured to send and receive signals, such as voice mail, text messages, and other data messages, over a network such as a cellular network or the Internet. The mobile device 102 may comprise a wireless network interface and/or a wired network interface 112. Although the device 102 is illustrated as a handheld mobile device in Figure 2, other embodiments may comprise different devices, such as video game systems and/or personal computers.

[0055] As shown in Figure 2, the mobile device 102 comprises a display 116. In addition to display 116, the mobile device 102 may comprise buttons, a touchpad, a scroll wheel, a rocker switch, a joystick, or other forms of input devices (not shown in Figure 2). Additionally, display 116 may comprise a touch-sensitive input device, such as a touch screen.

FITBIT 1002
Fitbit v. Immersion

[0056] Display 116 is in communication with processor 110. Display 116 is configured to display virtual message environment 210, and may comprise one or more virtual message objects. Virtual message objects may take the shape of any object display 116 is capable of showing. For example, virtual message objects may take the form of: arrows, balls, capsules, hearts, and tubes. As shown in Figure 2, the virtual message environment 210 comprises three virtual message objects 220a, 220b, and 220c. Inside the virtual message environment 210, virtual message objects 220a, 220b, and 220c may move freely, bouncing and colliding with other virtual message objects and the boundaries of the virtual message environment 210.

[0057] Each virtual message object may represent a message and/or a file, such as a text message, a picture, a video, a voicemail, a reminder, or a pseudo-emotional message such as a smiley face or a frowning face. The content of a virtual message object may be used determine the shape of the virtual message object. For example, a virtual message object in the form of a tube or a rolled-up scroll 220c may represent a text message. Or a virtual message object in the form of an egg or a capsule 220a may represent a message with an attachment, such as a video file, a picture, or a song. Virtual message objects may also represent various forms of non-verbal communication, such as gestures, facial expressions, or emotions. For example, virtual message object 220b, shown as a ball, may correspond to a non-verbal message such as an indication of playfulness. A virtual message object represented as an arrow may represent a poke or a jabbing gesture (i.e. to request or demand attention). Other virtual message objects may appear as a heart, a basketball, a water balloon, a typewriter, or another shape that display 116 is capable of displaying. Effective virtual message objects comprise easily identifiable visual and/or haptic properties and/or effects. For example, a virtual message object can represent a work file in the form of a typewriter and include a haptic effect that represents the clanging keys of a typewriter.

FITBIT 1002
Fitbit v. Immersion

Or the virtual message object representing an unimportant email may be in the form of a bowling ball and include a haptic effect which represents a bowling ball hitting pins.

[0058] A virtual message object may comprise a data store defining characteristics of the virtual message object. These characteristics may include information regarding how the virtual message object interacts with other virtual message objects and the boundaries of the virtual message environment. For example, in one embodiment, a virtual message object may appear in the form of a rubber ball and include data which causes the ball to easily bounce off other virtual message objects. In another embodiment a virtual message object may appear in the form of an egg, and contain data which causes the egg to easily shatter if impacted by another virtual message object.

[0059] Representing messages as virtual message objects enables a user to quickly determine information about a message without opening it. In some embodiments, the size of a message corresponds to the size or mass of the virtual message object. A message with a large file attachment can be represented as a large or massive object. The haptic collision effect associated with a large or massive object may be composed of strong (high magnitude) vibrations. A message such as a short text message or a message with a small file attachment can be represented as a small virtual message object. The haptic collision effect associated with a small virtual message object may be composed of soft (low magnitude) vibrations. In this way, all of the physical properties (visual appearance, haptic characteristics, etc.) are interrelated. This enables the user to gather information about the virtual message object and its contents from multiple sources at once.

[0060] In some embodiments, a virtual message object may comprise a text message. In such an embodiment, the virtual message object may include pre-written text. In other

FITBIT 1002
Fitbit v. Immersion

embodiments, the user may enter unique text for a virtual message object. In such an embodiment, the user interacts with the virtual message object to indicating that the user wishes to enter text. For example, such an interaction may comprise double-tapping the virtual message object. Sensor 114 or track ball 122 detects the user interaction, and transmits a corresponding signal to processor 110. Based on the received signal, processor 110, generates a text box, and displays this text box on display 116. In some embodiments, the text box may comprise a simple QWERTY keyboard for entering text. In other embodiments, the textbox may be more complex. For example, the text box may comprise a virtual representation of an old-fashioned mechanical typewriter. In such an embodiment, when the user depresses a key of the mechanical typewriter, the processor 110 may output an audio signal and haptic effect corresponding to the typewriter's clanging keys. In another embodiment, the textbox may comprise a blank sheet of paper, that the user can write on by interacting with the mobile device. For example, using a touch-screen, the user could sign their name using their finger or a stylus. In another example the user may write a complete message using their finger or a stylus. In other embodiments, the user may move the entire mobile device in pattern substantially approximating text. In such an embodiment, the display may show a virtual object in the form of a spray-paint can. When the user wishes to enter text, the user may press the spray-paint can and move the mobile device in a pattern substantially approximating the text the user wishes to enter. Sensor 114 may detect the movement, and transmit a corresponding signal to processor 110. Based on the received signal, processor 110 determines the entered text.

[0061] In some embodiments, a user may embed a haptic effect into a specific words within the text message. In such an embodiment, the user may enter a text message, and then interact with a specific word within the text message. Sensor 114 or Track ball 122 may detect

FITBIT 1002
Fitbit v. Immersion

the interaction and transmit a corresponding signal to processor 110. In such an embodiment, the user interaction may comprise double-clicking a specific word within a text message. Based on the received signal, processor 110 may determine that the user intends to add a haptic effect to a word. The processor 110 may then transmit an audio, haptic or visual signals which indicate that the processor 110 is ready to receive haptic information. The user may then enter a haptic effect, which the processor 110 appends to the word. In some embodiments, the haptic effect is pre-loaded on the mobile device. In other embodiments, the user may enter a new haptic effect via sensor 114. In such an embodiment, the user may shake the mobile device, and sensor 114 may detect the movement and transmit a corresponding signal to processor 110. Based on the received signal, processor 110 may determine a new haptic effect which corresponds to the shaking of the mobile device. Then, when the user transmits the message to a recipient, the recipient may touch the word, and feel the associated haptic effect. For example, in one embodiment a user may send a message including the word "love." In such an embodiment, the user may append a haptic effect comprising a beating heart to the word love. Then the recipient can feel the beating heart when the recipient interacts with the word love. In another embodiment, a user may enter their signature, and append a haptic effect to their signature. Such an embodiment may allow the user to attach a haptic signature to messages.

[0062] The virtual message environment 210 also comprises a virtual gateway 212. A virtual message object may be sent to other mobile devices by moving it through the virtual gateway 212. As a virtual message object moves through the virtual gateway 212, it is transmitted to a recipient device and "leaves" the local virtual message environment 210. Thus, embodiments of the invention may utilize a spatial metaphor for sending messages, facilitating a more intuitive process of sending messages.

FITBIT 1002
Fitbit v. Immersion

[0063] The virtual gateway 212 may be displayed by replacing a section of the virtual message environment 210 with the virtual gateway 212. The virtual gateway 212 may comprise a visual indication of the recipient(s) it is directed toward. For example, the virtual gateway 212 may show the name of a selected recipient. In Figure 2, "Noah" is shown as the potential recipient of a virtual message object sent through the virtual gateway 212. In another variation, a group of recipients, such as a "family" group or a "classmates" group may be shown in the virtual gateway 212. In such a variation, when a virtual message object is sent through a virtual gateway 212 indicating a recipient group, the virtual message object is sent to the mobile device of each individual in the group.

Illustrative Methods for Transmitting haptic messages

[0064] Figure 3 is a flow diagram of a method for transmitting haptic messages according to one embodiment of the present invention. While embodiments of the current invention may be utilized in a variety of devices, the process shown in Figure 3 will be described in relation to the block diagram shown in Figure 1 and the device shown in Figure 2.

[0065] In method 300, processor 110 receives a recipient signal associated with a recipient of the virtual message object 306. Processor 110 may receive a recipient signal from a button, scroll wheel, or other input device, such as track ball 122 or sensor 114. In one embodiment, processor 110 displays a sequential list of names from an address book stored in local memory. The names can be shown in the virtual message environment 210, for example, at the top or the bottom of the display 116. To scroll through the names, a left or right button is pressed. When the correct name for the intended recipient has been identified, the track ball 122 may be depressed to send a recipient signal to the processor 110. In one variation, a user may scroll through names in an address list by shaking the device in a left or right direction. With a

FITBIT 1002
Fitbit v. Immersion

small, soft shake, the processor 110 may progress through the address list by small increments, such as one or two names in either direction. With a large, violent shake, processor 110 may progress through the address list by larger increments, such as ten or twenty names in either direction.

[0066] Next, processor 110 displays virtual gateway 212 in the virtual message environment 308. Virtual Gateway 212 may be associated with the recipient of a virtual message object. For example, virtual gateway 212 may comprise a visual indication of a recipient by displaying the name of the recipient. In the event of a network failure, processor 110 may close the virtual gateway 212, yielding visual and/or haptic cues to the user that a virtual message object cannot be sent. In one variation, when processor 110 determines that a recipient cannot receive a virtual message object, the virtual message object may bounce against the virtual gateway 212 and remain in the virtual message environment 210. Once the virtual gateway 212 has been established, a virtual message object may be sent to a recipient. The virtual message object may be sent with a gesture moving it toward the virtual gateway 212.

[0067] Next, processor 110 receives a sensor signal from a sensor 114 configured to sense a physical interaction with a mobile device 309. The sensor 114 may detect both a direction and magnitude of the user's interaction. For example, if a user jerks the mobile device away from her body, the sensor 114 may detect both the speed with which the device was moved as well as the direction. In another example, the sensor signal may be associated with a user interaction wherein the user drags a virtual message object toward virtual gateway 212. In this way, the sensor signal may comprise a gesture directed toward the virtual gateway. In another example, the sensor signal may be associated with the mobile device 102 having been tilted.

FITBIT 1002
Fitbit v. Immersion

[0068] Then, processor 110 determines a virtual force based at least in part on the sensor signal 310. The processor 110 may determine both a direction and a magnitude of the virtual force. For example, the force may be in a direction perpendicular to the virtual objects and at a low intensity. In another example, if the user tilts the mobile device, the processor 110 may determine a force representing gravity, pulling virtual objects in the direction the user tilted the device. In other embodiments, the processor 110 may determine a force that varies in direction or intensity over time.

[0069] Next, the processor 110 applies the virtual force to a virtual message object within a virtual message environment 312. The virtual message object will then move within the virtual message environment based, at least in part, on the magnitude and direction of the virtual force. The virtual message object's behavior may further be defined by data contained in a data store. This data defines characteristics of the virtual message object's interaction in the virtual message environment. For example, the virtual message object may be in the shape of an egg, and have a characteristic defining a brittle surface. Then, if a virtual force of a high magnitude is applied to the surface of the virtual message object, the object may crack. In another example, the virtual message object may have a characteristic which defines a solid ball. When a virtual force of high intensity is applied, the ball may roll in the direction of the virtual force.

[0070] Then, the processor 110 determines whether to transmit the virtual message object 314. This determination may be based at least in part on the virtual force and the status of a recipient. Processor 110 may analyze the speed and angle of the force to determine if the virtual message object's trajectory will take it through the virtual gateway 212. If processor 110 determines that the trajectory will not carry the virtual message object through the virtual gateway 212, then processor 110 may determine not to transmit the virtual message object. But

FITBIT 1002
Fitbit v. Immersion

if the transmission characteristic of a virtual message object will carry it through the virtual gateway 212, then processor 110 may transmit the virtual message object. Additionally, processor 110 may determine whether to transmit the virtual message object based, at least in part, on the status of a recipient. For example, if the recipient has turned their mobile device off or disconnected it from the network, processor 110 may determine not to send the virtual message object. In another example, if the status of a recipient's mobile device is set to "hidden," processor 110 may determine not to send the virtual message object.

[0071] If at 314, processor 110 determines that a virtual message object should not be transmitted, then processor 110 may determine a haptic effect associated with a failed transmission 315. For example, after processor 110 determines that a virtual message object should not be sent, it may determine a haptic effect simulating the virtual message object bouncing against the virtual gateway 212 and staying in the virtual message environment 210.

[0072] Then, processor 110 determines a transmission characteristic of the virtual message object based, at least in part, on the sensor signal 316. In one embodiment, the sensor signal is associated with a hurried or forceful gesture, so processor 110 determines a corresponding hurried or forceful transmission characteristic. In another embodiment, a sensor signal may be associated with a gentle or slow gesture; thus, processor 110 may determine a corresponding gentle or slow transmission characteristic.

[0073] In some embodiments, the sensor signal may be associated with an angle of transmission of a virtual message object. For example, a user may move a virtual message object toward the virtual gateway at an angle. In this case, the virtual message object travels through the virtual gateway at an angle; therefore, processor 110 may determine an angular transmission

FITBIT 1002
Fitbit v. Immersion

characteristic. Alternatively, if a user sends a virtual message object straight through the virtual gateway, the processor 110 may determine a straight transmission characteristic

[0074] Finally, the processor 110 transmits the virtual message object and the transmission characteristic of the virtual message object 320. In some embodiments, transmission will occur when the virtual message object passes through the virtual gateway 212. When a virtual message object is sent through the virtual gateway 212, the virtual message object may disappear from the local virtual message environment 210. The disappearance may occur at substantially the same time as the virtual message object is transmitted across a network. If the virtual message object is not successfully transmitted to the recipient, it will remain in the virtual message environment 210. This provides the user with simple information regarding the status of the network connection or the status of the recipient device.

[0075] In one variation, when a virtual message object leaves the virtual message environment 210, processor 110 transmits a haptic signal to an actuator 118 alerting the user that the message has been successfully transmitted. For instance, processor 110 may determine a haptic effect that simulates an arrow hitting a wall.

[0076] Figure 4 is a flow diagram of a method for transmitting haptic messages according to one embodiment of the present invention. Figure 4 shows an embodiment wherein a virtual message object is received by a recipient mobile device.

[0077] In method 400, the recipient device's processor receives a signal associated with a virtual message object 402. The signal may be received from a network interface which is communicatively connected to an external network such as a cellular network, intranet, or the Internet. For example, the signal may have been transmitted across a network by another mobile device connected to that network. The signal associated with the virtual message object

FITBIT 1002
Fitbit v. Immersion

comprises data defining the virtual message object's characteristics. For example the signal may comprise data defining characteristics such as a virtual message object's size, shape, transmission characteristic, data type, and contents.

[0078] Then the recipient device's processor determines a haptic effect based, at least in part, on the transmission characteristic of the virtual message object 406. For example, if the sending mobile device is gently tilted toward a virtual gateway when the virtual message object was sent, then the transmission characteristic may comprise a low speed. The recipient device's processor will then use that transmission characteristic to determine a haptic effect comprising a gentle vibration. The gentle vibration simulates the virtual message object hitting a boundary of the recipient virtual message environment at a low speed. In contrast, a haptic effect based on a high speed transmission characteristic may comprise a strong jolt, to simulate the virtual message object arriving in recipient's virtual message environment at a high speed.

[0079] Finally, the recipient device's processor transmits a haptic signal to an actuator configured to output the haptic effect 408. The actuator will then output a haptic effect based, at least in part, on this signal.

Illustrative Scenarios for Generating and Transmitting Haptic Messages

[0080] Figures 5a and 5b are illustrations of generating haptic message objects according to one embodiment of the present invention. Figure 5a comprises a mobile device 500. A user may generate the virtual message object by placing the mobile device 500 in generate mode. The user then moves the mobile device in a predefined pattern. This motion is detected by the sensor 114 which transmits a sensor signal associated with the motion of the mobile device to the processor 110. Processor 110 will then determine a personal token based at least in part on the sensor signal. For example, a user may wish to define a personal token in the form of a heart. In

FITBIT 1002
Fitbit v. Immersion

order to define this personal token, a user may perform a gesture which moves the mobile device in the shape of a heart 512. This gesture may for example move the mobile device upward and over, then downward at an angle. The gesture may then move the mobile device upward and then over and down at an angle until the mobile device is in substantially the same position as it started. The sensor 114 will then transmit a signal associated with the heart shaped gesture to the processor 110. Based on this gesture, the processor 110 will generate a virtual message object comprising a personal token in the form of a heart 514. In other embodiments, the user may enter virtual message objects of other shapes.

[0081] In some embodiments the user may create a virtual message object with a user defined shape. In such an embodiment, the display 116 may show a spray-paint cant. The user may then press the spray-paint can and move the mobile device in a pattern. The sensors 114 may detect this motion and transmit a sensor signal corresponding to the motion to processor 110. Based on the received signal the processor 110 will generate a virtual message object substantially corresponding to the shape of the detected movement. In some embodiments, a user may move the mobile device in a pattern substantially approximating letters. In such an embodiment, the processor 110 may generate text which corresponding the letters. The user may then append this text to a virtual message object.

[0082] Figure 6 is an illustration of generating a haptic message according to one embodiment of the present invention. Figure 6 shows mobile device 600. Mobile device 600 comprises a virtual message environment 612 which is displayed on touch screen display 610. The virtual message environment comprises a virtual message object 614 in the shape of a heart. The virtual message object 614 comprises a personal token which will exhibit the same characteristics on a recipient's mobile device as it exhibits on the sender's mobile device.

FITBIT 1002
Fitbit v. Immersion

[0083] The virtual message object may comprise animation and a haptic effect. For example, a virtual message object in the form of a heart may be animated to appear to be beating or thuobbing. Arrow 618 shows lines which represent a haptic effect associated with the virtual message object. The virtual message object may further comprise a beating or throbbing haptic effect to representative of a beating heart.

[0084] Arrow 620 shows a finger touching the virtual message object. When the user interacts with the virtual message object, the touch-screen display 610 detects the user interaction and transmits a signal associated with the user interaction to the processor 110. Based on the received signal, the processor 110 may calculate a transmission characteristic of the virtual message object. For example a user may flick the virtual message object toward the virtual gateway, causing the mobile device to send the virtual message object. In another embodiment, the mobile device may use the microphone to detect a user interaction with the virtual message object. For example the microphone may detect that the user has blown into the mobile device. The microphone may then transmit a signal to the processor 110 associated with the user blowing into the microphone. Based on this signal, the processor 110 may determine a transmission characteristic of the virtual message object. For example the processor 110 may determine a transmission characteristic associated with a sender blowing a kiss to a recipient.

[0085] Figure 7 is an illustration of generating a haptic message according to one embodiment of the present invention. Prior to sending the message, the user may define additional characteristics of the personal token. Figure 7 shows a mobile device 700 after the user has double clicked the personal token 714. When the user double taps the personal token 714, a virtual keyboard 712 appears on touch-screen display 710. The user may then type a short message and click a button associated with a submission to append the message to the personal

FITBIT 1002
Fitbit v. Immersion

token 714. For example, arrow 716 shows that the user has entered the message "I miss you!" to the personal token 716. In other embodiments, the virtual keyboard 712 may comprise an old fashioned typewriter. In such an embodiment the processor 110 may transmit audio and haptic signals corresponding to the clanging keys of the typewriter. Actuator 118 and Speaker 120 may receive these signals and output corresponding haptic and audio effects.

[0086] Figures 8a and 8b are illustrations of deleting a haptic message according to one embodiment of the present invention. A user may decide not to send a personal token and instead to delete it. Figure 8a shows mobile device 800, which comprises a touch-screen 810. Touch-screen 810 comprises a personal token 812 in the form of a heart. The user has decided to delete personal token 812. Thus, the user moves their finger over touch-screen display 810 in an X-pattern 814. Touch-screen display 810 detects this interaction and transmits a signal associated with the X-Pattern to processor 110. Based at least in part on this signal, processor 110 determines that the personal token 812 should be deleted. Thus, processor 110 removes the personal token from display 810.

[0087] Figure 8b shows mobile device 800 comprising touch-screen display 810 a short time after the user has deleted the personal token. The processor 110 may remove the personal token from display 810 in a variety of ways. For example, in one embodiment, processor 110 may remove the personal token by causing it to slowly fade off touch-screen 810. In another embodiment, processor 110 may remove the personal token by causing it to pop and quickly disappear from touch-screen 810. In some embodiments, processor 110 will calculate a haptic effect associated with the removal of personal token 812. Processor 110 will then transmit a signal associated with the haptic effect to actuator 118, which then outputs the haptic effect.

Illustrative Method for Generating and Transmitting Haptic Messages

FITBIT 1002
Fitbit v. Immersion

[0088] Figure 9 is a flow chart illustrating a process of generating and transmitting a haptic message according to one embodiment of the present invention.

[0089] The method 900 begins when the processor 110 receives a sensor signal in response to a user interaction 902. The user interaction may be a user moving the mobile device 102 in a predefined pattern. The predefined pattern may be, for example, moving the mobile device 102 in a heart shaped pattern.

[0090] Next, the processor 110 determines that the user indicated a personal token, based at least in part on the sensor signal 904. A personal token may be a virtual message object comprising a personal message. The virtual message object exhibits the same characteristics in a recipient's mobile device as in the sender's mobile device. In one embodiment, the personal token has a shape that visually reflects the interaction associated with the received sensor signal. For example if the sensor signal is associated the motion of the device that substantially corresponds to the shape of a heart, the personal token may take the form of a heart.

[0091] Then, the processor 110 receives a sensor signal associated with a gesture from a touch-sensitive interface 906. In one embodiment the touch-sensitive interface may be a touch-screen display. In other embodiments the touch-sensitive interface may be a trackball or push-button. In some embodiments, the gesture may comprise a double-tap on a button displayed on the touch-screen display.

[0092] Next, the processor 110 causes the display 116 to display a user interface 908. In one embodiment, the user interface may be for example a virtual keyboard for text entry. In other embodiments, the user interface may provide an element for adjusting the color or haptic feedback associated with a personal token.

FITBIT 1002
Fitbit v. Immersion

[0093] Then, the processor 110 receives user input entered via the user interface 910. In one embodiment, the user inputs text on a virtual keyboard For example, the user may type a short text message associated with the personal token. In other embodiments, the user input may include a color, shape, or specific haptic feedback associated with the personal token.

[0094] Then, the processor 110 causes the display 116 to change based at least in part on the user input 912. In one embodiment, processor 110 may change the display 116 to show a textbox comprising text that the user entered. In other embodiments, processor 110 may change the display 116 by altering the shape, color, or other characteristics of the personal token. For example, in one embodiment, the user enters a text message associated with a personal token in the shape of a heart. When the processor 110 associates the text message with the heart, the processor 110 causes the heart to begin beating.

[0095] Next, the processor 110 generates a haptic signal based on the personal token and on the user input 914. In one embodiment, for example, the personal token may be in the form of a heart. In this embodiment, the haptic signal may correspond to a beating or throbbing heart. In other embodiments, the haptic signal may be associated with another interaction of the personal token. For example the haptic signal may be based on a particular haptic effect that a user has associated with a message, such as a vibration or clicking; or the haptic signal may be based on some other parameter, such as the color of a personal token.

[0096] Next, the processor 110 receives a microphone input associated with a user blowing into the microphone 916. For example, in one embodiment a user may blow on a microphone incorporated into the mobile device 102. In another embodiment, a user may blow at a region of the device, or in the direction of the whole device. In all of these examples, the

FITBIT 1002
Fitbit v. Immersion

user's breath is detected by the microphone, and the microphone then transmits a signal to the processor 110 associated with the user's blowing.

[0097] In response, the processor 110 sends the message including the personal token via the virtual gateway 918. For example, in an embodiment in which the personal token is a heart, the user blows on the microphone as if blowing a kiss. In response, processor 110 causing the message to be transmitted to the intended recipient. In another embodiment, the processor 110 transmits a personal token after applying a virtual force to the token. In such an embodiment, the virtual force carried the virtual message object through a virtual gateway. In such an embodiment, the processor 110 may have determined the virtual force based at least in part on a sensor signal associated with a user flicking the touch-screen display.

[0098] Figure 10 is a flow chart illustrating a process of generating and transmitting a haptic message according to one embodiment of the present invention. Process 1000 begins when processor 110 receives a message including a personal token 1002.

[0099] Next, the processor 110 receives a user input indicating selection of the message 1004. In one embodiment, a touch-screen display may detect the user input, while in other embodiments a track ball 122 may detect the user input. In some embodiments the user input may comprise a tapping or double-tapping of the message. Or, in other embodiments the user input may comprise tilting or otherwise manipulating the mobile device 102.

[00100] Then, processor 110 causes display 116 to display a user interface 1006. In some embodiments, the user interface is a virtual keyboard for entering text. In such an embodiment, the keyboard may appear as a QWERTY keyboard. In other embodiments the keyboard may appear as an old-fashioned typewriter, and the mobile device may output audio and haptic effects corresponding to the clanging keys of the typewriter when the user enters text. In some

FITBIT 1002
Fitbit v. Immersion

embodiments, the user interface may be a text pad on which the user can write using a touch-screen display. For example, a user may use their finger to write their signature on the touch-screen display. In such an embodiment, the user may also assign a haptic effect associated with their signature. For example, a user may create a virtual signature which comprises their written signature and a haptic effect approximating a basketball bouncing on a court. The haptic effect may also be derived from the signature itself, i.e., the attributes of the writing (strokes, loops, etc.) may be translated to substantially similar haptic effect parameters (intensity, duration, periodicity, etc.) In other embodiments, the user interface may be an interface for modifying other characteristics of the personal token. For example the interface may enable a user to modify the shape, color, or haptic effect associated with the personal token.

[00101] Next, the processor 110 receives a user input 1008. In some embodiments a touch-screen display may receive the user input. For example, the user may enter text on the touch-screen display. In other embodiments, the user input may be received by other sensors within the device. For example, the user may enter input by tilting or otherwise manipulating the mobile device.

[00102] Then, processor 110 receives a sensor signal indicating that the user has tilted the mobile device 1010. In some embodiments a gyroscope, an accelerometer, a GPS, or other sensor capable of detecting movement transmits the sensor signal to the processor 110. For example, a gyroscope may determine that the user has tilted the mobile device to a 45-degree angle, and transmit a signal associated with that amount of tilt to the processor 110.

[00103] Then, the processor 110 sends the message via the messaging gateway 1012. In some embodiments, the messaging gateway will appear at the top of the display and comprise an

FITBIT 1002
Fitbit v. Immersion

indication of the intended recipient. In such an embodiment, a message is sent when a virtual representation of the message travels through the messaging gateway.

[00104] In some embodiments of transmitting haptic messages, a user may wish to send a pre-written form message to a recipient. Figures 11a and 11b are illustrations of generating a haptic message according to one embodiment of the present invention. Figure 11a comprises mobile device 1100. A user may generate the virtual message object by placing the mobile device 1100 in a mode for generating a virtual message object. The user then moves the mobile device in a predefined pattern. This motion is detected by the sensor 114 which transmits a sensor signal associated with the motion of the mobile device to the processor 110. Processor 110 will then determine a virtual message object based at least in part on the sensor signal.

[00105] In some embodiments the processor 110 may determine that the motion is associated with a predefined virtual message object that comprises a business token. A business token is a business-related virtual message object that exhibits the same or substantially the same characteristics in a recipient's virtual message environment as it does in the sender's virtual message environment. For example, a predefined business token may take the form of a nail, and include the text and/or audio message, "You nailed it!" The business token may further comprise a haptic effect associated with the hammering of a nail. A recipient of the business token will feel this haptic effect when the business token arrives in their mobile device. Such an embodiment may provide the sender with the ability to provide a tangible response to a message.

[00106] In order to send the business token, a user may perform a gesture which moves the mobile device in a pre-defined pattern. For example a user may move the mobile device 102 up and down, simulating swinging a hammer 1110. Sensor 114 may detect the gesture and transmit an associated signal to processor 110. Processor 110 then determines whether the

FITBIT 1002
Fitbit v. Immersion

gesture matches the pre-defined pattern for the virtual nail business token. And based on the gesture, processor 110 will generate a business token 1130 on the display 1120, as shown in Figure 11b. In some embodiments, processor 110 may determine a haptic effect associated with the virtual nail. Processor 110 will then output the haptic signal to actuator 118, which outputs the haptic effect. In some embodiments processor 110 waits for an indicative user interaction to send the business token. In other embodiments, the processor 110 generates the business token and then automatically sends it.

[00107] Figures 12a and 12b are illustrations of transmitting a haptic message according to one embodiment of the present invention. Figures 12a and 12b comprise mobile device 1200, which has just received a business token in the form of a virtual nail. Device 1200 comprises a display 1210 which comprises the recently received business token 1220. In some embodiments, upon receipt of the business token, mobile device 1200 may output a haptic effect associated with the business token. In one such embodiment, the haptic effect may approximate the pounding of a nail. In other embodiments, the mobile device may output another haptic effect. In yet another embodiment, the mobile device may not output a haptic effect

[00108] In Figure 12b, the mobile device 1200 comprises a touch-screen display 1210. The touch-screen display comprises a business token 1220. When the user interacts with the business token 1220, the touch-screen transmits a signal associated with the user interaction to processor 110. Based at least in part on this signal, processor 110 displays a message associated with the business token to the user. In the embodiment shown in Figure 12b, the text associated with the virtual nail business token is "You nailed it!" 1230. In other embodiments, the user may define different text to associate with the business token.

FITBIT 1002
Fitbit v. Immersion

[00109] Figure 13 is a flow chart for a process for generating and transmitting a haptic message according to one embodiment of the present invention. Figure 13 shows process 1300, which begins when processor 110 receives at least one sensor signal from at least one sensor 114 of a mobile device, the at least one sensor signal associated with a movement of the mobile device 1302. In some embodiments, the sensor 114 may comprise an accelerometer, a GPS, or other sensor capable of detecting movement. The movement may comprise any gesture which the sensor 114 is capable of detecting. For example, in some embodiments, the movement comprises a movement approximating the shape of a heart. In other embodiments, the movement comprises a movement approximating a hammering gesture. In still other embodiments the movement may approximate tossing a rope.

[00110] Then, processor 110 determines a token to be displayed in a user interface based at least in part on the at least one sensor signal 1304. The token takes a shape related to the movement of the mobile device. In some embodiments the token may take the shape of a nail or a heart. In other embodiments, the token is in another shape, such as a balloon, bubble, rope or dart.

[00111] Next, the processor 110 causes the token to be displayed 1306. The token is displayed in a display 116 of the mobile device. In some embodiments, display 116 may further comprise a graphical user interface. In such an embodiment, display 116 may show the token in the graphical user interface. In further embodiments one or more additional tokens may also appear along with the token in the graphical user interface.

[00112] Then, a sensor 114 detects a user interaction with the token 1308. In some embodiments, the sensor 114 may be a touch-screen display. In other embodiments the sensor 114 may be a track-ball 122. In still other embodiments, the sensor 114 may be a motion sensor

FITBIT 1002
Fitbit v. Immersion

such as an accelerometer, gyroscope, or GPS. In some embodiments, the user interaction comprises a single tap or a double-tap on the surface of the token. In other embodiments, the user interaction may comprise tilting or shaking the mobile device 102. In such an embodiment, the processor 110 may apply a virtual force to the virtual message object in response to the detected interaction. In still other embodiments, the sensor 114 may comprise a microphone. In such an embodiment, the user interaction may comprise blowing on the microphone. In such an embodiment, the processor 110 may apply a force to the token simulating the effects of the user blowing on the token. For example, in one embodiment, a token may be in the form of a bubble. When the user blows on the microphone, the processor 110 may determine a force acting on the bubble which simulates the user blowing a bubble to the recipient.

[00113] Finally, the processor 110 transmits a signal associated with the token to a recipient 1310. In some embodiments, the processor 110 may transmit the signal via network interface 112. In some embodiments, the mobile device may comprise a graphical user interface comprising a messaging gateway. In some embodiment, the messaging gateway may comprise information identifying the recipient. In some embodiments, after the processor 110 transmits a signal associated the token, the processor 110 removes the token from the display 116.

Transmitting Haptic Messages Using a Real-Time Link

[00114] When using a mobile device 102, a user may wish to interact with another user in real-time. One embodiment of the present invention provides the capability for users to transmit haptic messages over a real-time link. For example, in one embodiment, a first user can interact with a touch-screen of the mobile device 102. The interaction causes an object on the touch-screen to be modified. For example, the touch-screen may be blank, and as the user interacts with the screen, the processor 110 generates a line tracking the user's movements across the

FITBIT 1002
Fitbit v. Immersion

touch-screen. In such an embodiment, the line may substantially follow the point of contact between the user and the touch screen.

[00115] In such an embodiment, the changes to the first user's touch-screen are substantially simultaneously duplicated on the touch-screen of a second user's mobile device. The second user can similarly drag a finger over the touch-screen of the second user's device. The second user's interactions are subsequently tracked by a second line that is present on both the first user's touch-screen and the second user's touch screen.

[00116] In such an embodiment, when the two lines touch or overlap, a touch or collision is detected by the processors on the first and second mobile devices. And in response, both devices output a haptic effect indicating the interaction. In such an embodiment, the two users can touch one another in real time via haptic messaging.

[00117] In another embodiment, a user may modify a message or other object displayed on the screen of the sending device, and at substantially the same time, the message or object is modified on the recipient's device. The changes to the messages or objects may go beyond text updates and comprise changes to virtual properties of the objects, haptic effects associated with the objects, or other changes. In this way a user can use a mobile device to send real-time haptic messages.

[00118] For example, in some embodiments, two linked mobile devices each comprise a touch-screen display. In such an embodiment, the users of each device draw images on their respective mobile devices and their output is displayed on the recipient's device in substantially real-time. In one embodiment, if the sender's and recipient's fingers crossed the same relative location on their respective touch-screen displays, the mobile devices would each output audio and haptic effects associated with a collision or touching.

FITBIT 1002
Fitbit v. Immersion

[00119] In another embodiment, the users may interact with an image that is simultaneously displayed on both users mobile devices. In such an embodiment, the users could simultaneously modify the image. The modifications would appear on both mobile devices substantially simultaneously. For example, one user could use their touch-screen to draw features on an image displayed on both mobile devices. In such an embodiment, for example, a user could crop the image, while the other user watches the cropping occur. In a further embodiment, a user could draw a comical mustache on an image, while the other user watches. This embodiment could be used for editing, or simply to entertain both users Such an embodiment may be further used while both users are connected via a telephone call or other audio link.

[00120] In another embodiment, the mobile device generates a direct haptic link to another mobile device to play a game. For example, the users could play a game of virtual tennis. In such a game, a user could flick a tennis ball to a recipient via their touch screen. The recipient could then flick the tennis ball back to the sender. In such an embodiment, the tennis ball may further comprise a haptic effect that represents the force with which the user hit the ball. In such an embodiment the users could also carry on a conversation via a telephone or other audio link available through the mobile devices. The game could be used to fill awkward pauses in conversation and provide a sense of shared space between the users.

[00121] In another embodiment, while in a call or chat, one user may transmit virtual message to a recipient. The recipient may modify these objects and transmit them back. Such an embodiment may add ambient affects to the conversation, and serve to fill silence, or set the mood of the conversation. These objects may further serve to allow the users to work together to create a virtual message object that comprises a separate document. For example, two users may

FITBIT 1002
Fitbit v. Immersion

send a virtual message object comprising a text document. Each user may edit the document, and send the draft to the other user for review.

[00122] In one embodiment, a user may wish transmit a haptic gesture associated with a champagne toast to a recipient. The user may make a pouring gesture with their mobile device. A sensor 114 of the mobile device may detect the pouring gesture. The sensor 114 transmits a signal to the processor 110 associated with the tilting of the mobile device, Processor 110 may then determine that the user is attempting to send a champagne toast. Thus, the processor 110 transmits a signal to the display which causes the display to output an image of a champagne bottle. The processor 110 may further output an audio signal associated with the pouring of champagne to the speakers. Additionally, the processor 110 may output a haptic signal to an actuator associated with the pouring of champagne. The actuator may then output a haptic signal associated with the pouring of champagne.

[00123] Figure 14 shows two mobile devices, 1400 and 1450. Mobile device 1400 is the sending mobile device, and mobile device 1450 is the receiving mobile device. Each of mobile devices 1400 and 1450 comprise a display 1410 which comprises a virtual message object in the form of a glass of champagne 1420. When a user titles either mobile device, a motion sensor 114 such as an accelerometer, gyroscope, or GPS determines that the user has tilted the mobile device and transmits a signal to processor 110 associated with the tilting. Processor 110 then calculates a virtual force representing gravity which is applied to the virtual champagne 1420. The force of gravity causes the champagne to shift within the glass as shown in both devices 1400 and 1450. In some embodiments, when the mobile device shifts, processor 110 determines a haptic effect associated with the shifting champagne. The processor 110 then transmits a signal associated with the determined haptic effect to actuator 118 which outputs the haptic effect.

FITBIT 1002
Fitbit v. Immersion

[00124] Using signals from the sensor 114, the processor 110 determines the location of each of mobile devices 1400 and 1450 in relation to each other. Processor 110 uses the signal to determine if both users have raised their glasses at substantially the same time. If both devices 1400 and 1450 are raised at the same time, processor 110 will determine that a toast is occurring and determine audio and haptic affects associated with the clinking the results when two glasses collide. The processor 110 then transmit signals associated with audio and haptic effects to actuator 118 and speaker 120. Actuator 118 and speaker 120 may then output the determined haptic effect. In some embodiments, this effect may be gentle clink as though two crystal glasses have touched each other. In other embodiments, the haptic effect may be a thud associated with two heavy beer steins slamming into each other.

[00125] Figure 15 is a flow chart illustrating a process of transmitting a haptic message according to one embodiment of the present invention. Process 1500 begins when a sensor 114 detects a user input indicating a pouring gesture 1502. In some embodiments, the sensor 114 may comprise an accelerometer, gyroscope, GPS or other sensor capable of sensing motion. In some embodiments a user gesture indicating a pouring gesture may comprise tilting the mobile device to a predetermined angle.

[00126] Then, the processor 110 transmits a signal to the display which causes the display 116 to display a champagne bottle 1504. In some embodiments, rather than a bottle of champagne, a bottle of beer or another beverage may appear. In other embodiments, a glass comprising a beverage may appear in place of the bottle.

[00127] Next, an actuator and a speaker output effects associated with the opening of a bottle 1506. In some embodiments, the audio and haptic effects may be effects associated with a

FITBIT 1002
Fitbit v. Immersion

cork popping. In other embodiments, the effects may be associated with the pouring of a beverage.

[00128] Then, a sensor 114 receives a user input that the pouring is completed 1508. In some embodiments, the sensor 114 may be an accelerometer, gyroscope, GPS or other sensor capable of sensing motion. In other embodiments, the sensor 114 may be a touch-screen or a track-ball 122. In some embodiments, the user input may comprise tilting the mobile device. In other embodiments the user input may comprise a gesture on the touch-screen display or a gesture made with the track-ball 122.

[00129] Next, the processor 110 transmits a signal to the display which causes the display to show a champagne glass 1510. In some embodiments the signal may cause the display to show a beer stein or other glass. In other embodiments, the signal may cause the display to show a bottle associated with some other type of beverage.

[00130] Then, a sensor 114 receives an input indicating the touching of glasses 1512. In some embodiments, the sensor 114 may be an accelerometer, gyroscope, GPS or other sensor capable of sensing motion. In other embodiments, the sensor 114 may be a touch-screen or a track-ball 122. In some embodiments the input may comprise raising the mobile device as though it is a glass of champagne in a toast. In other embodiments the input may be a gesture made on the touch-screen display.

[00131] Next, the processor 110 transmits a signal to the display, actuator and speakers associated with a toast 1514. In some embodiments the signal may comprise a visual signal associated with glasses touching, and audio and haptic signals associated with the light clink of two crystal glasses. In other embodiments the effects may be associated with different types of

FITBIT 1002
Fitbit v. Immersion

glassware. For example, the signal may comprise a visual signal associated with two heavy beer steins, and audio and haptic signals associated with heavy glasses impacting each other.

[00132] In one embodiment, a user may establish a direct virtual connection between two mobile devices by connecting both devices with a virtual rope. Devices mimicking the behavior of a real rope may cause vibrations that are reminiscent of those emitted by ropes when they are slackened and taught with tugging gestures.

[00133] Figures 16a, 16b, and 16c are illustrations of transmitting haptic messages according to one embodiment of the present invention. In Figure 16a, a mobile device 1600 is in communication with mobile device 1602. Each mobile device comprises a display 1604. Initially, mobile device 1602 comprises one end of a tug rope 1606, the rope attached to a pull or tug at one end, and unattached at the other end. Mobile device 1600 initially comprises an empty anchor. In order to initiate a connection, a user of mobile device 1600 may toss one end of the rope toward another user. For example, in one embodiment, the user may open a virtual gateway to the recipient mobile device, and flick the end of the rope in the direction of the virtual gateway. In another embodiment, the user may throw the rope by jerking the entire mobile device in the direction of the virtual gateway. The virtual tug rope may span the entire virtual space between the two devices, and ultimately arrive at mobile device 1600. In some scenarios, the virtual rope may not be able to span the length of the virtual space between the devices. For example, the mobile device 1600 may be too far way (such as in a different area code, state, or country) for the virtual rope to arrive. Alternatively, a user of the a mobile device may update a status such that certain virtual objects are automatically blocked.

[00134] When the rope appears on the display of mobile device 1600, the mobile device may generate a haptic and/or sound effect mimicking a rope landing in the virtual environment

FITBIT 1002
Fitbit v. Immersion

of the mobile device. Through such non-visual cues, mobile device 1600 may alert the user that a virtual tug rope has been tossed in their direction, without the user being required to look at the mobile device.

[00135] The user of the mobile device 1600 may catch the virtual tug rope. In some embodiments, the user may catch the tug rope by moving the mobile device in a catching gesture, such as a quick twirl of the communication device, or by pressing a specific button. In some embodiments, if the user of mobile device 1600 is not paying attention, they will not catch the rope and establish the connection. When the rope is not caught by a receiving device, the sending user may tug the virtual rope to have it come flying back into their mobile device, indicating that the connection has not been established. However, if the receiving user does see, feel and/or hear the rope arrive, they may catch the rope and secure it to their device.

[00136] In Figure 16b, the user of mobile device 1600 has caught the virtual tug rope 1606 sent be mobile device 1602. And the user has secured virtual tug rope 1606 to a virtual anchor 1608. The users of mobile devices 1600 and 1602 now share the same virtual physical object which spans across their shared virtual physical space.

[00137] In Figure 16c, the user of mobile device 1602 may yank or tug on the virtual tug rope, which may cause mobile device 1600 to generate a haptic effect mimicking the results of a taught rope 1610 pulling on anchor 1612. In response the user of mobile device 1600 may tug on the rope, which may cause mobile device to generate a haptic effect corresponding to the taught rope 1610 pulling on anchor 1614.

[00138] In other embodiment of the present invention, a user may form a real-time link to transmit information in a format other than a message. Figure 17 is an illustration of transmitting haptic messages according to one embodiment of the present invention. As shown in Figure 17,

FITBIT 1002
Fitbit v. Immersion

a mobile device 1700 comprises a display 1702. Display 1702 comprises a haptic contact list 1704. Each contact comprises a name and a haptic status shown in a haptic window. In one embodiment, when a user of mobile device 1700 touches the haptic status window of a contact, the user may feel a haptic effect corresponding to the status of the person listed in the haptic contact list. In a further embodiment, the mobile device may transmit a signal to the mobile device of the person listed in the haptic contact list. The signal may comprise a haptic signal to alert the person in the haptic contact list that someone is interested in their status. For example, while a first user swipes their finger across a second user's contact entry, the first user feels the second user's status. At the same time, the swipe gesture by the first user is transmitted to the second user's device, which may generate a haptic effect perceptually equivalent or similar to the duration and intensity of the finger swipe. In another embodiment, the first user may tap repeatedly on the second user's contact list entry, mimicking knocking on a door or window, which transmits a haptic, audio, and visual knocking effect to the second user, serving as an invitation to initiate a communication session.

[00139] In another embodiment, as the user moves mobile device 1700, the mobile device's processor 110 may determine a motion profile based at least in part on sensor signals received from a sensor 114. In some embodiments the sensor 114 may comprise a GPS sensor, accelerometer, or other sensor capable of detecting movement or location. Then, the processor 110 may transmit the user's motion profile to other mobile devices which list the user in their haptic contact list. The contact list on each communications device may be updated with the user's motion profile in real-time, so that a user may be able to determine the current activity of a person on their contact list by looking at their haptic status window.

FITBIT 1002
Fitbit v. Immersion

[00140] In Figure 1700, the haptic status of the first contact, David, is shown as a jumbled display of dots with no particular pattern 1706. This may indicate that David's communication device is in motion, possibly indicating that David is walking. The haptic status of the second contact, Remy, is represented as a stable, horizontal line 1708. This may indicate that Remy is sitting still, or alternatively, that the mobile device has been laid flat on a table. The haptic status of the third contact, Chris, is represented as a relatively flat vertical line 1710. This may indicate that Chris is holding the mobile device in an upright position. In some embodiments, the haptic status of each contact may be deliberately vague, so as to provide some privacy to each user while providing other users some information regarding their status.

[00141] Although Figure 17 depicts the contact list with several entries on a single page, other variations are possible. For instance, each contact may have their own dedicated page, screen, or virtual object. Zooming in on an individual contact may provide the user with a more accurate view of that contact's status. Although haptic contact list 1704 depicts each contact's status as a box full of balls, other methods for displaying status may be utilized. For instance, the haptic inbox may use icons such as a heart representing fast movement, a sleeping icon representing no movement, or other graphics to provide status information for each contact.

[00142] Figure 18 is a flow chart illustrating a process of transmitting haptic messages according to one embodiment of the present invention. Process 1800 begins when processor 110 receives a first sensor signal from a first sensor 114, the first sensor signal associated with a movement of the mobile device 1802. In some embodiments, the sensor 114 may be an accelerometer, gyroscope, GPS or other sensor capable of sensing motion. In some embodiments, the user gesture may comprise moving the mobile device in a predefined pattern. For example, in one embodiment the user gesture may comprise tilting the mobile device like a

FITBIT 1002
Fitbit v. Immersion

champagne bottle. In another example, the user gesture may comprise a movement substantially approximating the shape of a heart. In another embodiment, the user gesture may comprise pounding the mobile device like a hammer. In still another embodiment, the user gesture may comprise tossing or flipping a rope.

[00143] Next, processor 110 receives a second sensor signal from a touch-sensitive interface of the first mobile device, the second sensor signal associated with a user interaction 1804. In some embodiments, display 116 may comprise a touch-sensitive interface such as a touch-screen display. In other embodiments, the touch-sensitive interface may comprise track-ball 122. In some embodiments, the user interaction may comprise a user interaction with a graphical user interface shown on display 116. In such an embodiment, the user interaction may comprise double-tapping a portion of the graphical user interface. In another embodiment, the user interaction may comprise entering text which is appended to a virtual message object. In other embodiments, the user interaction may comprise finger painting on the surface of the touch-screen display.

[00144] Then, processor 110 determines a change in a display 116 of the first mobile device, based at least in part on the second sensor signal 1806. In some embodiments, the change may comprise displaying a trail which follows the user's finger as it moves across the surface of the touch-screen display. In other embodiments, the change in the display may comprise modifying a virtual object on the display. For example, the display may comprise an image, and the user interaction may comprise modifications to the image. In other embodiments, the change in the display may comprise displaying a new virtual object, such as bubbles, a heart, a nail, a rope, or a champagne bottle.

FITBIT 1002
Fitbit v. Immersion

[00145] Next, the processor 110 transmits a first data signal to a second mobile device, the first data signal comprising data associated with the user interaction and the movement of the first mobile device 1808. In some embodiments, processor 110 may transmit the data signal via network interface 112. In some embodiments, the processor 110 transmits the first data signal substantially simultaneously to receiving user input via the touch-sensitive interface. In other embodiments, the processor 110 does not transmit the data signal until receiving a user interaction indicating the processor 110 should transmit.

[00146] Then, the processor 110 receives a second data signal from the second mobile device 1810. In some embodiments, the processor 110 may receive the data signal from network interface 112. In some embodiments, the processor 110 transmits data signals to the second mobile device, and substantially simultaneously receives a signal from the second mobile device. In some embodiments, the second data signal comprises data corresponding to a user interaction with a touch-sensitive interface with the second mobile device.

[00147] Next, processor 110 determines a second change in the display of the first mobile device based at least in part on the second data signal 1812. In some embodiments, the received data may correspond to a change on the display of the second mobile device. In such an embodiment, the change to the display of the first mobile device determined by processor 110 may correspond to the change in the display of the second mobile device. For example, the user of the second mobile device may move their finger across the second mobile device to draw a picture. The second mobile device may then transmit a corresponding second signal to the first mobile device. The processor 110 of the first mobile device may then modify its display in a way that substantially correspond to the display of the second mobile device. In another embodiment, the user of the second mobile device may modify a picture on their touch-screen

FITBIT 1002
Fitbit v. Immersion

display. In such an embodiment, the second user's modifications will appear substantially simultaneously on the display of the first mobile device.

[00148] Then, processor 110 determines a haptic effect based at least in part on the second data signal 1814. For example, in one embodiment the second data signal may comprise information to corresponding to the user of the second mobile device tapping the surface of the second mobile device. In such an embodiment, the processor 110 may determine a haptic effect corresponding to the tapping. In another example, a user interaction with the first mobile device may cross substantially the same position as the second user's interaction with the second mobile device. In such an embodiment, the determined haptic effect may substantially correspond to an impact between the user of the first and the second mobile device. In another embodiment the second data signal may correspond to opening a virtual bottle on the second mobile device. In such an embodiment the determined haptic effect may correspond to a cork popping on the bottle.

[00149] Finally, the processor 110 transmits a haptic signal associated with the haptic effect to an actuator 118 configured to output the haptic effect. In some embodiments Actuator 118 may be, for example, a piezoelectric actuator, an electric motor, an electro-magnetic actuator, a voice coil, a linear resonant actuator, a shape memory alloy, an electro-active polymer, a solenoid, an eccentric rotating mass motor (ERM) or a linear resonant actuator (LRA).

Computer Readable Medium for Transmitting haptic messages

[00150] Embodiments of the present invention can be implemented in digital electronic circuitry, or in computer hardware, firmware, software, or in combinations of these technologies. In one embodiment, a computer may comprise a processor or processors. The processor

FITBIT 1002
Fitbit v. Immersion

comprises a computer-readable medium, such as a random access memory (RAM) coupled with the processor. The processor executes computer-executable program instructions stored in memory, such as executing one or more computer programs for messaging. Such processors may comprise a microprocessor, a digital signal processor (DSP), an application-specific integrated circuit (ASIC), field programmable gate arrays (FPGAs), and state machines. Such processors may further comprise programmable electronic devices such as PLCs, programmable interrupt controllers (PICs), programmable logic devices (PLDs), programmable read-only memories (PROMs), electronically programmable read-only memories (EPROMs or EEPROMs), or other similar devices.

[00151] Such processors may comprise or be in communication with media, for example computer-readable media, which stores instructions that, when executed by the processor, cause the processor to perform the steps described herein as carried out or facilitated by a processor. Embodiments of computer-readable media may comprise, but are not limited to, an electronic, optical, magnetic, or other storage or transmission device capable of providing a processor, such as the processor in a web server, with computer-readable instructions. Other examples of media comprise, but are not limited to, a floppy disk, CD-ROM, magnetic disk, memory chip, ROM, RAM, ASIC, configured processor, all optical media, all magnetic tape or other magnetic media, or any other medium from which a computer processor can read. Also, various other devices may include computer-readable media, such as a router, private or public network, or other transmission device. The processor and the processing described may be in one or more structures and may be dispersed through one or more structures. The processor may comprise a code for carrying out one or more of the methods (or parts of methods) described herein.

FITBIT 1002
Fitbit v. Immersion

General

[00152] The foregoing description of the embodiments, including preferred embodiments, of the invention has been presented only for the purpose of illustration and description and is not intended to be exhaustive nor to limit the invention to the precise forms disclosed. Numerous modifications and adaptations thereof will be apparent to those skilled in the art without departing from the spirit and scope of the invention.

FITBIT 1002
Fitbit v. Immersion

CLAIMS

That which is claimed is:

1. A method comprising:

receiving at least one sensor signal from at least one sensor of a mobile device, the at least one sensor signal associated with a movement of the mobile device;

determining a message to be displayed in a user interface based at least in part on the at least one sensor signal; and

causing the message to be displayed.

2. The method of claim 1, wherein the at least one sensor comprises one or more of: an accelerometer, a gyroscope, a touch-sensitive input device, a camera, or a GPS sensor.

3. The method of claim 1, wherein the at least one sensor comprises a plurality of sensors.

4. The method of claim 3, wherein a first sensor of the plurality of sensors comprises an accelerometer and a second sensor of the plurality of sensors comprises a touch-screen.

5. The method of claim 1, wherein the message comprises predefined characteristics.

6. The method of claim 5, wherein the predefined characteristics comprise: a shape and a haptic effect.

FITBIT 1002
Fitbit v. Immersion

7. The method of claim 1, wherein:

the movement of the mobile device comprises a movement approximating the shape of a heart; and

the message is in the form of a heart.

8. The method of claim 1, wherein:

the movement of the mobile device comprises a movement approximating a hammering motion; and

the message is in the form of a nail.

9. The method of claim 1, further comprising detecting a user interaction associated with the message.

10. The method of claim 9, wherein the interaction comprises an input on a touch-sensitive input device of the mobile device.

11. The method of claim 9, wherein the interaction comprises tilting the mobile device.

12. The method of claim 9, wherein the interaction comprises an input detected by a microphone of the mobile device.

13. The method of claim 12, wherein the interaction comprises blowing on the microphone.

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Fitbit v. Immersion

14. The method of claim 9, further comprising transmitting a signal associated with the message to a recipient.

15. A method comprising:

receiving a first sensor signal from a first sensor, the first sensor signal associated with a movement of a first mobile device;

receiving a second sensor signal from a touch-sensitive interface of the first mobile device, the second sensor signal associated with a user interaction;

determining a change in a display of the first mobile device based at least in part on the second sensor signal; and

transmitting a first data signal to a second mobile device, the first data signal comprising data associated with the user interaction and the movement of the first mobile device.

16. The method of claim 15, wherein the touch-sensitive interface comprises a touch-screen display.

17. The method of claim 15, wherein the determining a change in the display of the first mobile device and the transmitting a data signal to a second mobile device occur substantially simultaneously.

18. The method of claim 15, wherein the change in the display of the first mobile device comprises displaying a trail substantially following the location of a point of contact between the user and the device.

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19. The method of claim 15, wherein the movement of the first mobile device comprises a movement substantially approximating a pouring gesture.

20. The method of claim 19, wherein the change in the display comprises displaying a champagne bottle.

21. The method of claim 15, further comprising:

receiving a second data signal from the second mobile device;

determining a second change in the display of the first mobile device based at least in part on the second data signal.

22. The method of claim 21, wherein the second data signal comprises data corresponding to a display of the second mobile device.

23. The method of claim 21, wherein the change in the display of the first mobile device comprises outputting an image substantially the same as the display of the second mobile device.

24. The method of claim 21, further comprising:

determining a haptic effect based at least in part on the second data signal; and

transmitting a haptic signal associated with the haptic effect to an actuator configured to output the haptic effect.

25. The method of claim 24, wherein the haptic effect comprises a haptic effect approximating a champagne cork popping.

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Fitbit v. Immersion

26. The method of claim 24, wherein the haptic effect comprises a haptic effect approximating a collision between a user of the first mobile device and a user of the second mobile device.

27. A system comprising:

a processor configured to:

receive a first sensor signal from a first sensor, the first sensor configured to detect a movement of a first mobile device;

receive a second sensor signal from a second sensor, the second sensor configured to detect an interaction with the first mobile device;

receive a first data signal from a network interface, the network interface configured to receive signals transmitted by a second mobile device;

determine a change in a display signal based at least in part on the data signal and the second sensor signal; and

determine a haptic effect based at least in part on the first data signal.

28. The system of claim 27, wherein the first sensor and the second sensor are each configured to detect one or more of: contact, pressure, acceleration, inclination, inertia, or location.

29. The system of claim 27, wherein the second sensor comprises a touch-screen.

30. The system of claim 27, wherein the mobile device further comprises a speaker configured to generate a sound effect coordinated with the haptic effect.

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31. The system of claim 27, wherein the processor is further configured to transmit a second data signal to the network interface, and the network interface is further configured to transmit the second data signal to the second mobile device.

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ABSTRACT

Systems and methods for transmitting haptic messages are disclosed. For example, one disclosed method includes the steps of: receiving at least one sensor signal from at least one sensor of a mobile device, the at least one sensor signal associated with a movement of the mobile device, determining a message to be displayed in a user interface based at least in part on the at least one sensor signal, and causing the message to be displayed.

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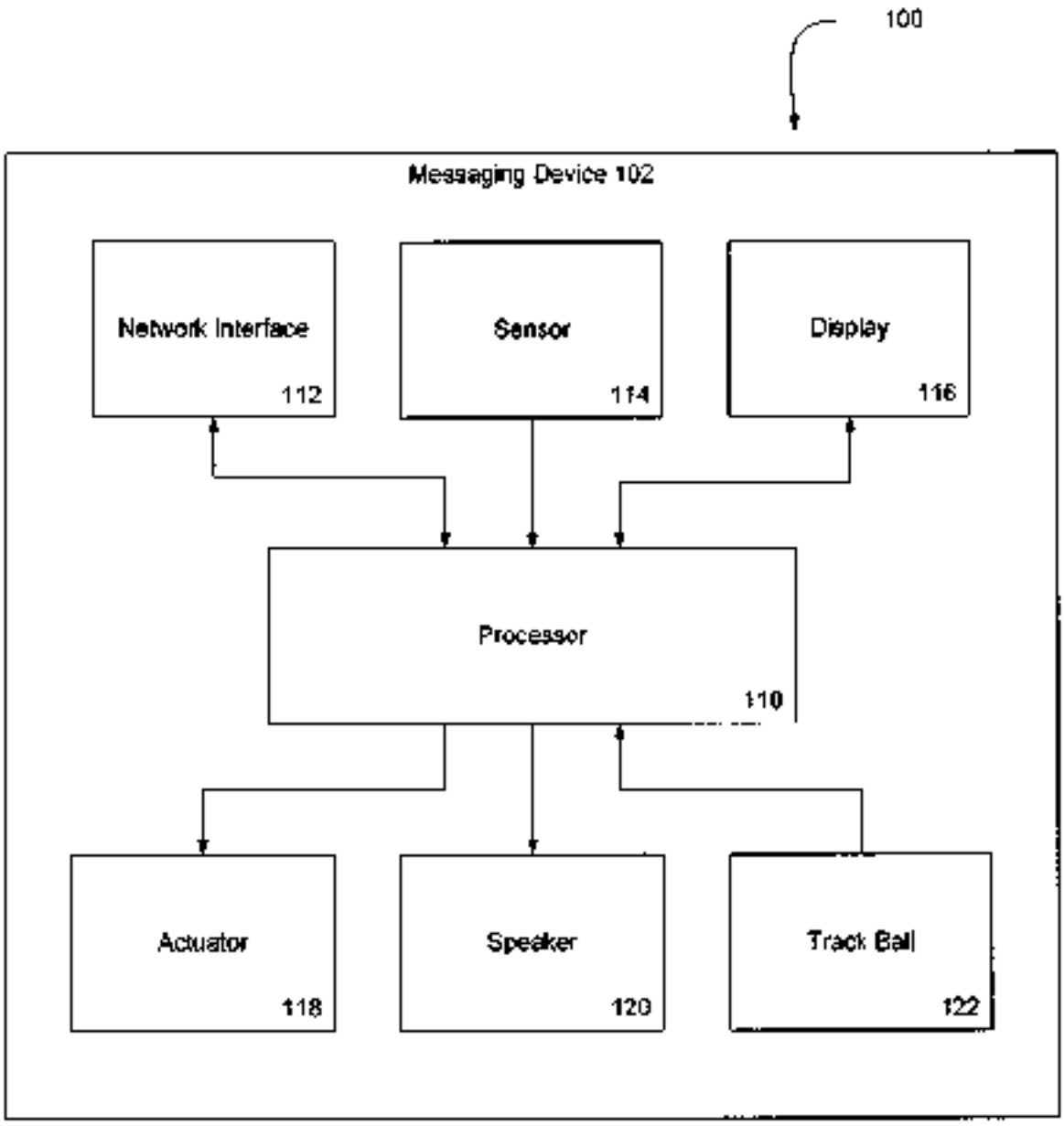


Figure 1

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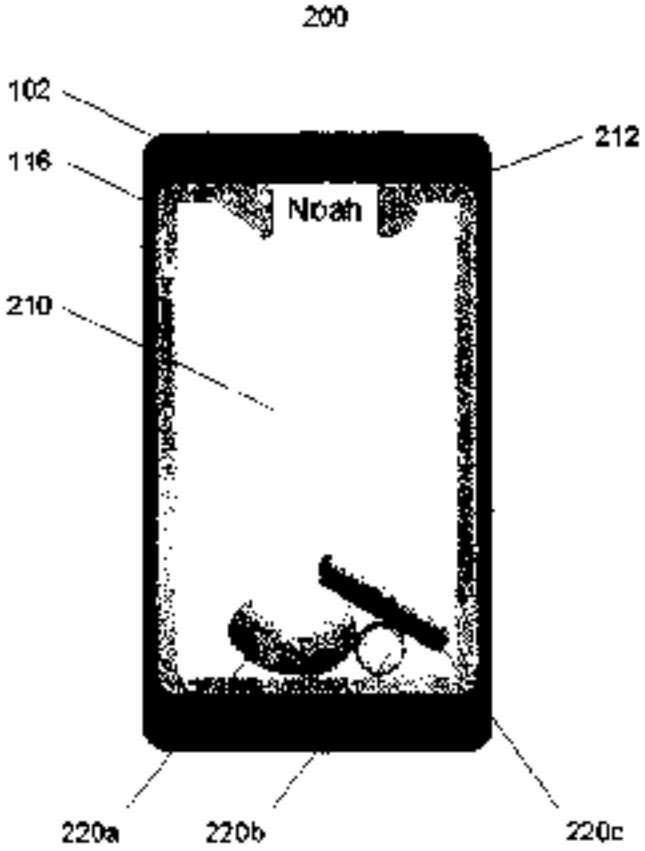


Figure 2

FITBIT 1002
Fitbit v. Immersion

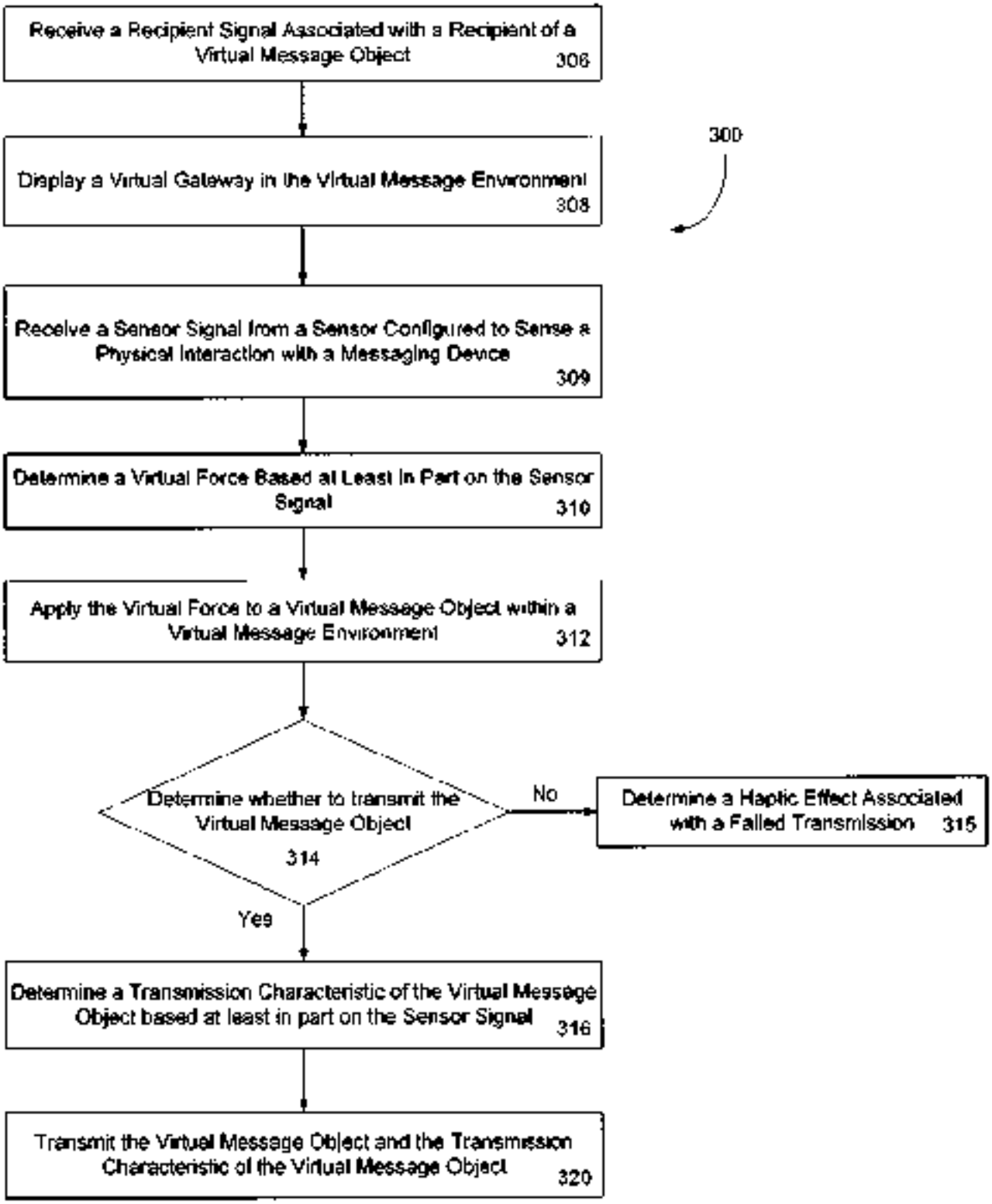


Figure 3

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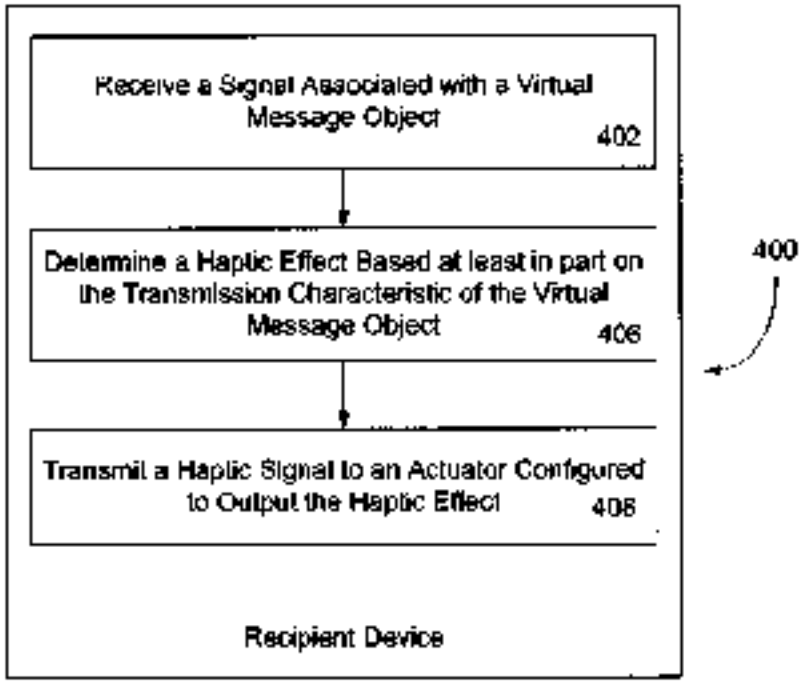


Figure 4

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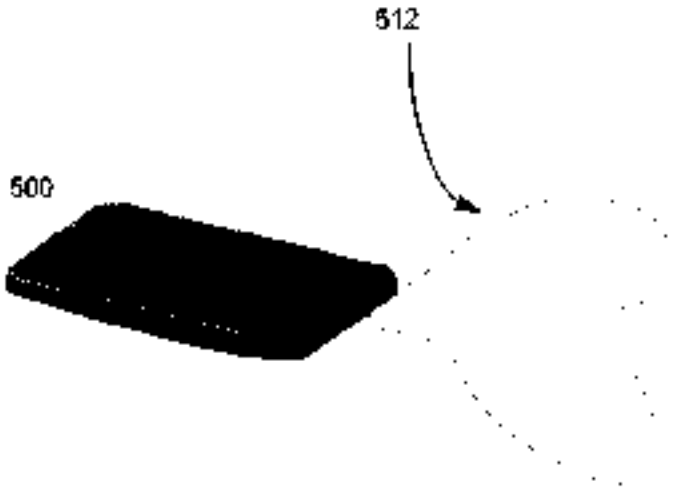


Figure 5a

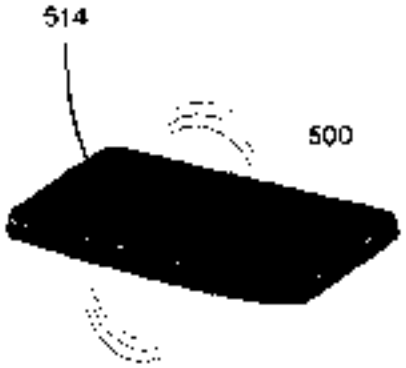


Figure 5b

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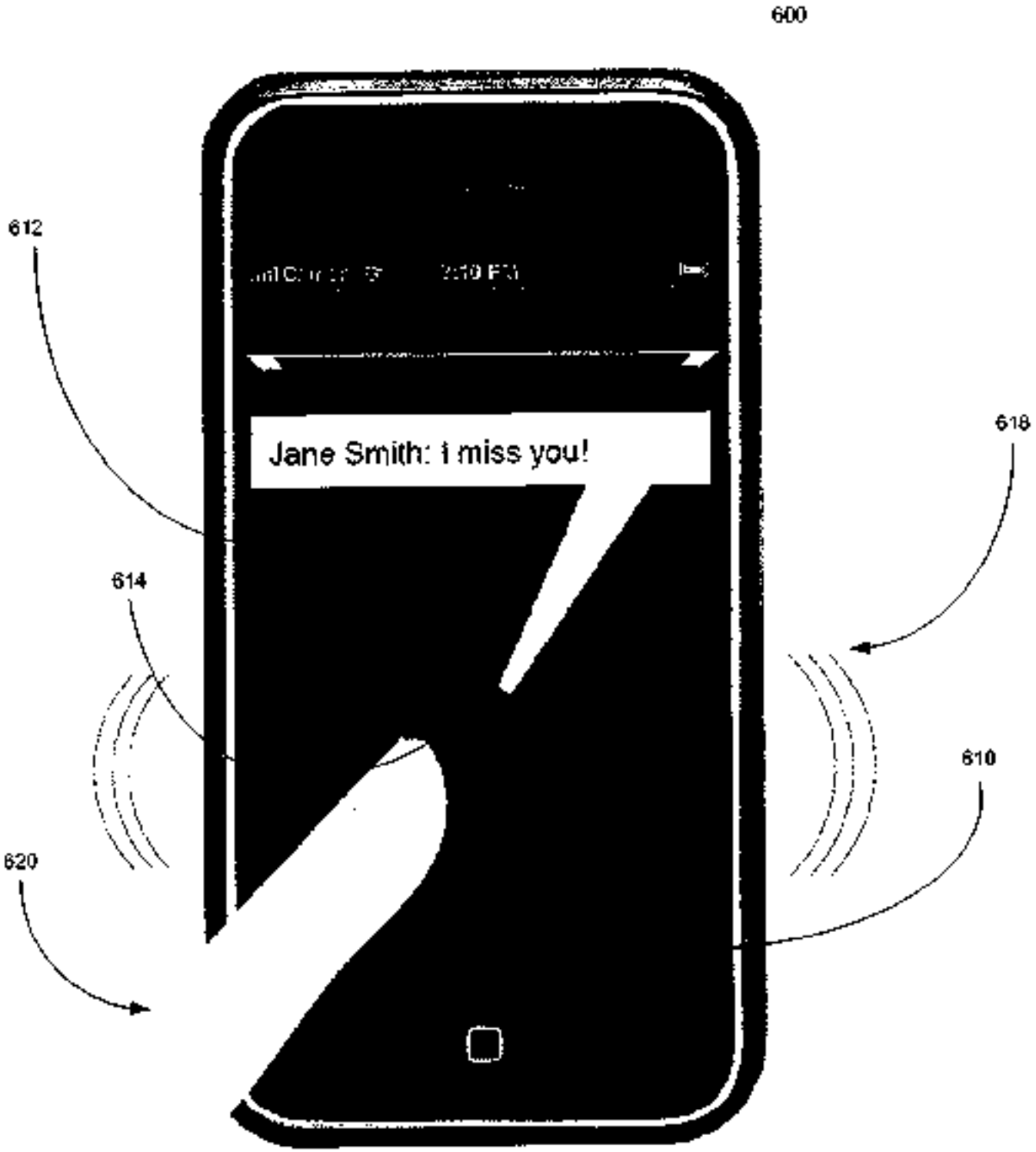


Figure 6

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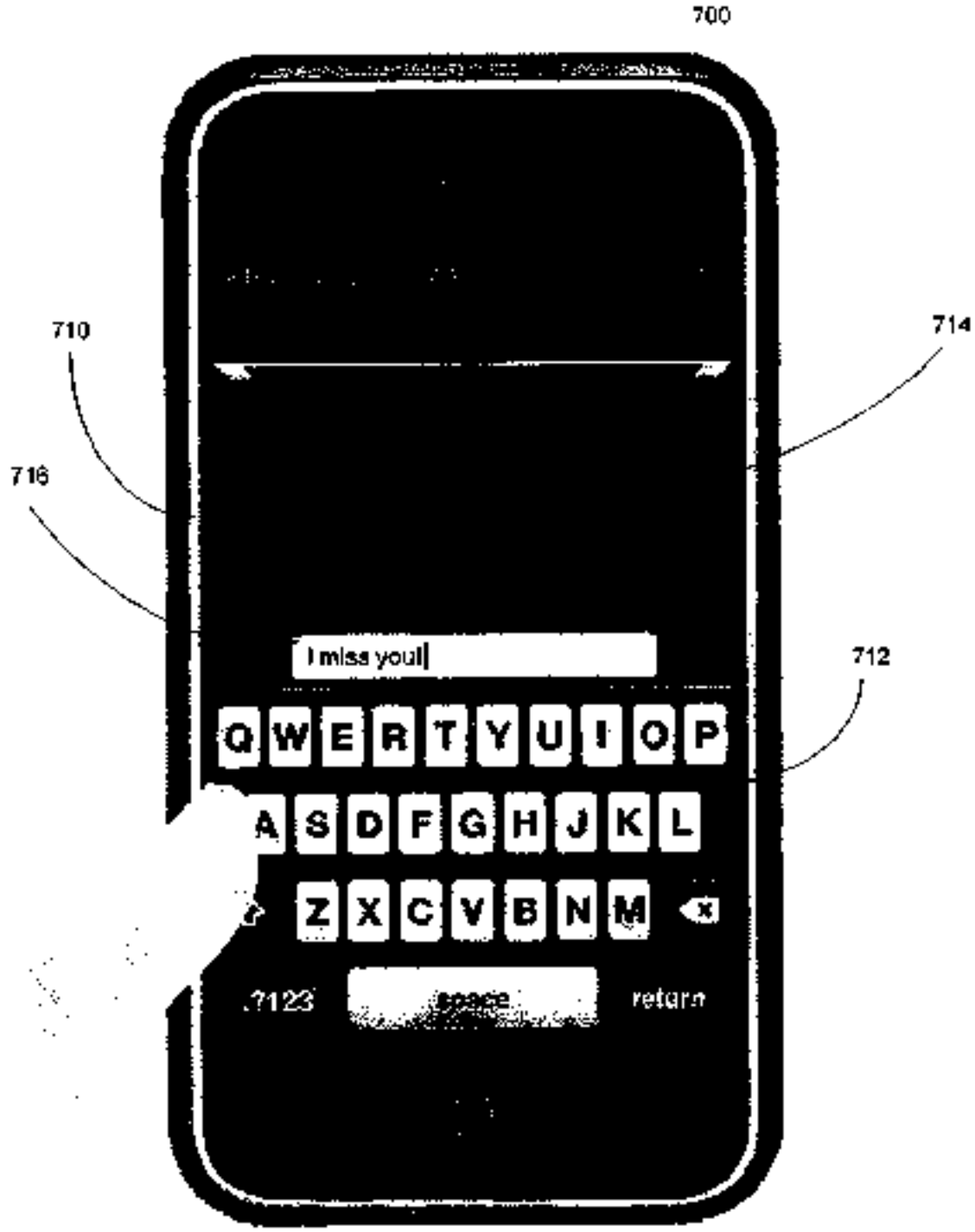


Figure 7

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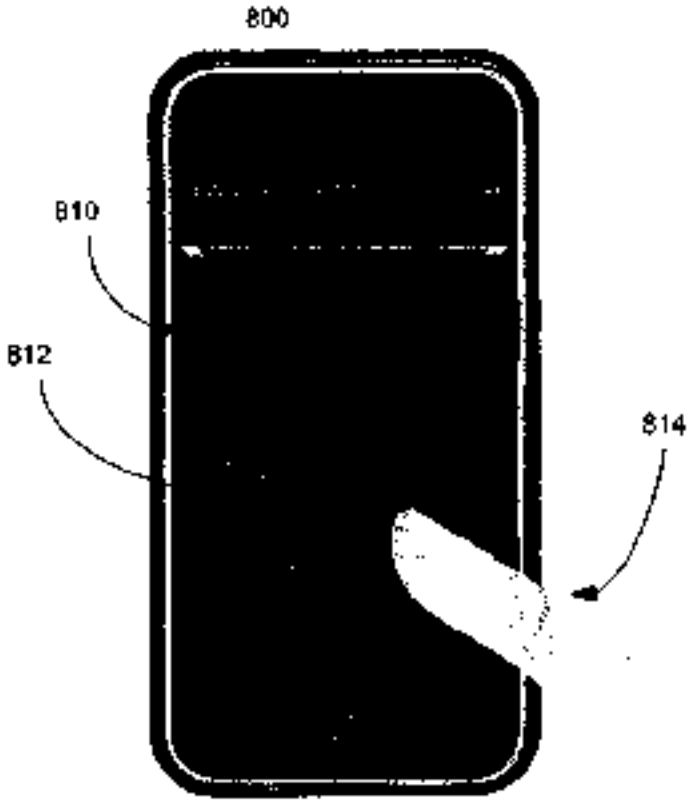


Figure 8a

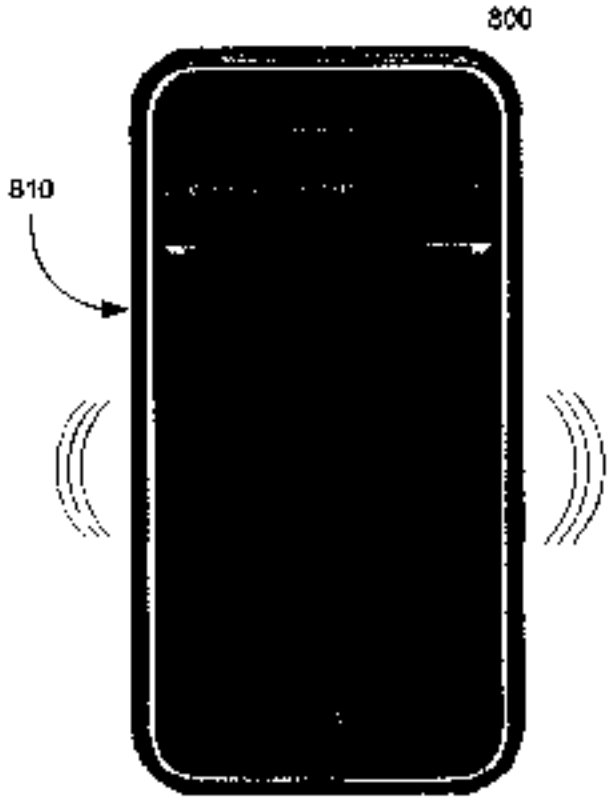


Figure 8b

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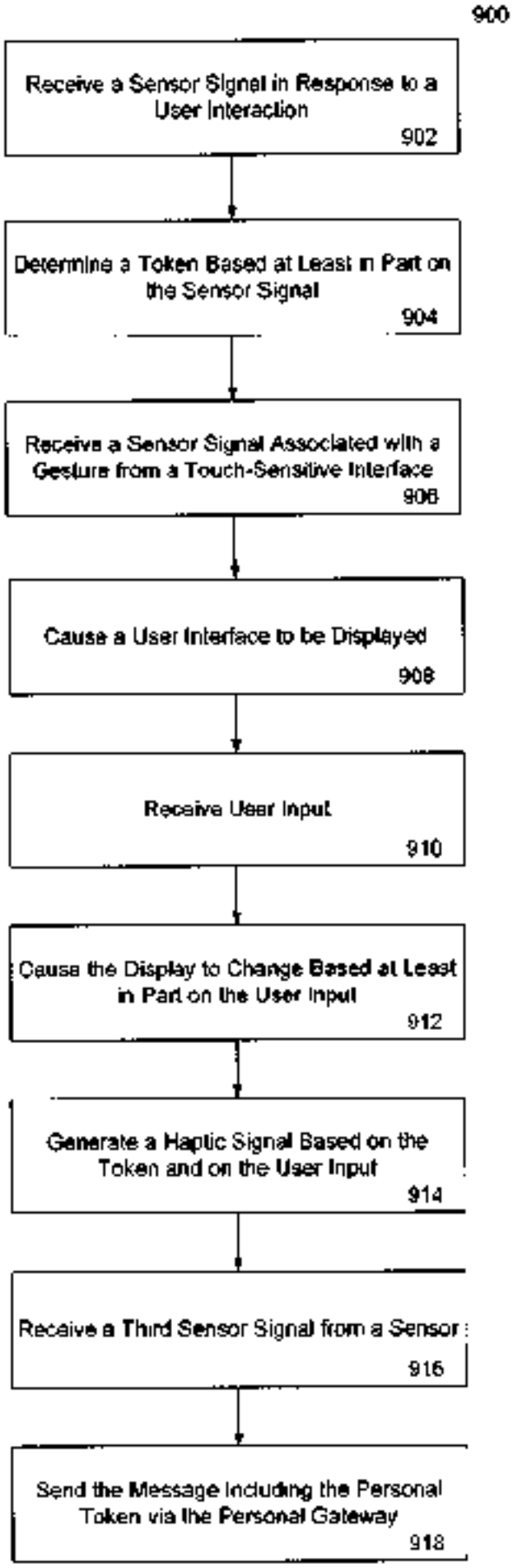


Figure 9

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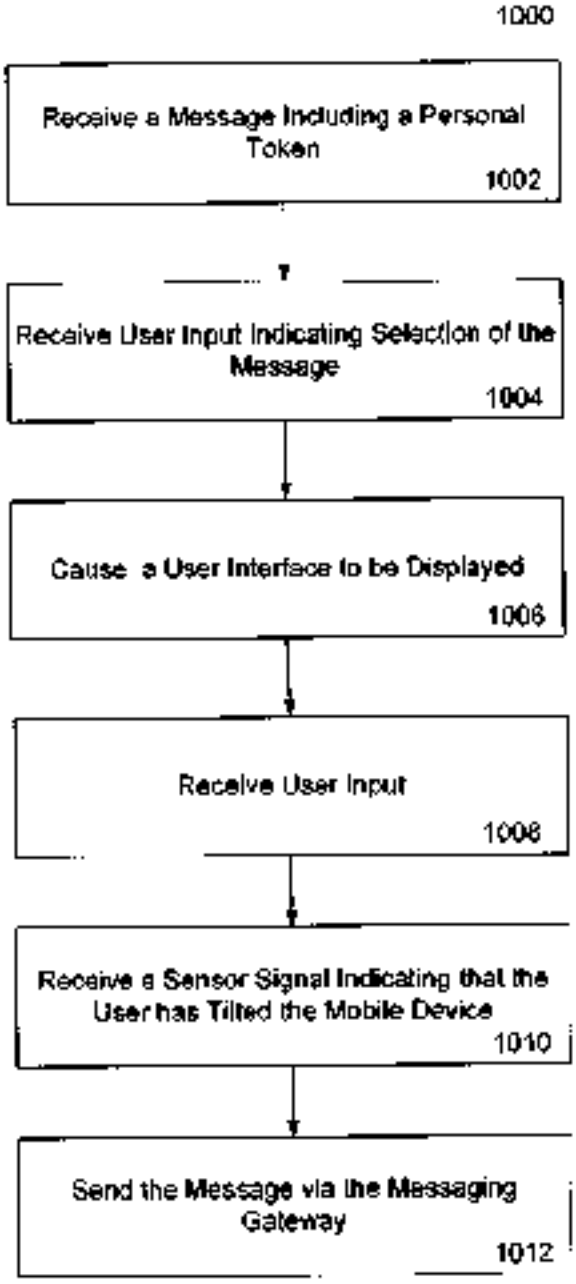


Figure 10

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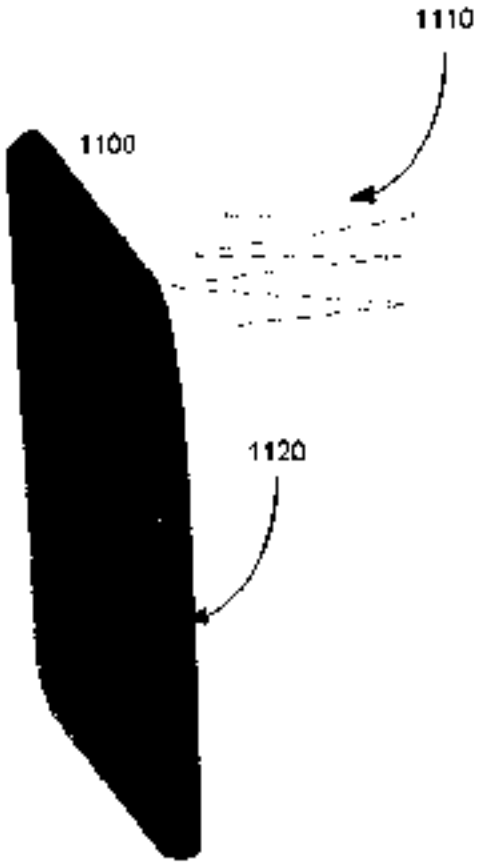


Figure 11a

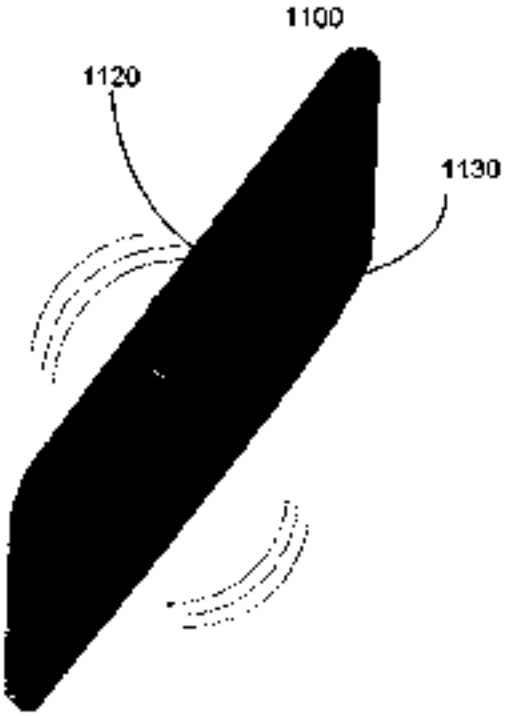


Figure 11b

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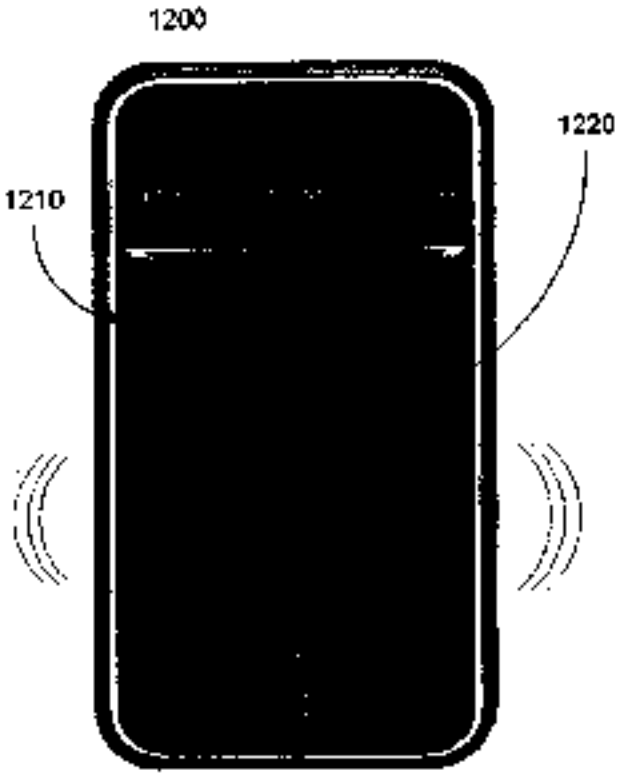


Figure 12a

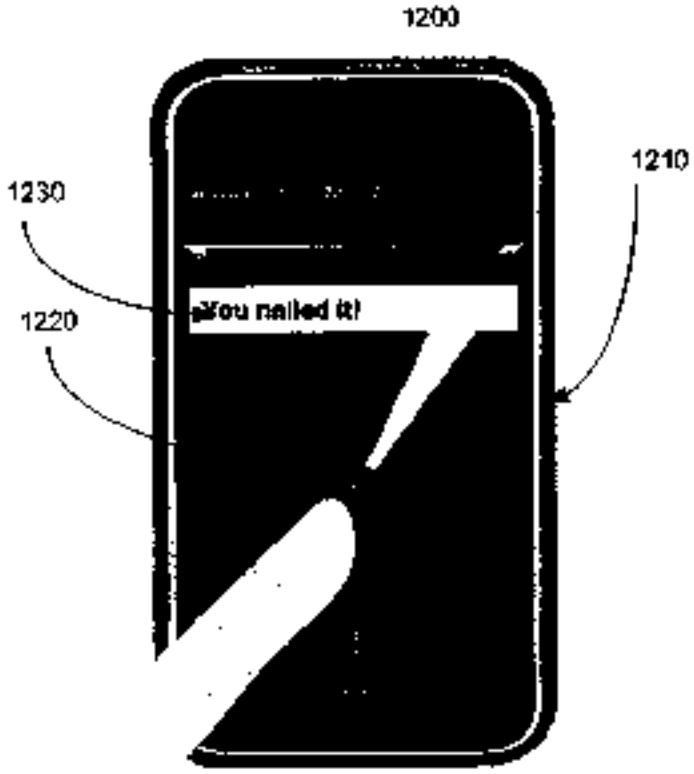


Figure 12b

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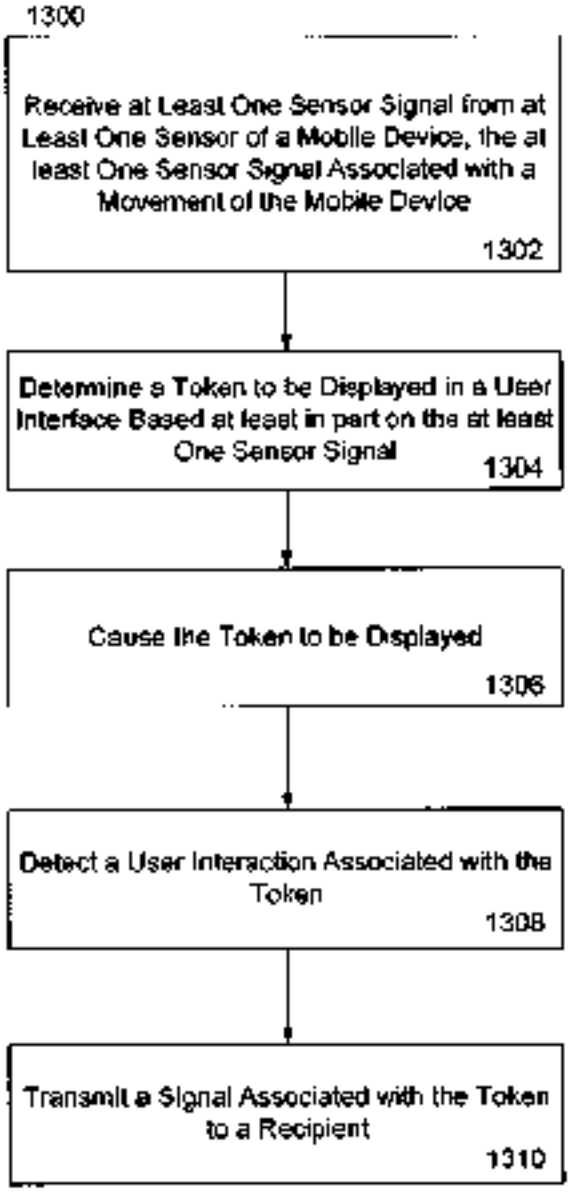


Figure 13

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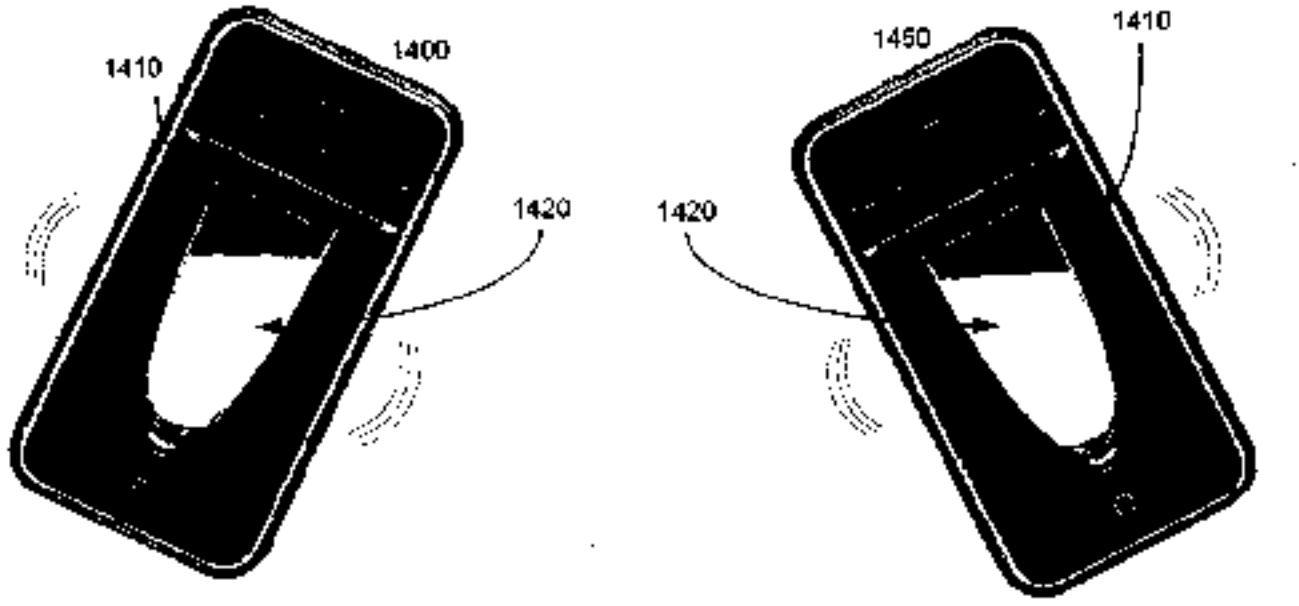


Figure 14

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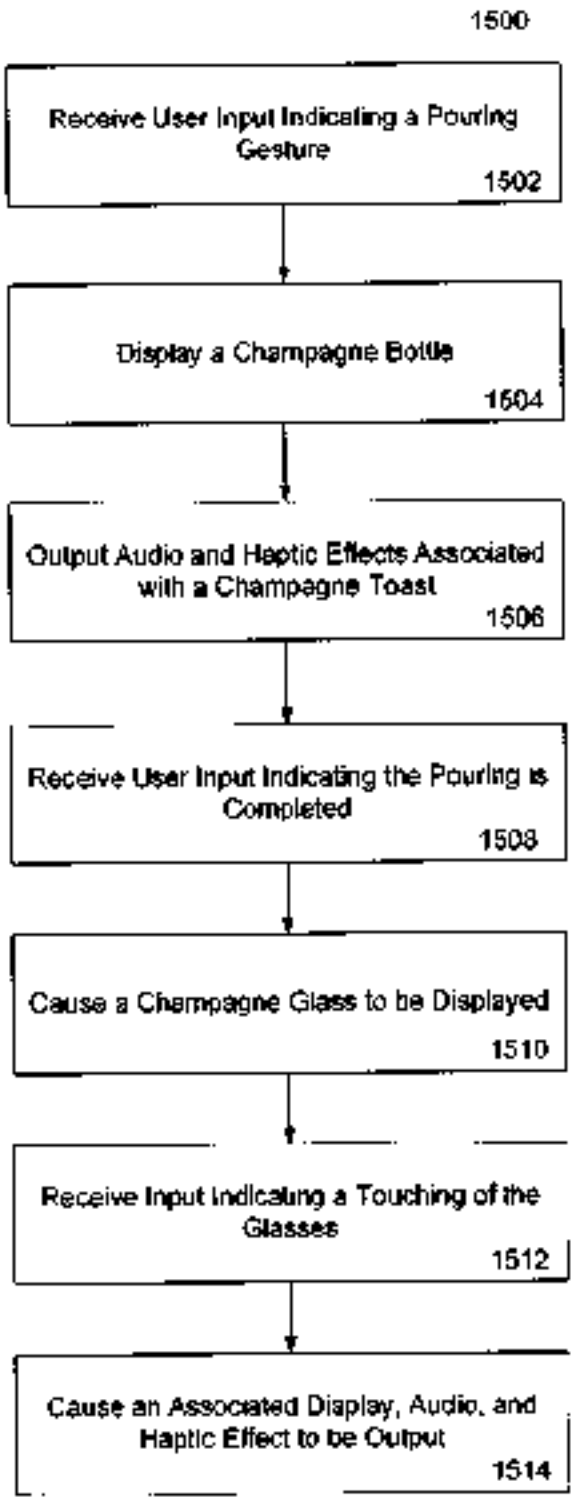


Figure 15

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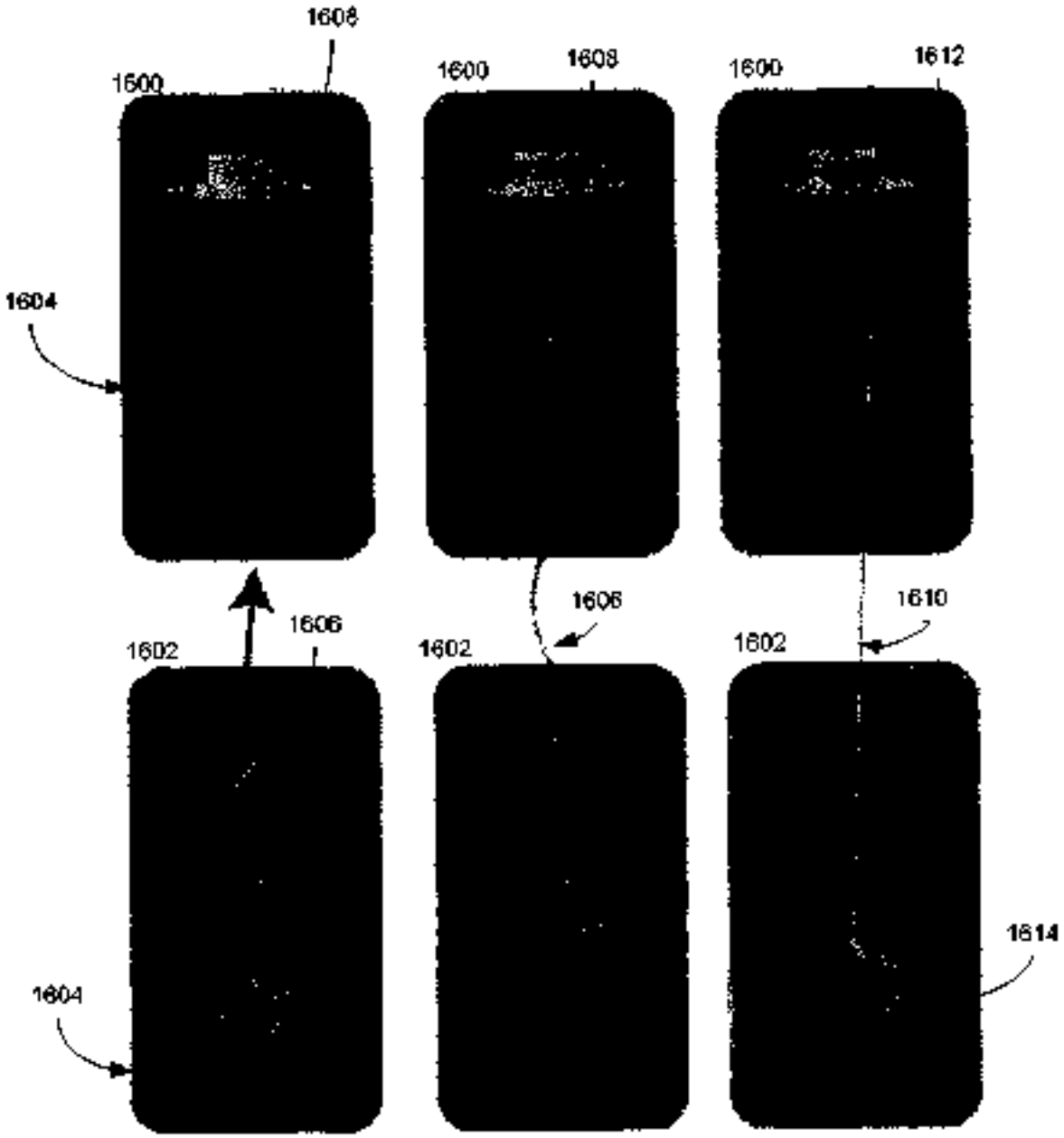


Figure 16A Figure 16B Figure 16C

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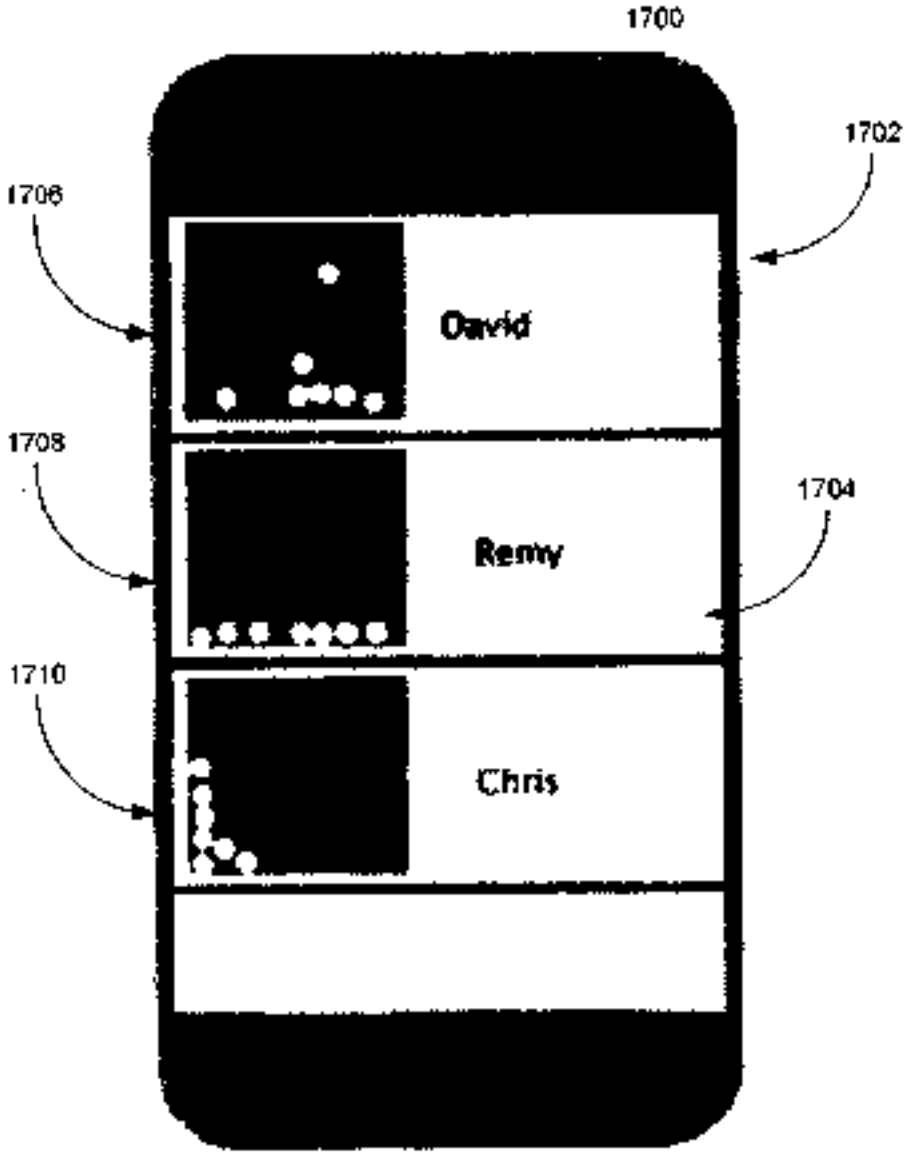


Figure 17

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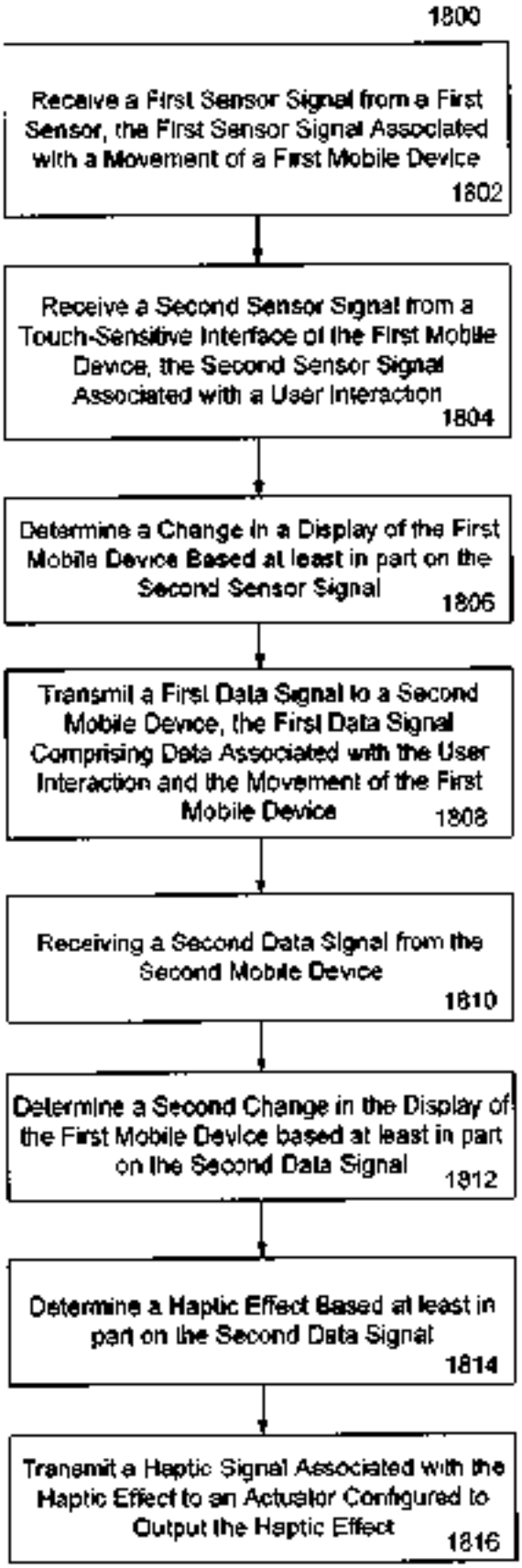


Figure 18

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PTO/SB/81 (04-05)
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I hereby appoint:

☑ Practitioners associated with the Customer Number: 34360

OR

☐ Practitioner(s) named below (If more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

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☐ Firm or Individual Name			
Address			
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Assignee Name and Address:

Immersion Corporation
801 Fox Lane
San Jose, California 95131

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	March 27, 2007
Name	Catherine Mereish	Telephone	408-350-6619
Title	Senior IP Counsel		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David M. Birnbaum
Filer:	Michael T. Morlock/Laura Smith
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	330	330
Utility Search Fee	1111	1	540	540
Utility Examination Fee	1311	1	220	220
Pages:				
Claims:				
Claims in excess of 20	1202	11	52	572
Miscellaneous-Filing:				
Petition:				

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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		1662

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Electronic Acknowledgement Receipt

EFS ID:	5699278
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David M. Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Laura Smith
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	14-JUL-2009
Filing Date:	
Time Stamp:	16:27:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$1662
RAM confirmation Number	3153
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

EXHIBIT 1002
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1	Transmittal of New Application	Utilitytransmittal378586.pdf	89548	no	1
Warnings:					
Information:					
2	Application Data Sheet	Applicationdatasheet378586.pdf	284281	no	4
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
3	Specification	Specification378586.pdf	27bc4e3	no	57
Warnings:					
Information:					
4	Drawings-only black and white line drawings	Figures378586.pdf	808211	no	18
Warnings:					
Information:					
5	Power of Attorney	PowerofAttorney378586.pdf	81553	no	1
Warnings:					
Information:					
6	Fee Worksheet (PTO-875)	fee-info.pdf	30369	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	4056405		

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If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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PTO/SB/06 (12-04)

Filing Date: 07/14/09

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/502,702

APPLICATION AS FILED – PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY FEE ($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	330
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	540
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	220
TOTAL CLAIMS (37 CFR 1.16(i))	31 minus 20 =	11	x$26		OR	x$52	572
INDEPENDENT CLAIMS (37 CFR 1.16(h))	3 minus 3 =	*	x$110			x$220	
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))			195			390	
* If the difference in column 1 is less than zero, enter "0" in column 2			TOTAL			TOTAL	1662

APPLICATION AS AMENDED – PART II

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	SMALL ENTITY ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE ($)
AMENDMENT A Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))							OR		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
					TOTAL ADDT FEE		OR	TOTAL ADDT FEE	

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)	OR	RATE ($)	ADDITIONAL FEE ($)
AMENDMENT B Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
Application Size Fee (37 CFR 1.16(s))							OR		
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					N/A		OR	N/A	
					TOTAL ADDT FEE		OR	TOTAL ADDT FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET NO	TOT CLAIMS	IND CLAIMS
12/502,702	07/14/2009	2416	1662	IMM351 (51851/378386)	31	3

CONFIRMATION NO. 6609

94900
PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

FILING RECEIPT

OC000000037050269

Date Mailed: 07/29/2009

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

David M. Birnbaum, Oakland, CA;
Chris Ullrich, Ventura, CA;

Assignment For Published Patent Application

Immersion Corporation, San Jose, CA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/080,978 07/15/2008
and claims benefit of 61/080,981 07/15/2008
and claims benefit of 61/080,985 07/15/2008
and claims benefit of 61/080,987 07/15/2008
and claims benefit of 61/148,312 01/29/2009
and claims benefit of 61/181,280 05/26/2009

Foreign Applications

If Required, Foreign Filing License Granted: 07/23/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/502,702**

Projected Publication Date: To Be Determined - pending completion of Missing Parts

Non-Publication Request: No

Early Publication Request: No

FITBIT 1002
Fitbit v. Immersion

Title

Systems And Methods For Transmitting Haptic Messages

Preliminary Class

370

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as

FITBIT 1002
Fitbit v. Immersion

set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
ADDRESS: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/502,702	07/14/2009	David M. Birnbaum	IMM351 (51851/378586)

CONFIRMATION NO. 6869

34300
PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

FORMALITIES LETTER

OC0000000037060264

Date Mailed: 07/29/2009

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

Items Required To Avoid Abandonment:

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
  Note: If a petition under 37 CFR 1.47 is being filed, an oath or declaration in compliance with 37 CFR 1.63 signed by all available joint inventors, or if no inventor is available by a party with sufficient proprietary interest, is required.

The application is informal since it does not comply with the regulations for the reason(s) indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
  - The drawings submitted to the Office are not electronically reproducible because portions of figures 2, 5a-8b, 11a-12b, 14, 16a-17 are missing and/or blurry.

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

The applicant needs to satisfy supplemental fees problems indicated below.

The required item(s) identified below must be timely submitted to avoid abandonment:

- To avoid abandonment, a surcharge (for late submission of filing fee, search fee, examination fee or oath or declaration) as set forth in 37 CFR 1.16(f) of **$130** for a non-small entity, must be submitted with the missing items identified in this notice.

FITBIT 1002
Fitbit v. Immersion

SUMMARY OF FEES DUE:

Total additional fee(s) required for this application is $130 for a non-small entity
+ $130 Surcharge.

Replies should be mailed to:

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450

Registered users of EFS-Web may alternatively submit their reply to this notice via EFS-Web.
https://sportal.uspto.gov/authenticate/AuthenticateUserLocalEPF.html

For more information about EFS-Web please call the USPTO Electronic Business Center at 1-866-217-9197 or visit our website at http://www.uspto.gov/ebc.

If you are not using EFS-Web to submit your reply, you must include a copy of this notice.

/lnguyen/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
ADDRESS: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/502,702	07/14/2009	David M. Birnbaum	IMM351 (51851/378586)

CONFIRMATION NO. 6669

34300
PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

IMPROPER CPOA LETTER



Date Mailed: 07/29/2009

NOTICE REGARDING POWER OF ATTORNEY

This is in response to the Power of Attorney filed 07/14/2009. The Power of Attorney in this application is not accepted for the reason(s) listed below:

- The Power of Attorney is from an assignee and the Certificate required by 37 CFR 3.73(b) has not been received.

/nguyen/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

FITBIT 1002
Fitbit v. Immersion

PTO/SB/08a (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	Birnbaum et al.
Art Unit	2472
Examiner Name	Unassigned
Attorney Docket Number	IMM361

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No. 1	Document Number: Number - Kind Code 2 (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials *	Cite No. 1	Foreign Patent Document: Country Code 3 - number 4 - Kind Code 5 (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T 6
	1	WO 2004/044728 A2	05-27-2004	Sony Comp Entertainment Inc.		
	2	WO 2004/075169 A2	09-02-2004	Koninkl Philips Electronics NV et al.		
	3	WO 2008/132540 A1	11-06-2008	Nokia Corp. et al		
	4	WO 2009/074185 A1	06-18-2009	Nokia Corp et al.		

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No. 1	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T 2
	5	WILLIAMSON, J. et al., Shoogle: Excitatory Multimodal Interaction on Mobile Devices, CHI 2007 Proceedings-Shaffe, Rabbi and Rall: New Forms of Input and Output, 2007, pp. 121-124, XP002549378.	
	6	Patent Cooperation Treaty, International Search Report, International Application No. PCT/US2009/050579, mailed October 21, 2009	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. 1 Applicant's unique citation designation number (optional). 2 See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. 3 Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). 4 For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. 5 Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. 6 Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

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FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:
KILPATRICK STOCKTON LLP
Attn. Gardner, Steven
1001 West Fourth Street
Winston-Salem, NC 27101
UNITED STATES OF AMERICA

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference: IMM310.PCT	Date of mailing (day/month/year): 21/10/2009
International application no.: PCT/US2009/050519	FOR FURTHER ACTION See paragraphs 1 and 4 below
Applicant: IMMERSION CORPORATION	International filing date (day/month/year): 14/07/2009

1 [x] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes, 1211 Geneva 20, Switzerland, Facsimile No. +41-22-338.82.70

For more detailed instructions, see the notes on the accompanying sheet.

2 [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3 [ ] With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments, on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the international Searching Authority	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Fx. 31 651 epo nl, Fax: (+31-70) 340-3016	Matthew Davis

Form PCT/ISA/220 (October 2005) (See notes on accompanying sheet)

FITBIT 1002
Fitbit v. Immersion

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 at this stage, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annex(s) D(I) and (II)).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no meaningful search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Preliminary Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination was already filed, see below.

How? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

FITBIT 1002
Fitbit v. Immersion

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. Thus, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

(i) the claim is unchanged,

(ii) the claim is cancelled,

(iii) the claim is new,

(iv) the claim replaces one or more claims as filed,

(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]: "Claims 1 to 29, 31, 32, 34, 36, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 35 unchanged; new claims 49 to 51 added."

2. [Where originally there were 15 claims and after amendment of all claims there are 11]: "Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendment consists in cancelling some claims and in adding new claims]: "Claims 1 to 5 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or "Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendments are made]: "Claims 1–10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under Article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be combined with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the reasonings or citations contained in that report. Remarks as to citations relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement, under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement) with the International Bureau, also file with the competent International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.2(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

If a demand for international preliminary examination is made, the written opinion of the International Searching Authority will, except in certain cases where the International Preliminary Examining Authority digests as an International Searching Authority and where it has notified the International Bureau under Rule 66.1*bis*(b), be considered to be a written opinion of the International Preliminary Examining Authority. If a demand is made, the applicant may submit to the International Preliminary Examining Authority a reply to the written opinion together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later (Rule 42bis.1(b)).

Consequence with regard to examination of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the national phase, a translation of the claims as amended (after Article 19) may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the *PCT Applicant's Guide*, Volume II.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference IMM310 PCT	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below
International application No PCT/US2009/050579	International filing date (day/month/year) 14/07/2009	(Earliest) Priority date (day/month/year) 15/07/2008

Applicant

IMMERSION CORPORATION

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 8 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report
   a. With regard to the language, the international search was carried out on the basis of
      [X] the international application in the language in which it was filed
      [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. [ ] This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).
   c. [ ] With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.
2. [ ] Certain claims were found unsearchable (See Box No. II)
3. [ ] Unity of invention is lacking (see Box No. III)
4. With regard to the title,
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established by this Authority to read as follows:

5. With regard to the abstract,
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority
6. With regard to the drawings,
   a. the figure of the drawings to be published with the abstract is Figure No. 1
      [X] as suggested by the applicant
      [ ] as selected by this Authority because the applicant failed to suggest a figure
      [ ] as selected by this Authority because this figure better characterizes the invention
   b. [ ] none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (April 2007)

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/050579

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F3/01 G06F3/048 H04M1/725

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WILLIAMSON J, MURRAY-SMITH R, HUGHES S: "Shoogle: Excitatory Multimodal Interaction on Mobile Devices" CHI 2007 PROCEEDINGS - SHAKE, RATTLE & ROLL: NEW FORMS OF INPUT & OUTPUT, 28 April 2007 (2007-04-28), - 3 May 2007 (2007-05-03) pages 121-124, XP002549378 San Jose, CA, USA the whole document	1-29
A	WO 2004/044728 A2 (SONY COMP ENTERTAINMENT INC [JP]) 27 May 2004 (2004-05-27) abstract page 4, line 20 - page 5, line 26 page 12, line 7 - page 13, line 18 page 16, line 4 - page 19, line 12 page 23, line 1 - page 24, line 19 figures 3,4	1-29

-/-

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
9 October 2009	21/10/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax (+31-70) 340-3016	Bianchi, Damiano

Form PCT/ISA/210 (second sheet) (April 2005)

page 1 of 2

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/050579

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2004/075169 A2 (KONINKL PHILIPS ELECTRONICS NV [NL], PHILIPS CORP [US]; VAN DE SLUIS B) 2 September 2004 (2004-09-02) page 11, line 2 - page 12, line 10 figures 4A-4C, 5A1, 5A2	1-29
X,P	WO 2009/074185 A1 (NOKIA CORP [FI]; PIKKOJAMSA KALLE [FI]; LIMJAMA JUKKA [FI]; JUHA KELA) 18 June 2009 (2009-06-18) page 2, line 16 - page 3, line 9 page 14, line 6 - page 16, line 19 page 18, line 9 - page 23, line 30 figures 4a-4f	1-29
X,P	WO 2008/132540 A1 (NOKIA CORP [FI]; REPONEN ERIKA [FI]; KAUKO JARMO [FI]; RONKAINEN SAMI) 6 November 2008 (2008-11-06) page 6, line 9 - page 10, line 16 figures 5a-5e,6a,6b	1-29

1

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2009/060579

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2004044728 A2	27-05-2004	AU 2003276720 A1	03-06-2004
		CN 1692329 A	02-11-2005
		JP 4117352 B2	16-07-2008
		JP 2004164242 A	10-06-2004
		US 2004111727 A1	17-06-2004
WO 2004075169 A2	02-09-2004	EP 1597895 A2	23-11-2005
		JP 2006518507 T	10-08-2006
		KR 20050104382 A	02-11-2005
WO 2009074185 A1	18-06-2009	US 2009201270 A1	13-08-2009
WO 2008132540 A1	06-11-2008	NONE	

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2008/069579	14.07.2008	15.07.2008

International Patent Classification (IPC) or both national classification and IPC
INV. G06F3/01 G06F3/048 H04M1/725

Applicant
IMMERSION CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☒ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2 FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3 For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of the opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax. +49 89 2399 - 4465	see form PCT/ISA/210	Bianchi, Damiano Telephone No. +49 89 2399 8609

Form PCT/ISA/237 (Cover Sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2009/050579

Box No. I Basis of the opinion

1 With regard to the language, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into ____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b))

2 ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3 With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material:

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material:

☐ on paper

☐ in electronic form

c. time of filing/furnishing:

☐ contained in the international application as filed.

☐ filed together with the international application in electronic form.

☐ furnished subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5 Additional comments:

Box No. II Priority

1 ☒ The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date (Rules 43bis.1 and 64.1) is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3 Additional observations, if necessary:

FITBIT 1002
Fitbit v. Immersion

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	12, 21-22
	No:	Claims	1-11, 13-20, 23-29
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-29
Industrial applicability (IA)	Yes:	Claims	1-29
	No:	Claims	

2. Citations and explanations

see separate sheet

FITBIT 1002
Fitbit v. Immersion

1 **Re Item V**

2 The following documents are introduced in the procedure:

D1 WILLIAMSON J, MURRAY-SMITH R, HUGHES S: "Shoogle: Excitatory Multimodal Interaction on Mobile Devices" CHI 2007 PROCEEDINGS - SHAKE, RATTLE & ROLL: NEW FORMS OF INPUT & OUTPUT, 28 April 2007 (2007-04-28) , - 3 May 2007 (2007-05-03) pages 121-124, XP002549379 San Jose, CA, USA

D2 WO 2004/044728 A2 (SONY COMP ENTERTAINMENT INC [JP]) 27 May 2004 (2004-05-27)

D3 WO 2004/075169 A2 (KONINKL PHILIPS ELECTRONICS NV [NL]; PHILIPS CORP [US]; VAN DE SLUIS B) 2 September 2004 (2004-09-02)

3 The subject matter of independent **claim 1** is not new in the sense of Article 33(2) PCT.

In accordance with the features of claim 1, document D1 discloses:

A method comprising:

receiving a sensor signal from a sensor configured to sense a physical interaction with a messaging device (see page 121, left column, abstract, "*mobile device*", right column, second paragraph, "*The Shoogle interface uses inertial sensing for natural motion sensing without any external moving parts; the user just shakes, tilts or wobbles the device to stimulate the auditory and vibrotactile feedback*" and right column, third paragraph, "*The user reaches into his or her bag, and shakes the phone*");

determining an interaction between one or more virtual message objects (see page 121, right column, third paragraph, "*virtual "message balls"*") **and a virtual message environment** (see page 121, right column, third paragraph, "*SMS inbox*"), **the interaction based at least in part on the sensor signal** (see page 121, right column, third paragraph, "*As the user shakes it*") **and a virtual physical parameter of at least one of the one or more virtual message objects** (the virtual physical parameter is represented by the mass of the balls, see also page 123, right column, first paragraph, "*In the SMS message prototype, the mass of each ball is proportional to the length of the message*");

determining a haptic effect based at least in part on the interaction (see page 121, right column, last paragraph to page 122, left column, first paragraph, "*Hearing that one of them is distinctly metallic, and has a deep,*

FITBIT 1002
Fitbit v. Immersion

heavy feeling impact, the user realises that a long text message from a colleague has been received" and page 123, right column, first paragraph. "*Users can also tap the device (detected via capacitive sensing), at which the balls bounce upwards (the only case where the third dimension is considered). They then rain back down in the order of creation, giving a structured view of the contents*"); **and**

generating a haptic signal configured to cause an actuator (see page 123, right column, last paragraph, "*To enhance the sensations, the internal eccentric motor of the iPaq is used in combination with the VBW32 transducer*") **to output the haptic effect** (see page 121, right column, last paragraph, "*impacts are heard and felt as these balls bounce around*").

Therefore D1 discloses all the features of claim 1, which as a consequence does not satisfy the requirements of Article 33(2) PCT

4 The disclosure of document D1 is prejudicial to the novelty of independent method **claim 11** as well. In particular, the document discloses:

A method comprising:

receiving a new virtual message object signal comprising a new virtual message object (see page 122, left column, first paragraph, "*As messages arrive*" and page 123, left column, fourth paragraph, "*As each ball is generated (e.g. as a message arrives)*");

determining an interaction between the new virtual message object (see page 121, right column, third paragraph, "*virtual 'message balls'*") **and a virtual message environment** (see page 121, right column, third paragraph, "*SMS Inbox*"), **the interaction based at least in part on the sensor signal** (see page 121, right column, third paragraph, "*As the user shakes it*") **and a virtual physical parameter of the new virtual message object** (the virtual physical parameter is represented by the mass of the balls, see also page 123, right column, first paragraph, "*In the SMS message prototype, the mass of each ball is proportional to the length of the message*");

determining a haptic effect based at least in part on the interaction (see page 121, right column, last paragraph to page 122, left column, first paragraph, "*Hearing that one of them is distinctly metallic, and has a deep, heavy feeling impact, the user realises that a long text message from a colleague has been received*" and page 123, right column, first paragraph, "*Users can also tap the device (detected via capacitive sensing), at which the balls bounce upwards (the only case where the third dimension is considered). They then rain back down in the order of creation, giving a structured view of the contents*"); **and**

FITBIT 1002
Fitbit v. Immersion

generating a haptic signal configured to cause an actuator (see page 123, right column, last paragraph, "*To enhance the sensations, the internal eccentric motor of the iPaq is used in combination with the VBW32 transducer*") **to output the haptic effect** (see page 121, right column, last paragraph, "*impacts are heard and felt as these balls bounce around*").

As a consequence the requirements of Article 33(2) PCT are not fulfilled.

5 Independent **claims 14** and **15** define computer-readable mediums comprising program code for executing the **methods** of claims **1** and 11 respectively. As a consequence, the objection regarding lack of novelty formulated for claims 1 and 11 applies to claims 14 and 15 as well.

Thus claims 14 and 15 do not satisfy the requirements of Article 33(2) PCT.

6 Independent **claim 16** defines a system having structural features that correspond to those of method claim 1. The same objection as brought forward for claim 1 is therefore applicable *mutatis mutandis*

Therefore claim 16 does not satisfy the requirements of Article 33(2) PCT.

7 The dependent claims do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step. In particular:

7.1 The **additional** features of claims 2 to 10, 18, 17 to 20 and 23 to 29 are disclosed by document D1.

7.2 Extending the teaching of D1 to an alarm or a reminder as defined in claim 13 would be an obvious option for the skilled person.

7.3 The **additional** features of claims 21 (a display for showing the virtual message environment) and 22 (the display comprises a touch screen) would be considered by the person skilled in the art as trivial design options.

Thus, the dependent claims do not satisfy the requirements of the PCT with respect to novelty (Article 33(2) PCT) and inventive step (Article 33(3) PCT).

8 The subject matter of claims 1 to 29 is industrially applicable (Article 33(4) PCT).

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
Filing a demand for international preliminary examination	In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/ WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT). If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT)
Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).
Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

FITBIT 1002
Fitbit v. Immersion

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FITBIT 1002
Fitbit v. Immersion

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(72) Inventor: WADA, Shinya; c/o SONY COMPUTER ENTERTAINMENT INC., 2-6-21, Minami-Aoyama, Minato-ku, Tokyo 107-0062 (JP).

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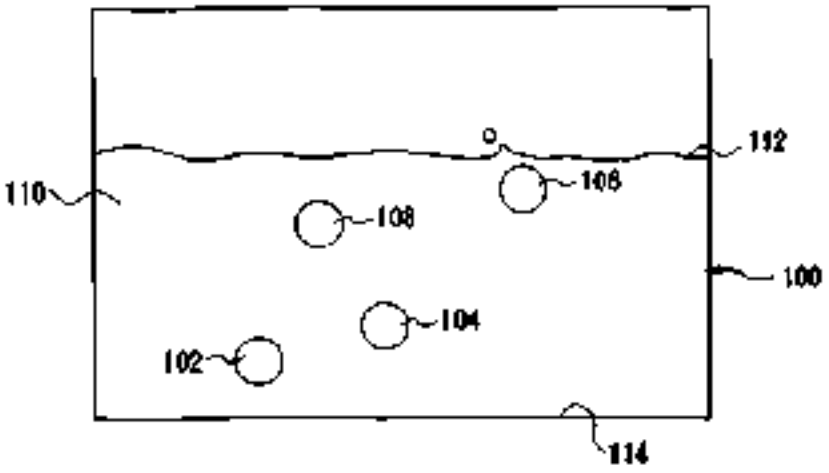
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Published:
— without international search report and to be republished upon receipt of that report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND APPARATUS FOR PROCESSING FILES UTILIZING A CONCEPT OF WEIGHT SO AS TO VISUALLY REPRESENT THE FILES IN TERMS OF WHETHER THE WEIGHT THEREOF IS HEAVY OR LIGHT



(57) Abstract: On a screen a file processing apparatus displays values of an attribute related to a plurality of files using a concept of weight. The weight of each file is represented by spherical objects submerged into the water and displayed on the screen. For example, a first spherical object representing a file whose data size is large, sinks near bottom. And a second spherical object represents a file whose data size is light and is floating near the water surface.

WO 2004/044728 A2

FITBIT 1002
Fitbit v. Immersion

DESCRIPTION

METHOD AND APPARATUS FOR PROCESSING FILES UTILIZING A CONCEPT OF WEIGHT SO AS TO VISUALLY REPRESENT THE FILES IN TERMS OF WHETHER THE WEIGHT THEREOF IS HEAVY OR LIGHT

TECHNICAL FIELD

The present invention relates to method and apparatus for processing files, and it particularly relates to a technology for managing or organizing a plurality of files on the computer.

BACKGROUND TECHNOLOGY

The rapid spread of personal computers (hereinafter referred to as PCs) has now slowed down, and the current trend is the marked versatility of functions in hardware such as PDAs (Personal Digital Assistants), portable telephones and game machines. For example, PDAs, which are equipped with wireless communication functions, can now use networks no matter where they are. Moreover, advances in high-definition display screen and CPU processing capacity have made it easier for such hardware to carry out high-load processing, such as moving picture processing which has so far been only possible on a PC. Similarly, portable telephones are increasingly multi-functional with camera function, moving picture function, game function and the

FITBIT 1002
Fitbit v. Immersion

like.

The functions of game machines are being extended by the addition of network function, hard disk and the like. And the external connection terminals employed for them are now of the types similar to those on a PC, thus ensuring their newly-added multiple usage and flexibility. This way, the barriers that used to exist between such hardware and PCs are being steadily removed, and such hardware's increasingly high graphic processing capabilities, in particular, are now even threatening the position of PCs.

As a variety of electronic devices grow more and more multi-functional, their increased flexibility is attracting and bringing in more users of their own. Moreover, the concepts of files and folders as seen in the file system, which used to be characteristic of PCs only, are now being introduced to the users of electronic equipment other than PCs as well.

However, some intrinsic limitations of such hardware in the electronic equipment other than PCs still persist. For example, the small size of the screen or the simplicity of control devices can pose visual and operational restrictions. Thus, if the display and control interfaces currently employed for PCs are to be pursued, then it may lead to a reduced accessibility to such hardware. Therefore, it is essential to develop interfaces using their own expression if the potential abilities for a

FITBIT 1002
Fitbit v. Immersion

variety of electronic equipment is to be fully exploited.

DISCLOSURE OF THE INVENTION

The present invention has been made in view of the foregoing circumstances and an object thereof is to realize a display that ensures easier visual grasp of the characteristics of data.

A preferred embodiment according to the present invention relates to a file processing apparatus. This apparatus includes: an attribute input unit which acquires a value of an attribute for at least one file in order to represent a value of a predetermined attribute for an intended file by using a concept of weight; a comparison processing unit which compares the value of an attribute with a reference value; a position determining unit which sets, based on a result obtained from the comparison processing unit, a relative display position of a predetermined object that represents symbolically the weight; and a display processing unit which visually represents the value of the attribute in terms of whether the weight is heavy or light, by displaying the object at the display position on a screen set by the position determining unit.

Here a "file" mainly means a program or a collection of data visualized by an icon on a screen. It may also mean

FITBIT 1002
Fitbit v. Immersion

a hierarchy, such as a folder or directory, visualized by an icon in a hierarchical file system or an offshoot document related to the body of a reference target, such as a so-called shortcut or alias visualized by an icon. A file may have a file name which includes an extension at the end. A file may also be a text file containing character data or a binary file containing binary data. An "attribute" may be a characteristic of a file or a parameter used as a reference for comparison with another file, which may include the date of file preparation or updating, the data size, the importance of each file to be set by the user, the type of file to be determined by data format or file usage, the number of files contained in a folder or the number of folders, and the count or frequency of file updating. An "attribute" may also be a parameter showing the level of a character to be controlled by the user in game software. A "values to be used as reference" may be the value of an attribute related to another file or the value showing the unused capacity of the storage area of a storage.

An "object" may symbolize a file or a folder or may collectively stand for a plurality of files or a plurality of folders. An object may be displayed on the screen as an image of a tangible object with a mass in the real world, such as a "sphere", a "particle" or a "weight", or in the form of an icon. For example, a "sphere" may be able to symbolize the weight of a thing because it may fall under

FITBIT 1002
Fitbit v. Immersion

its own weight or the force of gravity and may bounce on the ground or, if thrown into the water, may sink or float up. A scene of measuring the weight of things may be represented by an object like a weight and scale.

A file processing apparatus according to the present embodiment may be realized as an electronic equipment, such as a PC, a PDA, a game machine or a portable telephone. Recently, electronic equipment other than PCs can even use file systems primarily designed for PCs. However, PDAs or portable telephones, whose screens are small, or game machines, which are used away from the TV screen, often present much poorer visibility of characters than PCs. Hence, if a file name and the attributes of a file are displayed simply as a character string on the screen, the user may find it difficult to read them when selecting a desired file. This may also develop into some operational difficulties. Moreover, if a large number of files are to be displayed on a small screen, there will be little space left for displaying information on attributes.

In this embodiment, visual limitations are reduced by displaying attributes of a file not through the use of characters but in a form that helps the user's intuitive grasp. Further, operational limitations are also reduced by simplifying the contents of display. Moreover, a new operation method may be presented by incorporating a tilt sensor in the whole or a part of this apparatus.

FITBIT 1002
Fitbit v. Immersion

Another preferred embodiment according to the present invention relates to a method of processing files. This method includes: setting a relative display position of a predetermined object that symbolically represents the files in terms of whether the weight thereof is heavy or light, based on a value of a predetermined attribute for an intended file, in order to represent the value of a predetermined attribute therefor by using a concept of weight; and representing visually the weight by displaying the object at the relative display position on a screen.

Still another preferred embodiment according to the present invention relates also to a method of processing files. This method includes: acquiring values of a predetermined attribute for a plurality of intended files in order to represent the values of a predetermined attribute therefor by using a concept of weight; setting, for each of the plurality of files, a relative display position of a predetermined object that represents symbolically the files in terms of whether the weight thereof is heavy or light, based on the values of a predetermined attribute; and displaying the objects of the plurality of files at the respective display positions on a screen, and expressing visually comparison of the weights of the objects via another object that symbolizes weight measurement.

"Another object that symbolizes weight measurement" is a character that is used to display on the screen a

FITBIT 1002
Fitbit v. Immersion

comparison of weights between files or a measurement of a total weight of a plurality of files. Such an object used for instance is a weighing device, measuring device, balance, balloon or the like which is used for measurement in the real world.

Still apother preferred embodiment according to the present invention relates also to a method of processing files. This method includes: acquiring values of a predetermined attribute for a plurality of files, in order to represent the values of a predetermined attribute for intended files by using a concept of weight; setting a temporary sequence for the plurality of files; determining, based on the temporary sequence, a temporary display position of a predetermined object that symbolically represents the files in terms of whether the weight thereof is heavy or light; displaying an object that corresponds to the plurality of files, at the temporary display position on a screen; comparing the values of a predetermined attribute between adjacent files in the temporary sequence; updating the display position based on a comparison result obtained from the comparing; and representing visually the weight thereof by varying display contents according to the updating.

A "temporary sequence" may be a temporary order of arrangement for convenience' sake, for instance, when displaying on the screen a plurality of files designated by

FITBIT 1002
Fitbit v. Immersion

the user. It may simply be a specified sequence, a random sequence or any other sequence decided irrespective of the sizes of values of an attribute. "Temporary display positions" are temporary positions of display on the screen for instance when the user has designated a plurality of files. A state in which objects are displayed in the specified positions is still an initial display state, and the values of an attribute using the concept of weight are not yet represented.

"Adjacent files" are not necessarily strictly adjacent to each other in their sequence. It suffices if the files are located close to each other in an initial display state and the values of their attribute can be compared with each other. As a result of the comparison, the display position of the object for a file whose value is determined larger may be moved downward, or that of the object for file whose value is determined smaller may be moved upward. In this manner, the values of an attribute may be represented for easier visual confirmation by displaying on the screen the process of sorting a plurality of files according to the values of the attribute.

It is to be noted that any arbitrary combination of the above-described structural components and expressions changed between a method, an apparatus, a system, a computer program, a recording medium having stored computer programs therein, a data structure and so forth are all effective as

FITBIT 1002
Fitbit v. Immersion

and encompassed by the present embodiments.

Moreover, this summary of the invention does not necessarily describe all necessary features so that the invention may also be sub-combination of these described features.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a screen representing values of an attribute related to a plurality of files using a concept of weight according to a first embodiment of the present invention.

FIG. 2 is a block diagram showing functions of a file processing apparatus according to the first embodiment.

FIG. 3 shows a screen displaying objects corresponding to folders.

FIG. 4 shows how objects move from their initial display position to display positions corresponding to their attribute values.

FIG. 5 is a flowchart showing a basic processing flow from folder display to file display in a file processing apparatus.

FIG. 6 illustrates a scene in which the attributes of files to be represented by a concept of weight are switched according to a second embodiment of the present invention.

FIG. 7 is a flowchart showing a process of switching

FITBIT 1002
Fitbit v. Immersion

attributes to be displayed on a screen.

FIG. 8 shows an appearance of a PDA in a third embodiment of the present invention.

FIG. 9A shows a state in which a whole PDA is inclined.

FIG. 9B shows a state in which a whole PDA is inclined.

FIG. 10 is a functional block diagram of a file processing apparatus according to a third embodiment of the present invention.

FIG. 11 is a flowchart showing a process of changing display contents according to the inclination of a PDA.

FIG. 12 shows a screen representing attribute values using an object which is a balance, according to a fourth embodiment of the present invention.

FIG. 13 is a flowchart showing a process of comparing the sums of data sizes of a plurality of files or folders between themselves.

FIG. 14 shows a dialogue screen from which a user instructs a check on free capacity.

FIG. 15 shows a screen for using a "balance" object to confirm whether free capacity can hold the downloaded files or not.

FIG. 16 shows a screen using a "balloon" object.

FIG. 17 shows a screen display visually representing attribute values by the appearance and display positions of suspension weigher and spherical objects according to a fifth embodiment of the present invention.

FITBIT 1002
Fitbit v. Immersion

FIG. 18 is a flowchart showing a process of measuring the sum of data sizes of a plurality of files or folders.

FIG. 19 shows a screen display visually representing attribute values by a box and "particle" objects.

FIG. 20 shows a display state where a plurality of particles are placed in a box at random positions.

FIG. 21 is a flowchart showing a process of classifying a plurality of files as detailed step of S16 and S30 of FIG. 5.

FIG. 22 is a functional block diagram showing a structure of a file processing apparatus according to a seventh embodiment of the present invention.

FIG. 23 is a flowchart showing a process of moving objects, which are a plurality of particles placed in a box, according to attribute values.

FIG. 24 illustrates swaying motions of a PDA in an eighth embodiment of the present invention.

FIG. 25 is a functional block diagram showing a structure of a file processing apparatus according to an eighth embodiment of the present invention.

FIG. 26 is a flowchart showing a process of moving objects, which are a plurality of particles placed in a box, by swaying the whole body of a PDA.

BEST MODE FOR CARRYING OUT THE INVENTION

FITBIT 1002
Fitbit v. Immersion

The invention will now be described based on the following embodiments which do not intend to limit the scope of the present invention but exemplify the invention. All of the features and the combinations thereof described in the embodiments are not necessarily essential to the invention.

First embodiment

In a first embodiment of the present invention, a plurality of files or folders to be managed by a file system are represented by such object forms as spheres or cubes and at the same time the values of an attribute attendant on those files or folders are represented by the weights of those objects. In the real world, where gravitational, buoyant and other forces work, things change their positions according to their "weight", which is their mass. In other words, the weight of a thing surfaces in the form of a variation in its position. Utilizing this characteristic, the sizes of values of an attribute related to files or folders are visually represented on the screen. In an actual processing, objects corresponding to the files or folders are displayed in positions corresponding to the values of the attribute. As a result, the values of the attribute can be grasped by the positions where the objects are displayed.

FIG. 1 shows a screen representing the values of an attribute related to a plurality of files using a concept of

FITBIT 1002
Fitbit v. Immersion

weight according to the first embodiment. On a screen 100, a plurality of files are displayed as spherical objects. First to fourth spheres 102, 104, 106 and 108 not only represent their respective files but also have the weight corresponding to the data size of their respective files. The first to fourth spheres 102, 104, 106 and 108 are displayed in the water 110.

The first to fourth spheres 102, 104, 106 and 108 are displayed in their relative positions corresponding to their respective weights. For example, the first sphere 102, which is the heaviest, is suspended in the water near the water bottom 114. Conversely, the third sphere 106, which is the lightest, is floating near the water surface 112. The metaphoric relationship of the larger the file size, the heavier the object is conceptually acceptable, and the user can recognize at a glance, without any particular assistance, that a file suspended deeper in the water is of a larger file size.

FIG. 2 is a block diagram showing functions of a file processing apparatus according to the first embodiment. In terms of hardware, the file processing apparatus can be realized by a CPU and other elements of a computer. In terms of software, it can be realized by programs having file managing and display processing functions, but drawn and described in FIG. 2 are function blocks that are realized in cooperation with those. Thus, it is understood

FITBIT 1002
Fitbit v. Immersion

by those skilled in the art that these functional blocks can be realized in a variety of forms by hardware only, software only or the combination thereof.

The file processing apparatus 10 includes a file storage 12 for storing a plurality of files and folders, an attribute input unit 14 for receiving attribute values of files, a comparison processing unit 16 for comparing the attribute values, and an instruction receiving unit 18 for receiving instructions from a user. The file storage 12 may be constituted by an auxiliary storage, such as a hard disk on which a plurality of files or folders are stored under the management of a file system or a memory device, such as a detachable non-volatile memory.

The attribute input unit 14 receives attribute values of files or folders selected by the user from the file storage 12 or a node of a network. In this first embodiment, data sizes of selected files are received. The comparison processing unit 16 compares the data size of the selected file with a reference value. The reference value may be a predetermined numerical value corresponding to the water surface 112 or the bottom 114 of the water shown in FIG. 1. For example, the data size corresponding to the water surface 112 may be set to zero bytes, and the data size corresponding to the water bottom 114 may be set to the maximum data size of the files held in the file storage 12. Suppose that the maximum data size is 10 MB and the data

FITBIT 1002
Fitbit v. Immersion

size of a selected file is 5MB, then the file is displayed in a middle position between the water surface 112 and the bottom 114 of the water. When a plurality of files are to be selected, the data size of any one of them may be set as the reference value.

The file processing apparatus 10 further includes an output processing unit 20 for generating images and audio and an object storage 25 for storing image data or three-dimensional data of each object. To be connected to the file processing apparatus 10 are a monitor 32 for displaying images on the screen and a speaker 34 for outputting audio. The object storage 25 may be formed integrally by a single storage unit that also serves as the file storage 12. The output processing unit 20 includes a position determining unit 22 for setting the display positions of objects, a display processing unit 24 for outputting images to the monitor 32, an audio generator 28 for outputting audio to the speaker 34, and an effect generator 26 for changing images or audio.

The position determining unit 22 sets a relative display position of an object for a file selected by the user based on the results of comparison by the comparison processing unit 16. When a plurality of files have been selected, the position determining unit 22 sets relative display positions respectively for them. For example, the position of the heaviest file of the plurality of files is

FITBIT 1002
Fitbit v. Immersion

set to the water bottom 114, the position of the lightest file of the plurality of files is set to the water surface 112, and the relative positions of the other files are determined between the water bottom 114 and the water surface 112.

The display processing unit 24 acquires image data or three-dimensional data necessary for the display of spheres or cubes from the object storage 25 and displays them in their relative positions set on the screen 100. The display processing unit 24 displays an image of the water 110 as the background. When a plurality of files have been selected, the display processing unit 24 represents a comparison of their weights by displaying the spheres in their relative positions. To show how the spheres are adrift in the water, the display processing unit 24 may move the objects up and down and right and left in the display. In this case, the objects are moved vertically or horizontally within a range of a few pixels around their respective display positions set by the position determining unit 22.

The instruction receiving unit 18 may receive instructions from the user intending to change the display positions of objects. In such a case, the effect generator 26 causes the position determining unit 22 and the display processing unit 24 to carry out a processing to effect the change to the position of the object based on the user instructions. The instruction receiving unit 18 receives

FITBIT 1002
Fitbit v. Immersion

instructions from the user via a control device, such as a mouse or keyboard of a PC or a controller of a game machine. The effect generator 26 determines an object which is to be changed, and calculates the amount of change therefor according to the instructions received by the instruction receiving unit 18 and then sends the results to the position determining unit 22 and the display processing unit 24.

For example, when the user instructs that a motion of a sphere thrown into the water be displayed, the effect generator 26 specifies the sphere for which the display must be changed, and the position determining unit 22 sets a range for the motion of the sphere such that a motion of the sphere dropping into the water and sinking can be displayed. And the display processing unit 24 displays images of a splash, ripples and the like that may accompany such a motion. The motion contents are also conveyed from the effect generator 26 to the audio generator 28, which outputs sounds corresponding to the motion to the speaker 34. The audio generator 28 may produce sounds, using volumes and tones that correspond to the weight of the sphere, namely, the data size of the file.

For example, if the user instructs that the water be stirred or a sphere be flipped, the position determining unit 22 and the display processing unit 24 will perform a necessary processing to display images of the sphere being swayed up and down or right and left and the water surface

FITBIT 1002
Fitbit v. Immersion

112 undulating. In this case, too, the motion contents are conveyed from the effect generator 26 to the audio generator 28, which produces necessary sounds.

FIG. 3 shows a screen displaying objects corresponding to folders. In the present embodiment, folders are represented by cubic objects to be distinguished in appearance from files represented by spheres. Displayed on a screen 100 are how first to fifth cubes 200, 202, 204, 206 and 208 are adrift in the water 110. These cubes are displayed in relative positions between the water surface 112 and the water bottom 114 corresponding to their respective attribute values. The appearances of these cubes are defined by three-dimensional data, and the display processing unit 24 displays the cubes rotating little by little so that the faces thereof change their orientation with time.

When the user selects the third cube 204 via the instruction receiving unit 18, a folder name 212 is displayed on the screen 100. Here, a character string "INBOX" is displayed as the folder name 212. Now the user gives instructions to open the third cube 204 via the instruction receiving unit 18, and the display will show the third cube 204 opening and releasing first to third spheres 102, 104 and 106 from within it. The first to third spheres 102, 104 and 106 represent the files contained in the folder represented by the third cube 204.

FITBIT 1002
Fitbit v. Immersion

FIG. 4 shows how objects move from their initial display position to the display positions corresponding to their attribute values. The first to third spheres 102, 104 and 106, which have been released from the third cube 204 shown in FIG. 3, move to the relative display positions corresponding to their respective data sizes. The trajectories thereof are calculated by the position determining unit 22. When the user selects the second sphere 104 via the instruction receiving unit 18, a file name 213 is displayed on the screen 100. Here, a character string "10/10 RECEIVED MAIL" is displayed as the file name 213.

FIG. 5 is a flowchart showing a basic processing flow from folder display to file display in the file processing apparatus 10. The attribute input unit 14 refers to the whole directory in the file storage 12 (S10) and acquires an attribute value of each folder (S12). According to the present embodiment, the data size of each folder is acquired. The position determining unit 22 sets the display position of a cube for each folder according to the acquired data size (S14). The display processing unit 24 acquires object data, such as image or three-dimensional data on each cube, from the object storage 25 (S16) and displays it in the position set by the position determining unit 22 (S18).

Until the user selects any of the cubes via the instruction receiving unit 18 (S22N), the display processing

FITBIT 1002
Fitbit v. Immersion

unit 24 keeps displaying the cubes while the orientation and position of the faces thereof change little by little (S20). When the user selects one of the cubes and instructs the opening thereof (S22Y), the display processing unit 24 displays the process of the cube releasing the spheres (S24). The attribute input unit 14 acquires the attribute value of each file contained in the folder of the opening cube (S26), and the position determining unit 22 sets the display positions of the spheres according to the attribute value of each file (S28).

The display processing unit 24 acquires object data on the spheres from the object storage 25 (S30) and displays them near the selected cube, which are their initial positions (S32). The position determining unit 22 generates the trajectories to the set display positions and the display processing unit 24 displays the process of the spheres moving along the trajectories to the set display positions. Until the user selects any of the spheres (S36N), the spheres adrift and swaying in the water is displayed (S34). The user selects one of the spheres (S36Y) and uses it in such a way as opening the file (S38).

By implementing the above structure, data sizes of files or folders are represented using a concept of weight. By presenting files and folders in a display method that appeals to intuitive perception, a graphical file browser is realized.

FITBIT 1002
Fitbit v. Immersion

Second embodiment

A second embodiment of the present invention has a function of switching by user instructions the attributes of files or folders which are to be represented by a concept of weight. Otherwise, the structure and functions thereof are the same as those of the first embodiment.

FIG. 6 illustrates a scene in which the attributes of files to be represented by a concept of weight are switched according to the second embodiment. On a screen 100, the user selects an attribute by pressing one of Size button 120, Date button 122, Type button 124 and Importance button 126. When selecting the data size of files or folders as the attribute as in the first embodiment, click on the Size button 120. When selecting the date and time of data preparation or updating, click on the Date button 122. When selecting the type of files or folders, click on the Type button 124. When selecting the importance of files or folders determined arbitrarily by the user, click on the Importance button 126.

FIG. 6 shows a state in which the Date button 122 has been selected. At this time, a level display 130 corresponding to the type of button selected appears on the left side of the screen 100. The level display 130 shows visually the correspondence of older dates with heavier weights and newer dates with lighter weights, so that an old

FITBIT 1002
Fitbit v. Immersion

or new date of preparation may be grasped at a glance by seeing how far a sphere sinks in the water. Referring to FIG. 6, it can be easily grasped visually that a third sphere 106 is the oldest file and a fourth sphere 108 is the newest file.

Similarly, when the Type button 124 has been selected, the spheres are displayed in depth positions predetermined according to the types of the files. The relationship between the types of files and the weights is indicated by the level display 130. When the Importance button 126 is selected, the spheres for files with greater importance are displayed in positions of deeper submersion.

FIG. 7 is a flowchart showing a process of switching attributes to be displayed on the screen. A basic processing flow in a file processing apparatus 10 according to the second embodiment is as shown in FIG. 5. FIG. 7 represents a flow to be replaced with S20 and S34 of FIG. 5. When user instructions to switch attributes are received via the instruction receiving unit 18 (S50Y), the attributes to be represented by weight are switched according to the instructions (S52). The attribute input unit 14 acquires the attribute values after the switching (S54), and the position determining unit 22 updates the display positions of the objects according to the acquired values (S56).

Third embodiment

FITBIT 1002
Fitbit v. Immersion

A file processing apparatus 10 according to a third embodiment of the present invention is a PDA. FIG. 8 shows an appearance of the PDA. On the screen of a PDA 140, too, the values of an attribute concerning files or folders are represented by the weight of spheres thrown into the water. Since the screen of a PDA is relatively small, a display of multiple character strings cannot be grasped at a glance. Thus, it helps intuitive recognition better if the attribute values for the files or folders are represented by the weights of objects rather than by character strings.

This PDA 140 has a built-in tilt sensor, and the positions of the objects change according to the inclination of the body of the PDA 140. Thus, files may be controlled by operating the PDA 140 with one hand. If the screen of the PDA 140 is an x-y plane and an axis vertical to this plane is a z-axis, then the angle between the z-axis and the horizontal plane is the inclination of the PDA 140.

FIG. 9 shows a state in which the whole PDA 140 is inclined. That is, from a state as shown in FIG. 9A, one end of the PDA 140 is inclined downward and the other end thereof upward into a state as shown in FIG. 9B. A sensor detects an angle θ between the z-axis and the horizontal plane as the inclination of the PDA 140, and when the inclination exceeds a predetermined threshold value, the spheres in the water displayed on the screen of the PDA 140 change their positions. When the inclination is in the x-

FITBIT 1002
Fitbit v. Immersion

axis direction, the spheres move in the x-axis direction, and when the inclination is in the y-axis direction, they move in the y-axis direction.

Where the inclination does not exceed the threshold value, buoyancy is assumed to be working in the z-axis direction and the spheres are displayed in such a manner that they are adrift in random directions in the x-y plane. For the first time when the inclination has exceeded the threshold value, the difference in weight is represented by a move in the y-axis direction. When the inclination changes in the x-axis direction, the display may, for instance, be produced in such a way that the screen scrolls to the left or to the right. When not all of a plurality of spheres selected by the user fall within the screen, the area to be displayed may be switched by scrolling the screen rightward or leftward. Through an operation like this, the user can either display or not display on the screen certain spheres from among the plurality of spheres, thus selecting a desired sphere, or a file.

FIG. 10 is a functional block diagram of a file processing apparatus 10 according to the third embodiment. This third embodiment differs from the first embodiment in that the file processing apparatus 10 includes an inclination detector 30 for detecting its inclination and that it has a monitor 32 and a speaker 34 built-in. The inclination detector 30 includes a change detector 33 for

FITBIT 1002
Fitbit v. Immersion

detecting the magnitude of inclination of a PDA 140 as a whole, which is a file processing apparatus 10 operated by the user, and an inclination determining unit 31 for determining the direction of the inclination. The inclination detector 30 may be structured in such a manner that it is detachable from the file processing apparatus 10. When the change detector 33 has detected an inclination surpassing the threshold value, a position determining unit 22 updates the relative display positions for the objects according to the direction of the inclination.

FIG. 11 is a flowchart showing a process of changing display contents according to the inclination of the PDA 140. A basic processing flow in the file processing apparatus 10 according to the third embodiment is as shown in FIG. 5. FIG. 11 represents a flow to replace S20 and S34 of FIG. 5. When the user inclines the PDA 140 (S60Y) and the inclination exceeds a predetermined threshold value (S62Y), the position determining unit 22 updates the display positions along the coordinate axis in the direction of the inclination (S64).

Fourth embodiment

In a fourth embodiment of the present invention, the values of an attribute concerning files or folders are represented in such a manner that a comparison is made using another object besides the objects representing the

FITBIT 1002
Fitbit v. Immersion

attribute values themselves. Another object meant here is a balance for instance, which may change in form or position according to the balance of weight of a plurality of objects to be compared.

FIG. 12 shows a screen display representing the attribute values, using another object, namely, a balance. A first sphere 152 and a second sphere 154 are placed on the left-hand scale plate of the balance 150. A third sphere 156 is placed on the right-hand scale plate of the balance 150. The first to third spheres 152, 154 and 156 represent their respective files or folders. In this illustration, the left-hand scale plate is hanging lower with heavier objects on, so that it can be seen at a glance that the sum of the files represented by the first and second spheres 152 and 154 have a larger data size than the file represented by the third sphere 156.

The user may set a new file or folder to be compared by adding any of fourth to seventh spheres 151, 153, 155 and 157 on the left-hand scale plate or the right-hand scale plate of the balance 150. Thus, in this fourth embodiment, a sum of data sizes of files or folders may be compared with the data size of another file or folder. Moreover, by placing a plurality of spheres on each of the scale plates, the sums of data sizes of files or folders may be compared with each other. Comparison of weights of objects among themselves is processed by the comparison processing unit 16

FITBIT 1002
Fitbit v. Immersion

of FIG. 2. The positions of objects are calculated by the position determining unit 22, and the images to be displayed are processed by the display processing unit 24.

Any of the spheres may be utilized as an object to show the size of free area rather than the data size of a file or folder. For example, the third sphere 156 may be used to represent the size of free area in the total memory capacity of the file storage 12. In such a case, it can be easily seen from FIG. 12 that the files or folders represented by the first and second spheres 152 and 154 cannot be stored in the file storage unit 12 because it can be easily grasped that their data size surpasses the capacity of the file storage unit 12.

FIG. 13 is a flowchart showing a process of comparing the sums of data sizes of a plurality of files or folders between themselves. A basic processing flow in a file processing apparatus 10 according to the fourth embodiment is as shown in FIG. 5. FIG. 13 represents a flow to replace S20 and S34 of FIG. 5.

When the user instructs via the instruction receiving unit 18 that a comparison be made between data sizes of combinations of a plurality of files or folders (S90Y), the sum of data sizes for one of the combinations to be compared is calculated (S92) and the thus calculated sum is compared with the data size of the other combination (S94). According to the result of this comparison, the position

FITBIT 1002
Fitbit v. Immersion

determining unit 22 sets the display positions for the spheres (S96). The display processing unit 24 acquires object data on the balance from the object storage 25 as measuring objects (S97) and displays the balance and the plurality of spheres on the screen (S98).

FIG. 14 shows a dialogue screen from which the user instructs a check on free capacity. When the user downloads a desired file from a network, the balance object of this fourth embodiment may be used as an interface for confirming whether the data size of the file can be locally stored or not. On this screen, the user who is about to download files named "Game AAA" and "Game BBB" from a network is now being asked to perform a free capacity check. Upon a click on a check button 159 by the user operating a pointer 210, the screen will switch to a screen as shown in FIG. 15.

FIG. 15 shows a screen for using a "balance" object to confirm whether free capacity can hold the downloaded files or not. On this screen, first and second spheres 152 and 154 representing the files to be downloaded are placed on the left-hand scale plate of the balance, and a third sphere 156 representing the free capacity is placed on the right-hand scale plate of the balance. In this illustration, the left-hand scale plate is hanging lower with heavier objects on, so that it can be seen at a glance that the data size of the files to be downloaded is larger than the free capacity. Further, the names of the files and a character string,

FITBIT 1002
Fitbit v. Immersion

"Free Space", may be displayed near the respective spheres.

FIG. 16 shows a screen using a "balloon" object as an interface with similar functions as the "balance" object in FIG. 15. Another object meant here is a balloon with spheres hanging from it, which changes its position according to the balance of buoyancy and gravity. If gravity is a weight in the positive direction, buoyancy is a weight in the negative direction. The screen in FIG. 16 displays a state in which a plurality of spheres 172 representing a plurality of files, respectively, are suspended with a string below a balloon 170. The plurality of spheres 172 show in terms of weight the data size of a file or folder selected by the user. If the user selects a plurality of files or folders, then the total of their data sizes will be shown as the total weight. The plurality of spheres 172 are suspended in the air by the buoyancy produced by the gas inside the balloon 170.

The buoyancy of the balloon 170 indicates the size of free capacity in the file storage 12 in the negative direction. If the data size of a file or folder to be measured is small enough to go into the free capacity, the display thereof will be such that the plurality of spheres 172 are lifted up from the ground by the balloon 170. Conversely, if the data size of a file or folder is larger than the free capacity, then the display will show the plurality of spheres 172 stuck to the ground. In this

FITBIT 1002
Fitbit v. Immersion

manner, a visual representation using a "balance" or "balloon" object is made for the user so that prior to starting downloading, the user can easily see whether or not the free capacity can accommodate the file or folder to be downloaded. Also, this visual simulation for proper selection can be used to easily find which combination of files can be stored before starting to download them.

When the free capacity is confirmed, downloading is started based on user instructions. A user command therefor may be given either by a dialogue screen as shown in FIG. 14 that prompts the start of downloading or a command for action, such as the user's bursting the balloon 170. When the balloon has burst, the position determining unit 22 and the display processing unit 24 carry out such processing as to display the motion of the suspended spheres dropping to the ground. Moreover, the balloon bursting may be displayed for instance when a non-volatile memory is removed from this apparatus to record a file or folder.

Fifth embodiment

In a fifth embodiment of the present invention, the values of an attribute concerning files or folders are represented in such a manner that measuring is done using still another object besides the objects representing the attribute values themselves. Still another object meant here is a suspension weigher for instance, which may change

FITBIT 1002
Fitbit v. Immersion

in form or position according to the weight measured of selected objects. Use of a suspension weigher may also allow the user to read the specific value of the weight.

FIG. 17 shows a screen display visually representing the attribute values by the appearance and display positions of the suspension weigher and spherical objects. A plurality of first spheres 162 are placed on the scale plate of a suspension weigher 160. These spheres represent their respective files or folders, and the weight measured by the suspension weigher 160 represents the total of the data sizes of these files or folders. Since a plurality of spheres may be placed on the scale place, the sum of a plurality of files or folders can be handled in this fifth embodiment.

Changes in the position of the first spheres 162, the scale reading of the suspension weigher 160, and the form or appearance image of the suspension weigher 160 are processed by the position determining unit 22 and the display processing unit 24 of FIG. 2. The user moves a second sphere 163 onto the scale plate by operating a pointer 210 on the screen. The user may also add an object to be measured from among a plurality of third spheres 161. Instructions to increase or decrease the number of spheres are given by moving the pointer 210.

FIG. 18 is a flowchart showing a process of measuring the sum of data sizes of a plurality of files or folders. A

FITBIT 1002
Fitbit v. Immersion

basic processing flow in a file processing apparatus 10 according to the fifth embodiment is as shown in FIG. 5. FIG. 18 represents a flow to replace S20 and S34 of FIG. 5.

When the user instructs a data size measurement (S100), the attribute input unit 14 calculates the sum of data sizes of files or folders represented by the spheres placed on the scale plate (S102). According to the result of this calculation, the position determining unit 22 sets the display positions for the spheres (S104). The display processing unit 24 acquires object data on the suspension weigher from the object storage 25 as measuring objects (S106) and not only displays this data and the spheres in the predetermined positions but also indicates the calculated sum of data sizes on the scale (S108).

Sixth embodiment

In a sixth embodiment of the present invention, the values of an attribute concerning files or folders are represented in such a manner that classification is done using still another object besides the objects representing the attribute values themselves. Still another object meant here is a box for instance, which the user can intuitively associate with a folder. Moreover, files or folders to be classified are represented by particles placed in a box. In this sixth embodiment, too, the data size which serves as an attribute value is shown in terms of weight.

FITBIT 1002
Fitbit v. Immersion

FIG. 19 shows a screen display visually representing the attribute values by a box and "particle" objects. A plurality of particles representing files or folders to be classified are placed in a box 180. These particles are divided into three appearance types according to their respective weights. A first particle 182 is a file of relatively large data size, whereas a third particle 186 is a file of relatively small data size. A second particle 184 has a data size in between them. As shown in FIG. 19, the plurality of particles placed in the box 180 are displayed in random arrangement. In this manner, a rough visual classification is made of the files contained in a specific folder. The classification meant here need not be highly accurate but serves its purpose if the user can grasp a rough classification at a glance. The objects in this sixth embodiment are classified into three pattern types, but any colors or patterns or the like may be used so long as they effect a rough classification.

A file processing apparatus 10 according to this sixth embodiment has a structure similar to the one shown in FIG. 2 of the first embodiment. The comparison processing unit 16 in FIG. 2 classifies a plurality of files into a plurality of groups according to their respective sizes of attribute values. The display processing unit 24 acquires "appearance" object data on the groups from the object storage 25 and displays the objects.

FITBIT 1002
Fitbit v. Immersion

FIG. 21 is a flowchart showing a process of classifying a plurality of files as detailed steps of S16 and S30 of FIG. 5. In this sixth embodiment, a plurality of files are roughly classified into three groups, which are then distinguished in appearance by their respective colors and patterns. The classification is made using the following procedure, for instance. First, the comparison processing unit 16 detects a maximum value and a minimum value from each of the attribute values of the files (S150). The range from the maximum value to the minimum value is divided into a plurality of ranges, such as three ranges, and the boundaries of the respective ranges are set as the boundaries for grouping (S152). The division may be into equal parts or any other way under predetermined rules. A plurality of files are thus classified into three groups by comparing an attribute value of each file with the boundary values (which correspond to "a reference value" in WHAT IS CLAIMED of this patent specification) (S154). After this grouping according to the attribute values, the display processing unit 24 acquires object data on each of the groups from the object storage 25 (S156).

If file types or file creators as attribute values are to be represented by weight, a plurality of files may be grouped by file type or file creator. Moreover, for example, when the attribute values represent dates and times, such as the dates and times of file preparation or updating, the

FITBIT 1002
Fitbit v. Immersion

values of the oldest and the newest dates and times may be detected from the attribute values of the files at S150.

Seventh embodiment

In a seventh embodiment of the present invention, the values of an attribute concerning files or folders are represented by particles placed in a box just as in the sixth embodiment. In this seventh embodiment, too, the data size, or an attribute value, is shown in terms of weight and at the same time each particle is displayed in a position corresponding to its weight. Initially, the particles are displayed temporarily in random positions as shown in FIG. 19. Then the positions of accumulation of the particles are changed according to their weights and the particles are visually classified by the position of accumulation as shown in FIG. 21. In FIG. 19 and FIG. 21, the particles are classified in three appearance types, for convenience, just as in the sixth embodiment, but it goes without saying that any other examples with different modes of classification can also be used.

FIG. 22 is a functional block diagram showing a structure of a file processing apparatus 10 according to the seventh embodiment. An output processing unit 20 in this seventh embodiment differs from the first to sixth embodiments in that it includes a comparison processing unit 16 and an order setting unit 17. The order setting unit 17

FITBIT 1002
Fitbit v. Immersion

sets a temporary order for a plurality of files to be classified. This temporary order, which is determined without regard to the values of an attribute concerning the plurality of files, may be either a random order or an order selected by the user. In the temporary order, the position determining unit 22 determines temporary display positions for the plurality of files and the display processing unit 24 displays the "particle" objects in the temporary display positions.

The comparison processing unit 16 compares attribute values for adjacent files in the temporary order. Adjacent files meant here may not have to be strictly adjacent, but may be a plurality of files selected arbitrarily. In effect, a plurality of files are classified into a plurality of small groups, and the attribute values are compared group by group sequentially. Based on the results of the comparison, the order setting unit 17 updates the order of the plurality of files. For example, when the order of a plurality of files is to be updated in an ascending order of the attribute values thereof, the order will be reversed if a file which is behind another file in order has a smaller attribute value than the other.

As the above-described updating of sequence between adjacent files is repeated, the order as a whole is arranged into an ascending order with the results of group-by-group comparison reflected in it gradually. This process of

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updating the order, which applies the principle of rearrangement by bubble sort, is displayed progressively on the screen. Thus, the user can visually grasp how a plurality of particles are gradually being classified according to their weights. The visual changes in the display are processed by an effect generator 26, the position determining unit 22 and the display processing unit 24.

FIG. 23 is a flowchart showing a process of moving objects, which are a plurality of particles placed in a box, according to attribute values. A basic processing flow in a file processing apparatus 10 according to this seventh embodiment is as shown in FIG. 5. FIG. 23 represents a flow to replace S20 and S34 of FIG. 5. At S14 and S28 in FIG. 5, the order setting unit 17 determines a temporary order and the position determining unit 22 sets temporary display positions in the temporary order. At S18 and S32, the objects are displayed temporarily. In FIG. 23, when instructions are given to rearrange in an ascending order (S68), the comparison processing unit 16 compares the attribute values between adjacent files in a temporary order and the order setting unit 17 updates the order based on the results of comparison (S70). In the updated order, the position determining unit 22 changes the display position of each object (S72) and the display processing unit 24 displays the particles in their respective positions (S74).

FITBIT 1002
Fitbit v. Immersion

S70 to S74 are repeated until there is no longer order change (S76).

Eighth embodiment

A file processing apparatus 10 according to an eighth embodiment of the present invention is realized as a PDA 140. The user can instruct a box 180 to sway by swaying the whole body of the PDA 140. In response to the sway, a plurality of files, represented by particles, are classified into groups.

FIG. 24 illustrates the swaying motions of a PDA 140. The user can sway the whole PDA 140 up and down or right and left relative to the screen. The PDA 140, which has a built-in vibration sensor, detects the magnitude of sway. Whenever a sway is detected, the display positions for the particles are updated gradually, with the particles moving to the positions of accumulation according to their data sizes.

FIG. 25 is a functional block diagram showing a structure of a file processing apparatus 10 according to the eighth embodiment. An output processing unit 20 in this eighth embodiment differs from the one in the seventh embodiment in that it further includes a vibration detector 35.

The vibration detector 35 detects the sway of a predetermined position of a file processing unit 10 which is

FITBIT 1002
Fitbit v. Immersion

operated by the user. Although the predetermined position of a file processing unit 10 in this eighth embodiment is the whole body of the PDA 140, it may be a controller if the applicable equipment is a game machine. The vibration detector 35 may employ a piezo-electric element to detect the sways, and the sways to be detected may be any of up and down, right and left, and vertical sways relative to the screen. Whenever the vibration detector detects a sway exceeding a predetermined threshold value, the vibration detector 35 causes the comparison processing unit 16 to perform a comparison processing, the order setting unit 17 to perform a rearrangement processing, the position determining unit 22 to perform an update processing of display positions, and the display processing unit24 to perform a display processing.

FIG. 26 is a flowchart showing a process of moving objects, which are a plurality of particles placed in a box, by swaying the whole body of a PDA. A basic processing flow in a file processing apparatus 10 according to the eighth embodiment is as shown in FIG. 5. FIG. 26 represents a flow to replace S20 and S34 of FIG. 5. At S14 and S28 in FIG. 5, the order setting unit 17 determines a temporary order and the position determining unit 22 sets temporary display positions in this temporary order. At S18 and S32, the objects are displayed temporarily. Referring to FIG. 26, when the vibration detector 35 detects a sway exceeding a

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threshold value (S80), the comparison processing unit 16 compares the values of an attribute between adjacent files in a temporary order and the order setting unit 17 updates the order based on the results of comparison (S82). In the updated order, the position determining unit 22 changes the display position of each object (S84) and the display processing unit 24 displays the particles in their respective positions (S86).

Since the processings of S18 to S20 and S32 to S34 in FIG. 5 are repeated, the processings of S80 to S86 in FIG. 26, which belong to those steps, are also repeated, so that the positions of particles are changed whenever a sway of the PDA 140 is detected. It is to be noted that in this eighth embodiment, the rearrangement in an ascending order is accomplished gradually by changing the positions of particles whenever a sway of the PDA 140 is detected, but in other embodiments, the process of rearrangement may be carried out all at once. Namely, when a sway of the PDA 140 is detected for the first time, the processing for rearranging the particles may be carried out until the rearrangement in an ascending order is completed without waiting for the detection of a next sway. In such a case, the rearrangement may be performed by a sort method, such as a simple selection method.

The present invention has been described based on the embodiments which are only exemplary. It is understood by

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Fitbit v. Immersion

those skilled in the art that there exist other various modifications to the combination of each component and process described above and that such modifications are encompassed by the scope of the present invention. Such modified examples will be described hereinbelow.

In each of the above-described embodiments, the objects to be compared or measured are files or folders stored in a storage in the file processing apparatus 10. As a modified example, the objects may be files or folders stored in a node of a network. In such a case, the file processing apparatus 10 is provided with a communication function for accessing the network. The file processing apparatus 10 may display network files and local files on the same screen without making distinction. As a result, the user can handle files and folders without being conscious of the network.

The third embodiment is structured such that the inclination of a PDA 140 as a whole is detected and the positions of objects are changed according to the inclination. As another modified example, the inclination of a predetermined position of a system, such as the controller of a game machine, may be detected. Such a controller may have a built-in tilt sensor.

In each of the embodiments, the function for changing the positions or forms of objects in response to user instructions has been described. As still another

FITBIT 1002
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modification, sound effect may be produced along with these changes in the display. For example, such sound effects may include the sound of a sphere bouncing, the sound of water splashing, or the sound of a balloon bursting. Moreover, such other directing and manipulating effects as vibration of the controller or stronger repulsion of the stick of a game machine may be added to the above sound effect.

In the eighth embodiment, the user can instruct a classification of files by swaying the whole PDA 140. A file processing apparatus 10 according to still another modified example may have a function for instructing a classification not via the vibration detector 35 but via a control device, such as a keyboard, a mouse or a controller of a game machine.

In the seventh and eighth embodiments, the rearrangement of files is processed by utilizing the bubble sort method. As still another modified example, another sorting method, such as simple sort, quick sort or shaker sort, may be employed. In the seventh and eighth embodiments, objects are initially displayed in random display positions as the initial display state. As still another modified example, the objects may be displayed in positions corresponding to the values of an attribute from the beginning.

In the sixth embodiment, the arrangement is such that objects are roughly classified into appearances

FITBIT 1002
Fitbit v. Immersion

corresponding to their weights, whereas in the seventh and eighth embodiments, the objects are subjected to rearrangements corresponding to their weights. As still another modified example, a structure may be such that the objects are first classified roughly into appearances corresponding to their weights and then further subjected to rearrangements corresponding to their weights.

In the sixth embodiment, a plurality of particles placed in a box 100 are displayed in random positions. As still another modified example, the plurality of particles in the box 100 may, for instance, be divided into three ranges of lower, middle and upper ranges, and the position determining unit 22 as shown in FIG. 2 may set the display position of first particles 102 in the lower range, the display position of second particles 104 in the middle range, and the display position of third particles 106 in the upper range. In a modified example like this, the display positions of particles vary from group to group, so that the user can roughly classify files by the difference in display position.

Although the present invention has been described by way of exemplary embodiments, it should be understood that many changes and substitutions may further be made by those skilled in the art without departing from the scope of the present invention which is defined by the appended claims.

FITBIT 1002
Fitbit v. Immersion

CLAIMS

1. A file processing apparatus, including:

an attribute input unit which acquires a value of an attribute for at least one file in order to represent a value of a predetermined attribute for an intended file by using a concept of weight;

a comparison processing unit which compares the value of an attribute with a reference value;

a position determining unit which sets, based on a result obtained from said comparison processing unit, a relative display position of a predetermined object that represents symbolically the weight; and

a display processing unit which visually represents the value of the attribute in terms of whether the weight is heavy or light, by displaying the object at the display position on a screen set by said position determining unit.

2. A file processing apparatus according to Claim 1, further including an inclination detector which detects inclination of a predetermined region in the file processing apparatus operated by a user, wherein according to the inclination detected by said inclination detector said position determining unit varies the relative display position.

3. A file processing apparatus according to Claim 1, wherein

FITBIT 1002
Fitbit v. Immersion

said attribute input unit acquires values of the attribute for a plurality of files, said comparison processing unit sets a value of an attribute for at least one of the plurality of files to the reference value, said position determining unit sets relative display positions of a plurality of objects corresponding to the plurality of files, respectively, and wherein said display processing unit displays the plurality of files at the respective display positions and visually represents the comparison of weights of the files via another object representative of the measurement of the weights.

4. A file processing apparatus according to Claim 3, wherein said comparison processing unit sets, as the reference value, a size of a storage area that stores at least one file, said position determining unit sets a relative display position of an object indicative of the storage area according to the size of the storage area, and wherein said display processing unit visually expresses the comparison of data size between the at least one file and the storage area via the another object.

5. A file processing apparatus according to Claim 1, wherein said attribute input unit acquires values of an attribute for a plurality of files and said comparison processing unit classifies the plurality of files into a plurality of groups

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Fitbit v. Immersion

according to the respective values of the attribute, and wherein said display processing unit displays the object in an appearance corresponding to the respective groups.

6. A file processing apparatus according to Claim 1, wherein said attribute input unit acquires values of an attribute for a plurality of files, said comparison processing unit classifies the plurality of files into a plurality of classes and sequentially compares the values of an attribute for each class, wherein, after relative display positions are temporarily determined respectively as positions that initially display objects for the plurality of files, said position determining unit sequentially updates the relative display positions in a manner such that comparison results for each class are reflected for each class, and wherein said display processing unit varies the display of the objects according to said updating after the plurality of files are displayed at the temporally determined relative display positions.

7. A file processing apparatus according to Claim 5, further including a vibration detector which detects a swaying motion at a predetermined region of the file processing apparatus operated by a user, wherein said comparison processing unit performs a comparison processing when the motion is detected, and said position determining unit

FITBIT 1002
Fitbit v. Immersion

updates the relative display position according to the result obtained from said comparison processing unit.

8. A file processing apparatus according to Claim 6, further including a vibration detector which detects a swaying motion at a predetermined region of the file processing apparatus operated by a user, wherein said comparison processing unit performs a comparison processing when the motion is detected, and said position determining unit updates the relative display position according to the result obtained from said comparison processing unit.

9. A file processing apparatus according to Claim 1, further including:

an instruction receiving unit which receive an instruction from a user intending to change the display position of the object; and

An effect generator which causes, based on the instruction, said position determining unit and said display processing unit to process a change in any of position, shape and appearance of the object.

10. A method of processing files, including:

setting a relative display position of a predetermined object that symbolically represents the files in terms of whether the weight thereof is heavy or light, based on a

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value of a predetermined attribute for an intended file, in order to represent the value of a predetermined attribute therefor by using a concept of weight; and

representing visually the weight by displaying the object at the relative display position on a screen.

11. A method of processing files according to Claim 10, further including:

detecting inclination of a predetermined apparatus operated by a user; and

varying the relative display positions according to the inclination.

12. A method of processing files, including:

acquiring values of a predetermined attribute for a plurality of intended files in order to represent the values of a predetermined attribute therefor by using a concept of weight;

setting, for each of the plurality of files, a relative display position of a predetermined object that represents symbolically the files in terms of whether the weight thereof is heavy or light, based on the values of a predetermined attribute; and

displaying the objects of the plurality of files at the respective display positions on a screen, and expressing visually comparison of the weights of the objects via

FITBIT 1002
Fitbit v. Immersion

another object that symbolizes weight measurement.

13. A method of processing files according to Claim 12, wherein said acquiring further acquires a size of a storage area that stores at least one file, and said setting sets the relative display position of at least one object corresponding to the at least one file, based on a comparison result obtained by comparing a data size between the at least one object and the storage area, and wherein said displaying and expressing represents visually the comparison result via the another object.

14. A method of processing files, including:

acquiring values of a predetermined attribute for a plurality of files, in order to represent the values of a predetermined attribute for intended files by using a concept of weight;

setting a temporary sequence for the plurality of files;

determining, based on the temporary sequence, a temporary display position of a predetermined object that symbolically represents the files in terms of whether the weight thereof is heavy or light;

displaying an object that corresponds to the plurality of files, at the temporary display position on a screen;

comparing the values of a predetermined attribute

FITBIT 1002
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between adjacent files in the temporary sequence;

updating the display position based on a comparison result obtained from said comparing; And

representing visually the weight thereof by varying display contents according to said updating.

15. A method of processing files according to Claim 14, further including:

detecting a swaying motion of a predetermined apparatus operated by a user;

performing said comparing when the swaying motion is detected in said detecting;

updating a relative display position of the object according to the comparison result.

16. A method of processing files according to Claim 10, further including:

acquiring an instruction from a user who intends to cause a display position of the object to be changed; and

changing at least one of position, shape and appearance of the object, based on the instruction.

17. A program executable by a computer, the program including the functions of:

setting a relative display position of a predetermined object that symbolically represents the files in terms of

FITBIT 1002
Fitbit v. Immersion

whether the weight thereof is heavy or light, based on a value of a predetermined attribute for an intended file, in order to represent the value of a predetermined attribute therefor by using a concept of weight; and

representing visually the weight by displaying the object at the relative display position on a screen.

18. A program executable by a computer, the program including the functions of:

acquiring values of a predetermined attribute for a plurality of intended files in order to represent the values of a predetermined attribute therefor by using a concept of weight;

setting, for each of the plurality of files, a relative display position of a predetermined object representing symbolically the files in terms of whether the weight thereof is heavy or light, based on the values of a predetermined attribute; and

displaying on a screen the objects of the plurality of files at the respective display positions, and expressing visually comparison of the weights of the objects via another object that symbolizes weight measurement.

19. A program executable by a computer, the program including the functions of:

acquiring values of a predetermined attribute for a

FITBIT 1002
Fitbit v. Immersion

plurality of files, in order to represent the values of a predetermined attribute for intended files by using a concept of weight;

setting a temporary sequence for the plurality of files;

determining, based on the temporary sequence, a temporary display position of a predetermined object that symbolically represents the files in terms of whether the weight thereof is heavy or light;

displaying an object that corresponds to the plurality of files, at the temporary display position on a screen;

comparing the values of a predetermined attribute between adjacent files in the temporary sequence;

updating the display position based on a comparison result obtained from said comparing; and

representing visually the weight thereof by varying display contents according to said updating.

20. A computer-readable recording medium which stores a program executable by a computer, the program including the functions of:

setting a relative display position of a predetermined object that symbolically represents the files in terms of whether the weight thereof is heavy or light, based on a value of a predetermined attribute for an intended file, in order to represent the value of a predetermined attribute

FITBIT 1002
Fitbit v. Immersion

therefor by using a concept of weight; and

representing visually the weight by displaying the object at the relative display position on a screen.

21. A computer-readable recording medium which stores a program executable by a computer, the program including the functions of:

acquiring values of a predetermined attribute for a plurality of intended files in order to represent the values of a predetermined attribute therefor by using a concept of weight;

setting, for each of the plurality of files, a relative display position of a predetermined object representing symbolically the files in terms of whether the weight thereof is heavy or light, based on the values of a predetermined attribute; and

displaying on a screen the objects of the plurality of files at the respective display positions, and expressing visually comparison of the weights of the objects via another object that symbolizes weight measurement.

22. A computer-readable recording medium which stores a program executable by a computer, the program including the functions of:

acquiring values of a predetermined attribute for a plurality of files, in order to represent the values of a

FITBIT 1002
Fitbit v. Immersion

predetermined attribute for intended files by using a concept of weight;

setting a temporary sequence for the plurality of files;

determining, based on the temporary sequence, a temporary display position of a predetermined object that symbolically represents the files in terms of whether the weight thereof is heavy or light;

displaying an object that corresponds to the plurality of files, at the temporary display position on a screen;

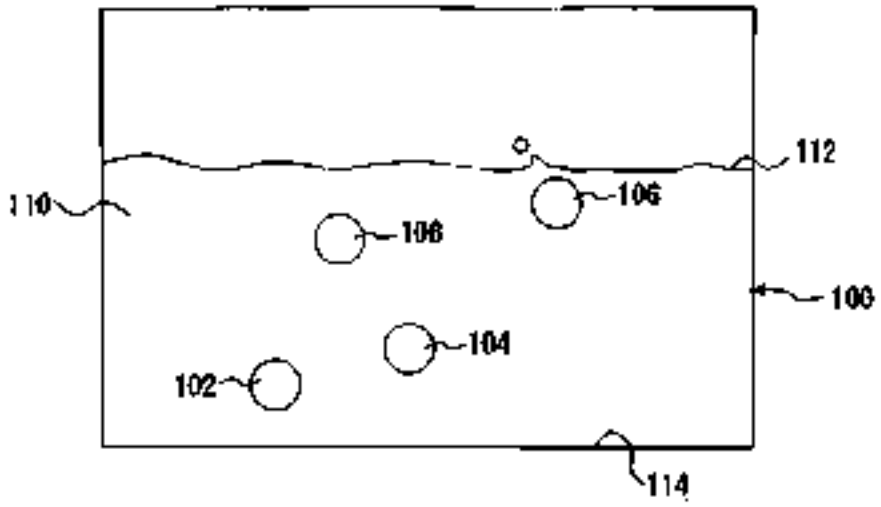
comparing the values of a predetermined attribute between adjacent files in the temporary sequence;

updating the display position based on a comparison result obtained from said comparing; and

representing visually the weight thereof by varying display contents according to said updating.

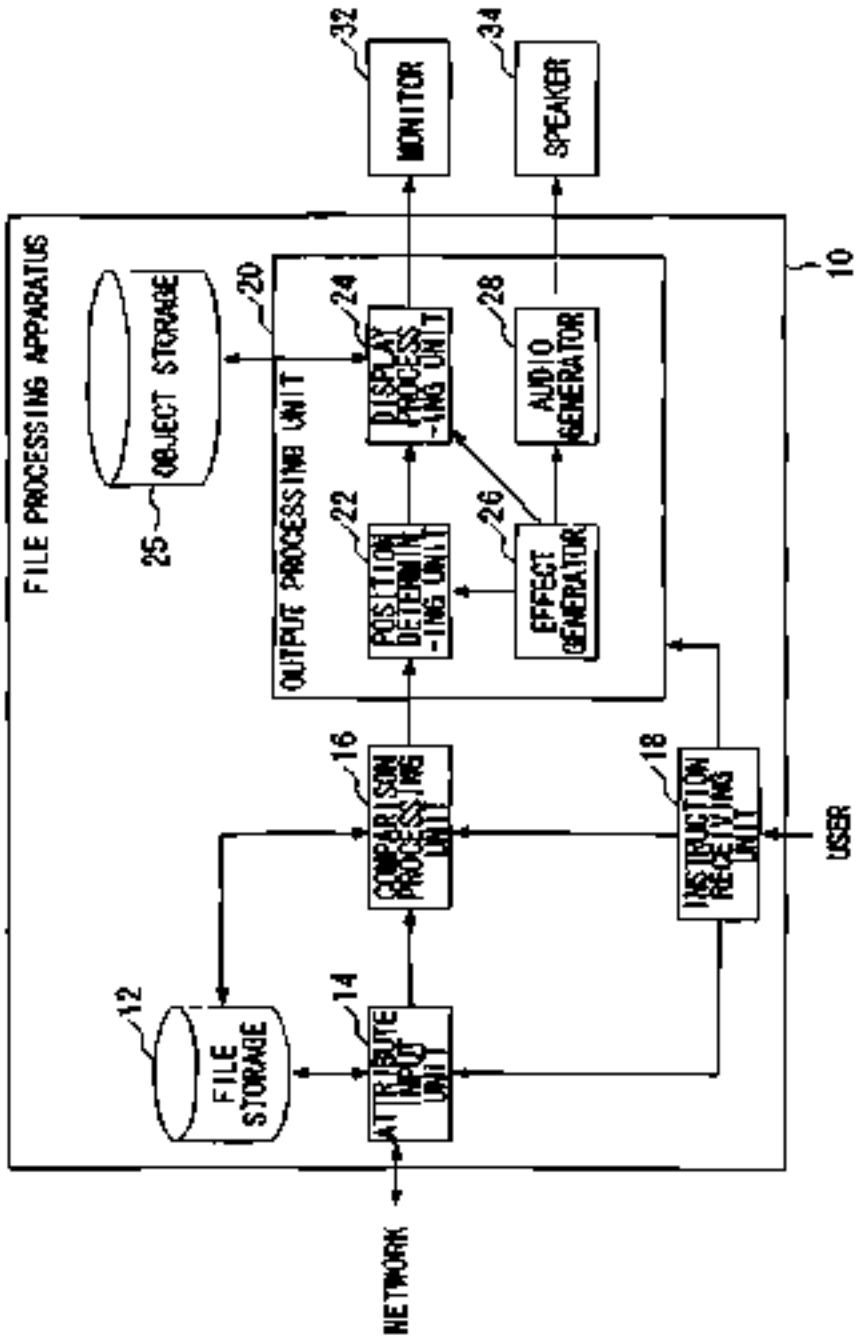
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FIG. 1



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FIG. 2



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FIG. 3

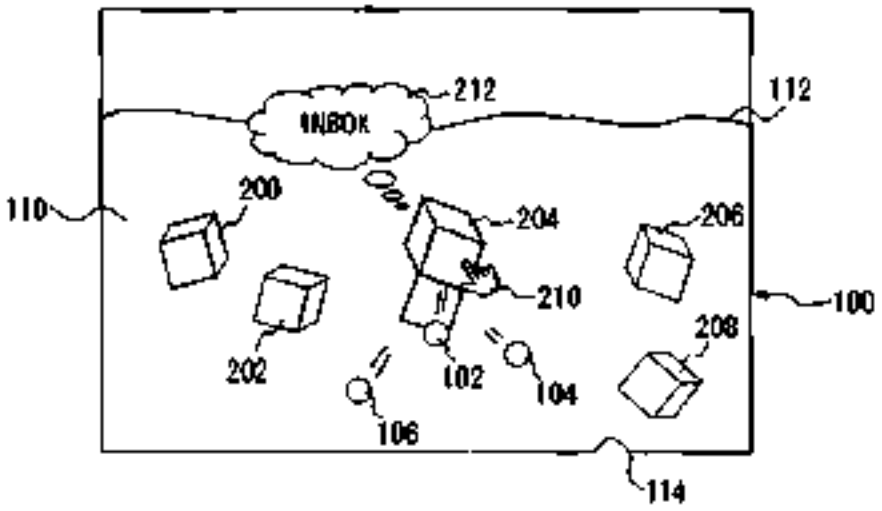
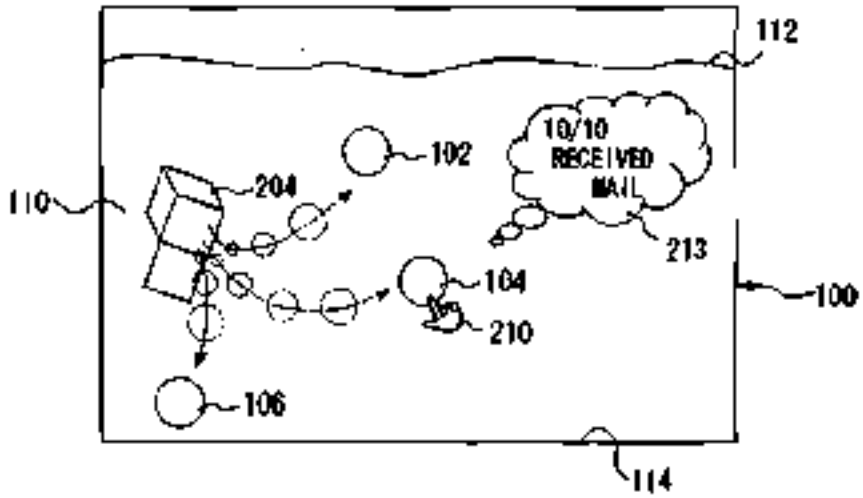
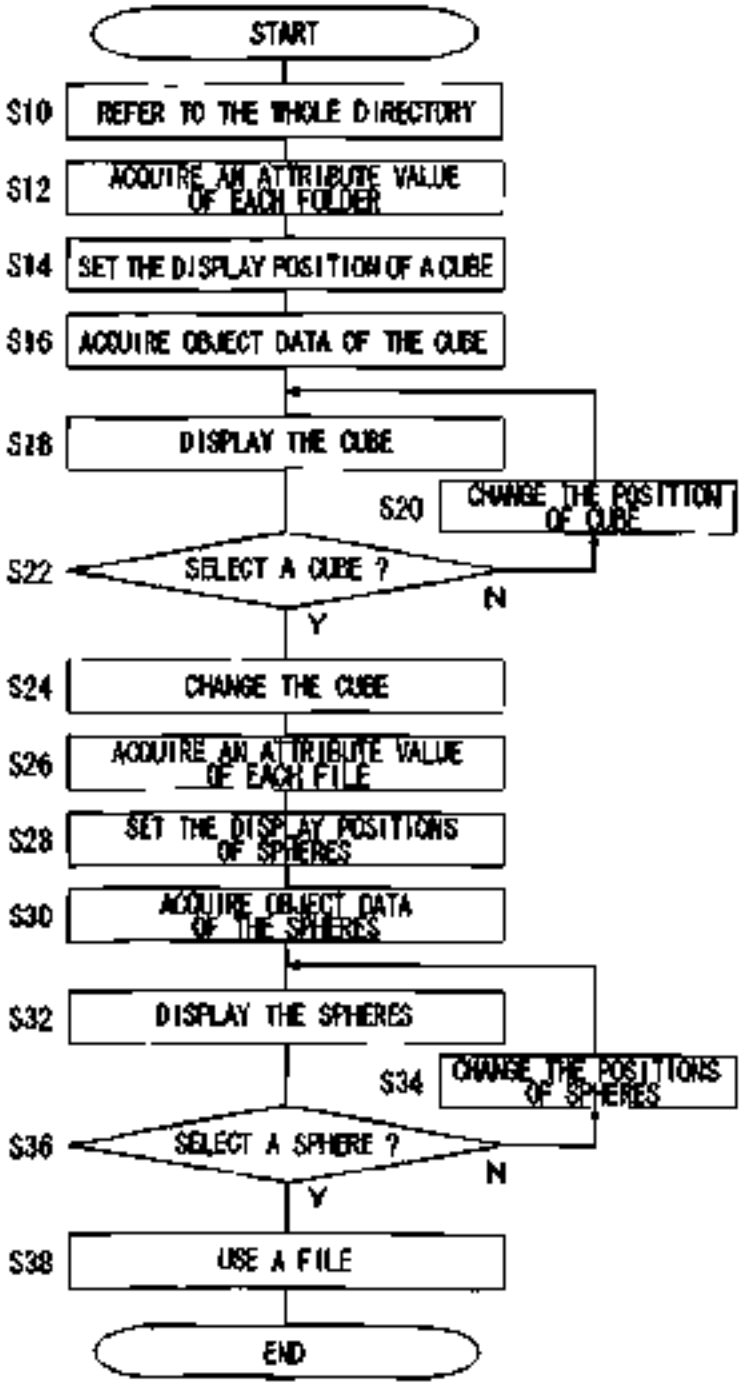


FIG. 4



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FIG. 5



FITBIT 1002
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FIG. 6

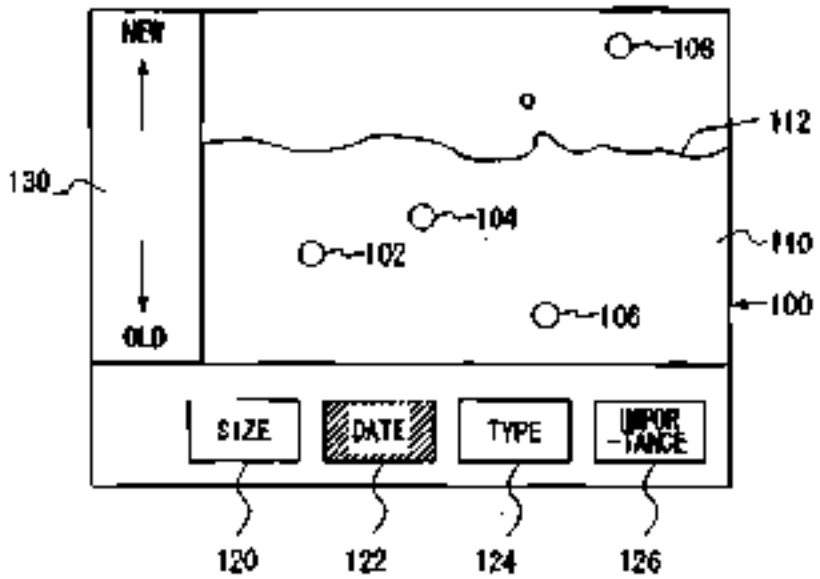
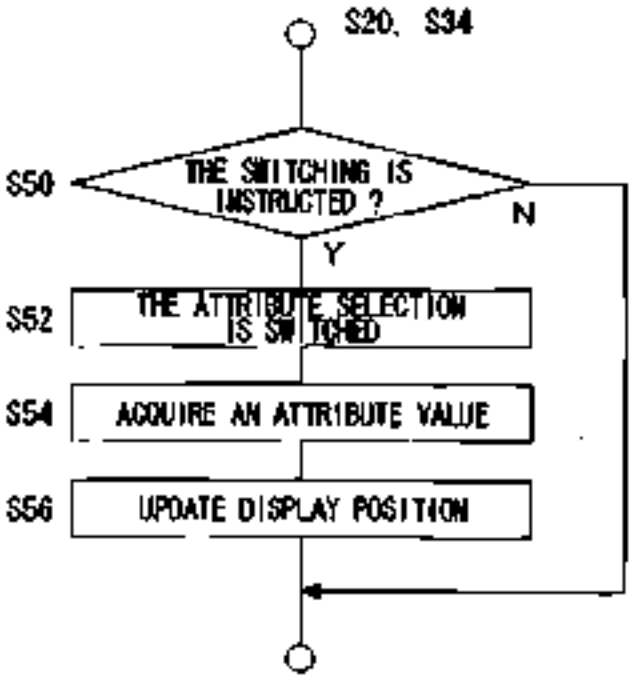
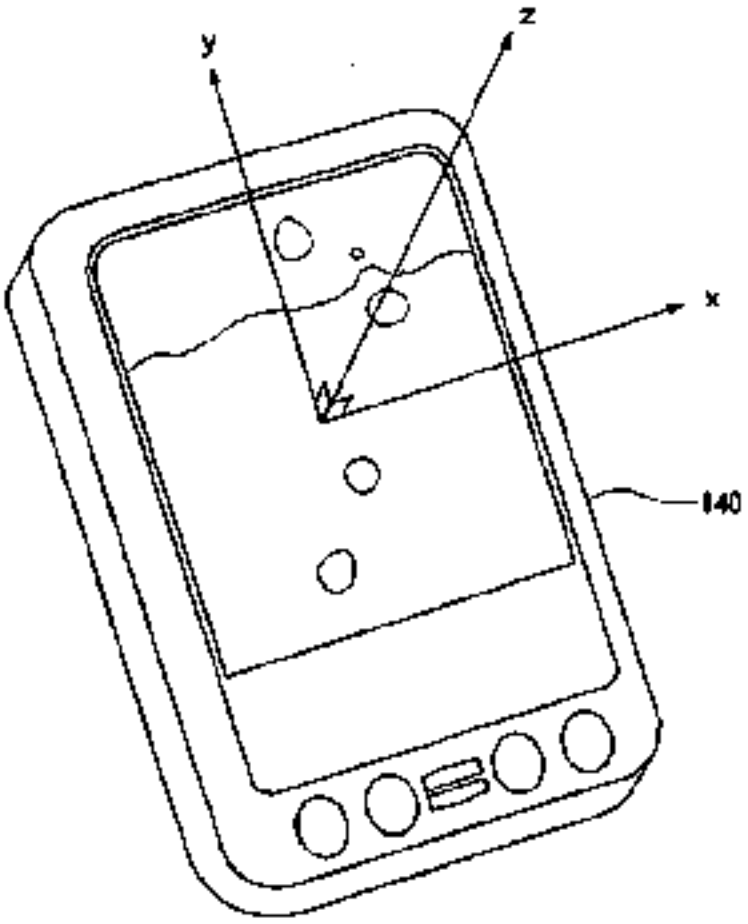


FIG. 7



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FIG. 8



FITBIT 1002
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FIG.9B

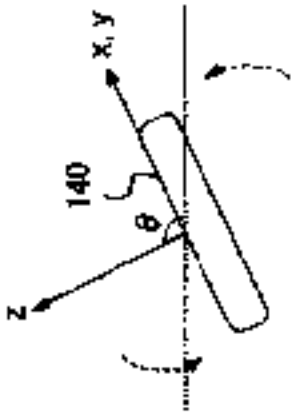
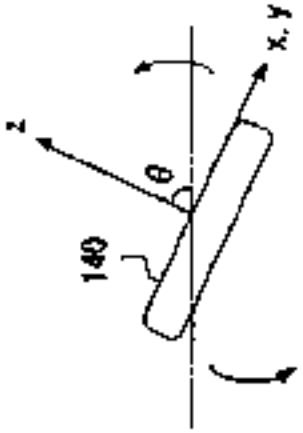
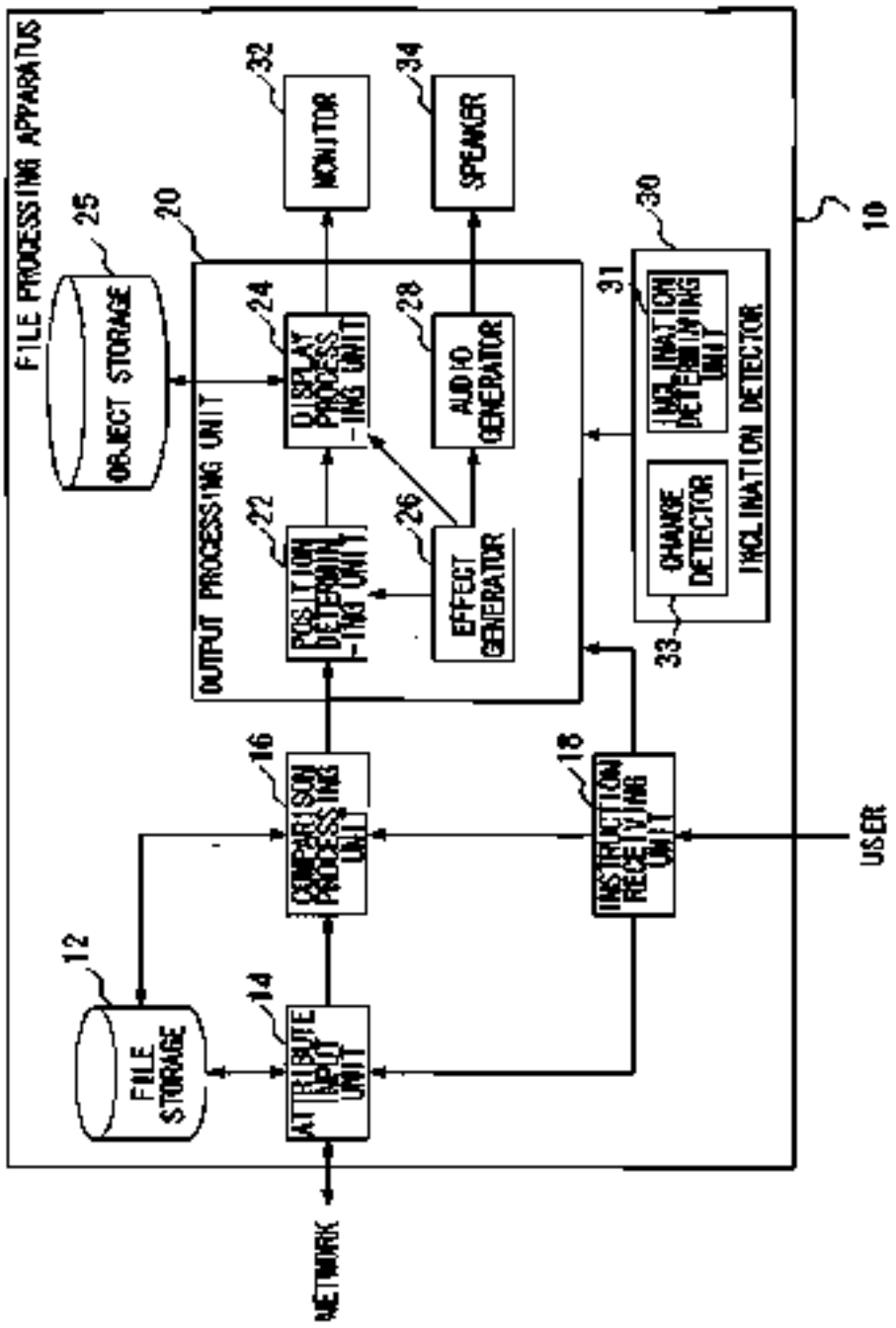


FIG.9A



FITBIT 1002
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FIG. 10



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FIG. 11

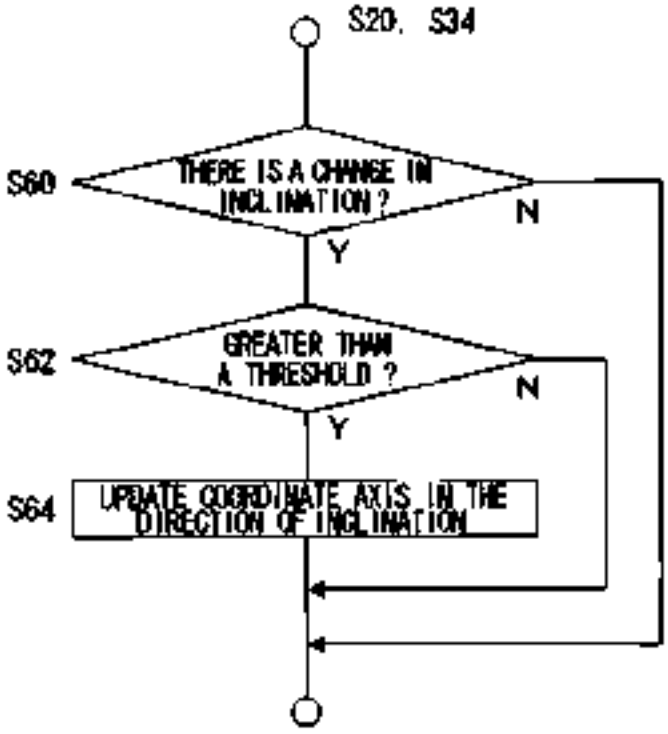
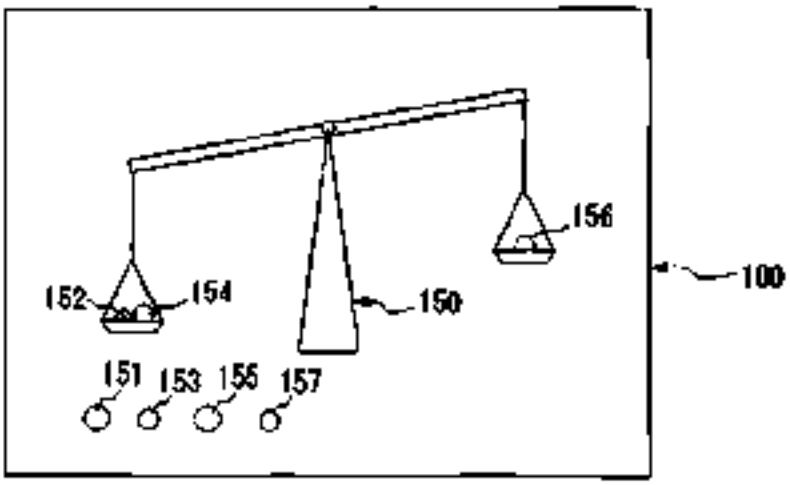
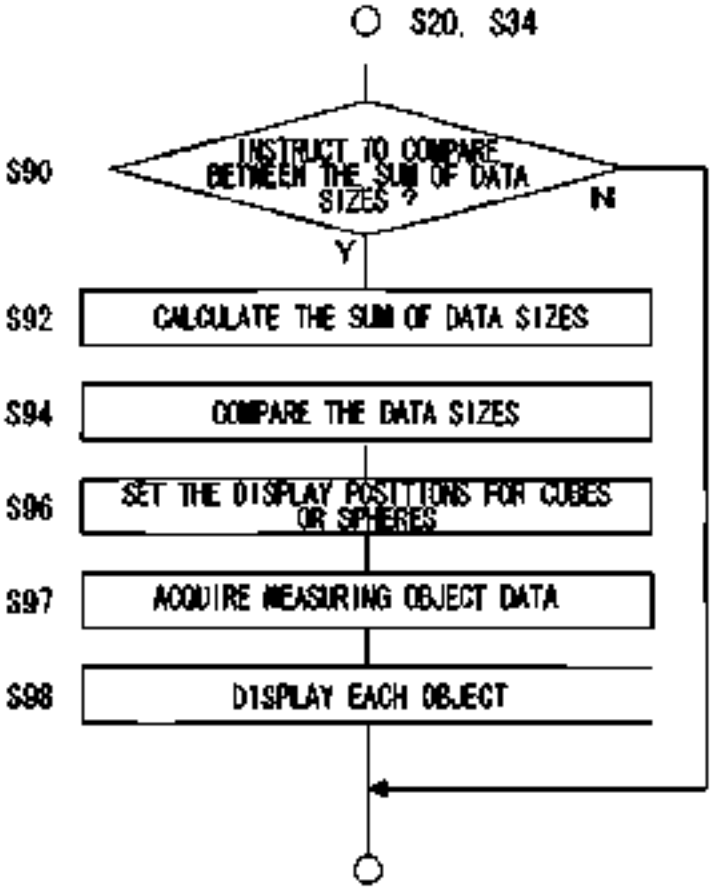


FIG. 12



FITBIT 1002
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FIG. 13



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FIG. 14

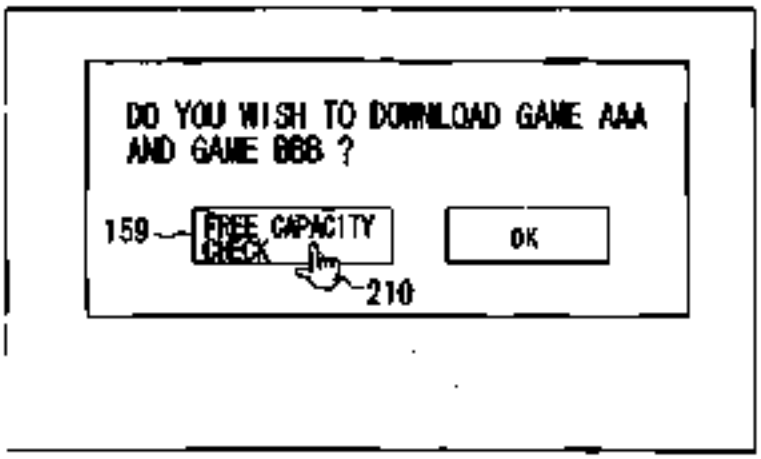
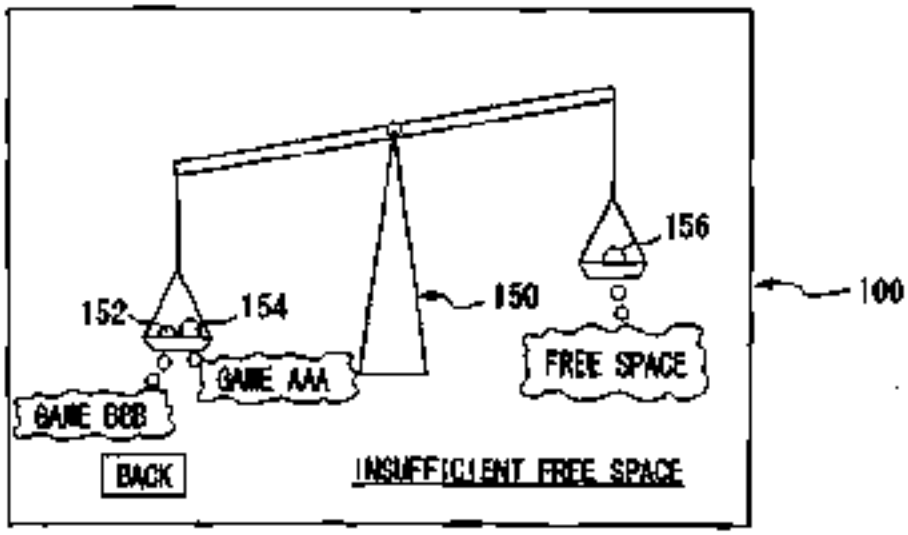


FIG. 15



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FIG. 16

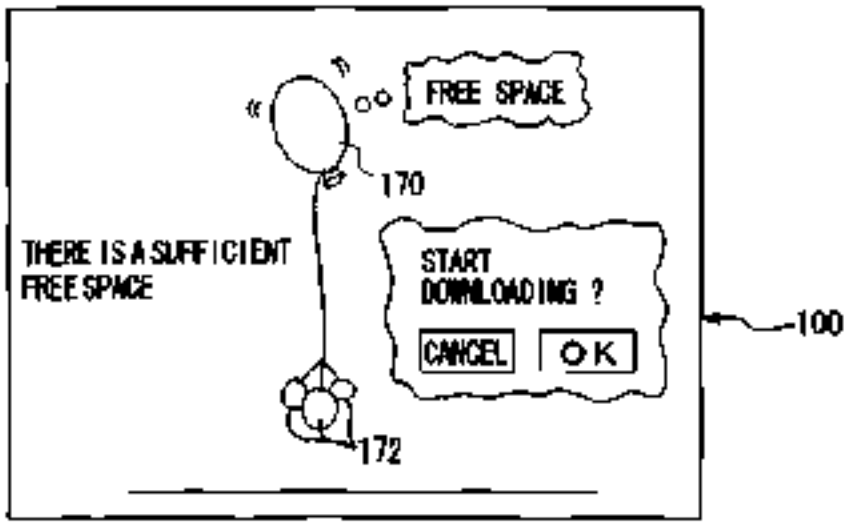
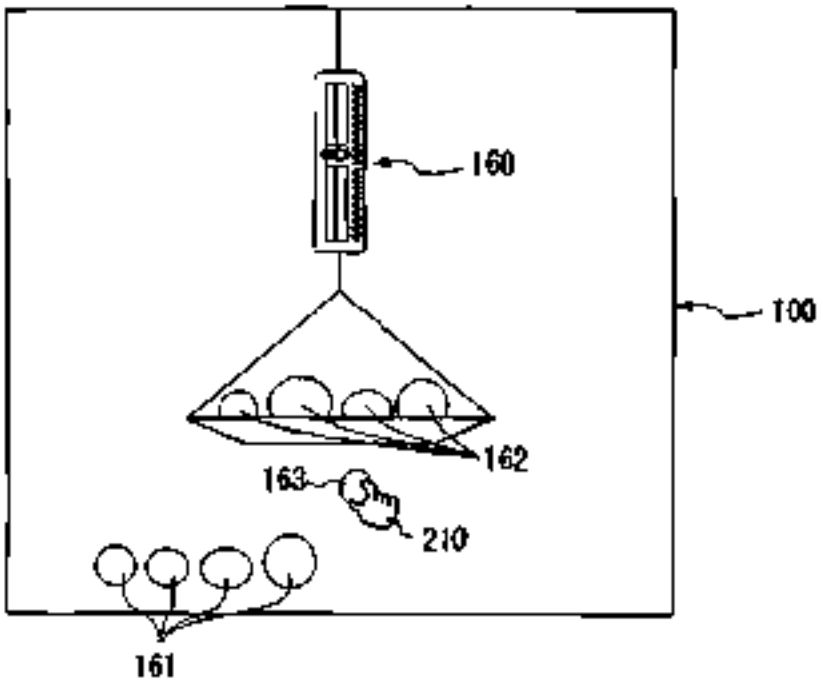
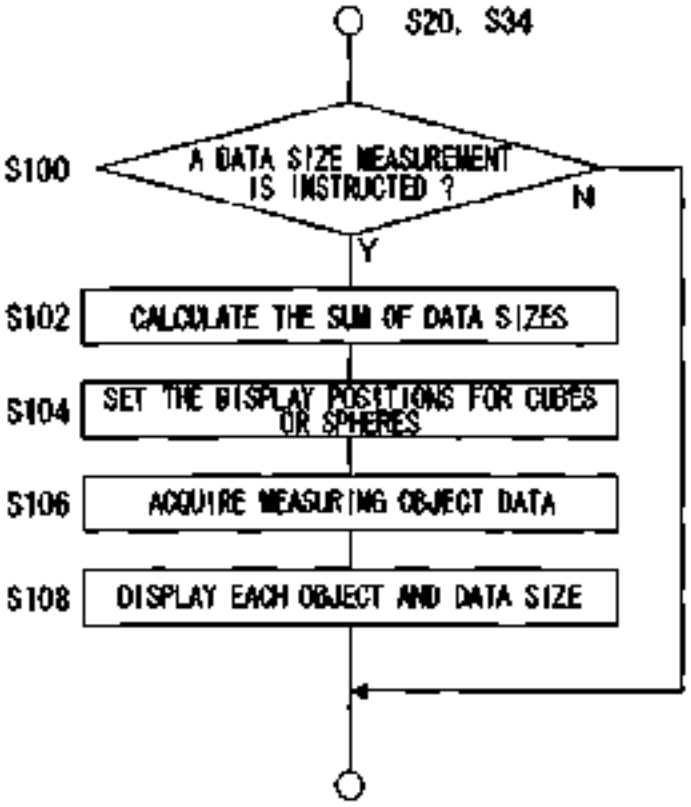


FIG. 17



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FIG. 18



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FIG. 19

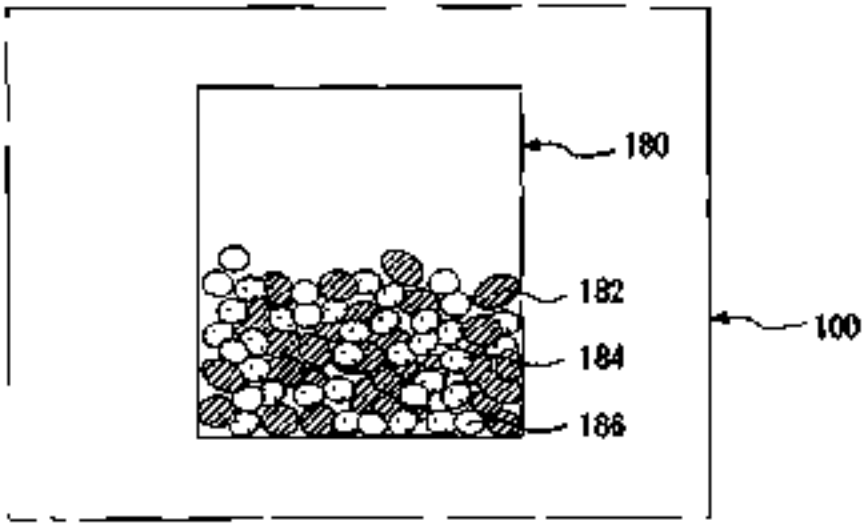
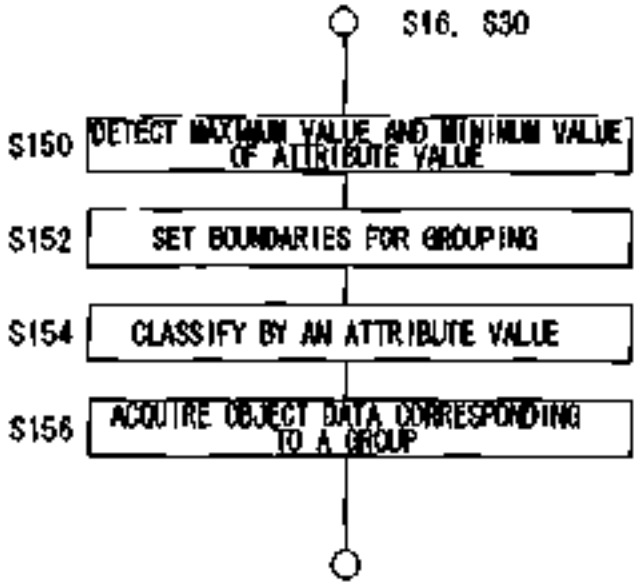
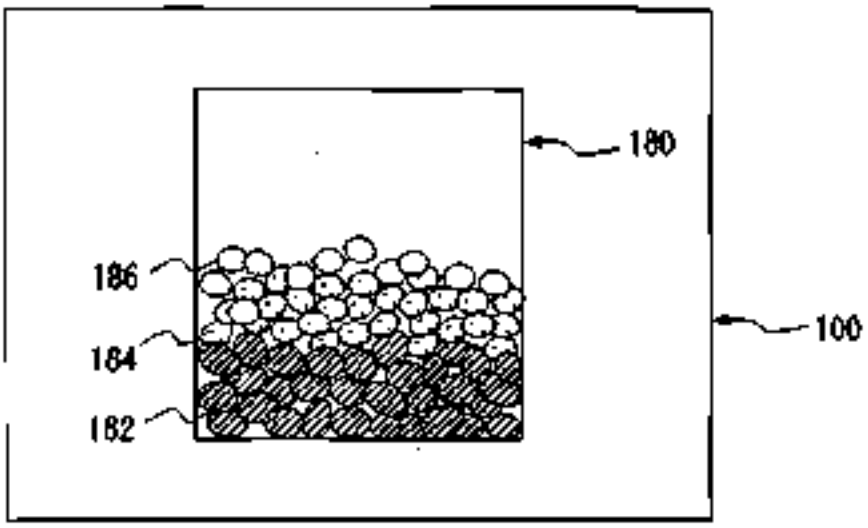


FIG. 20



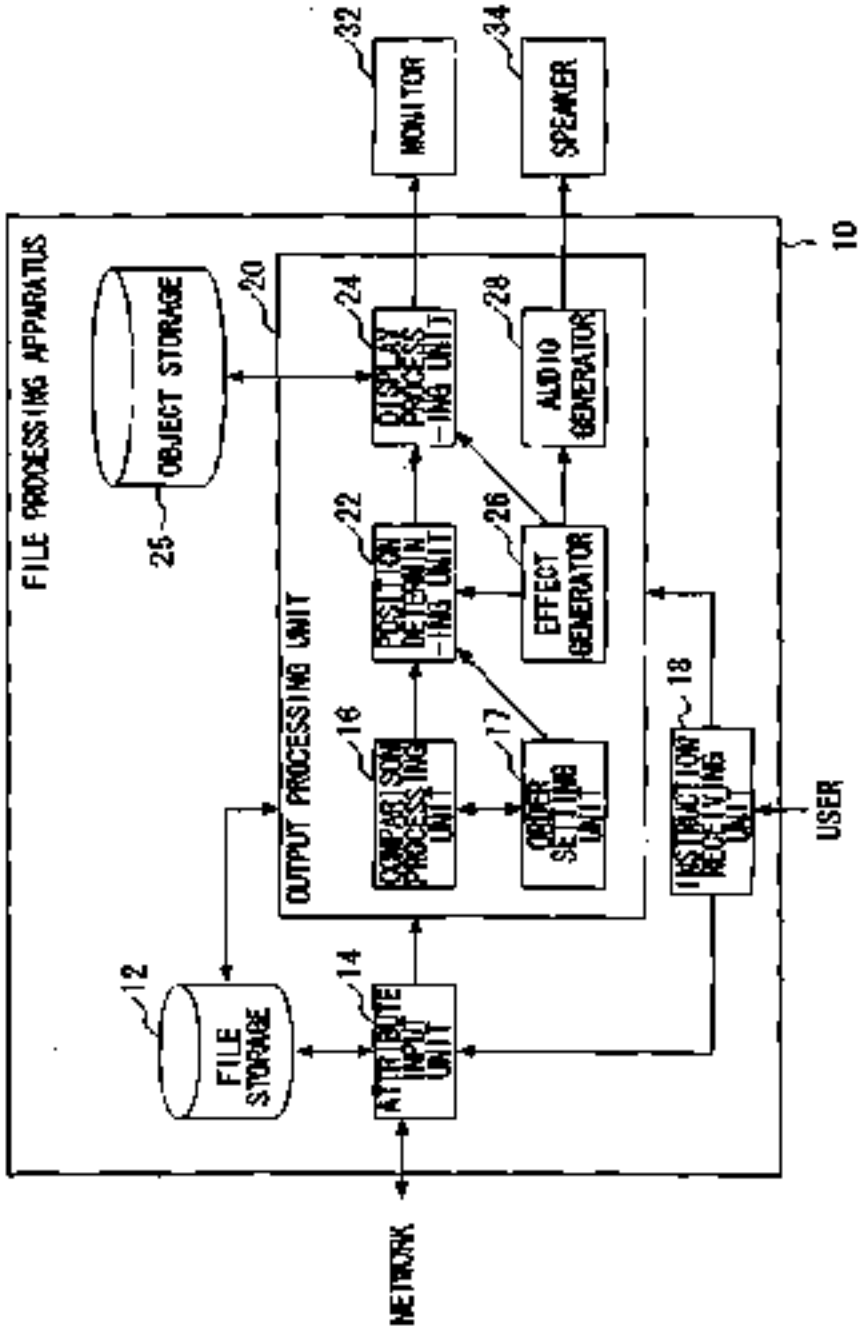
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FIG. 21



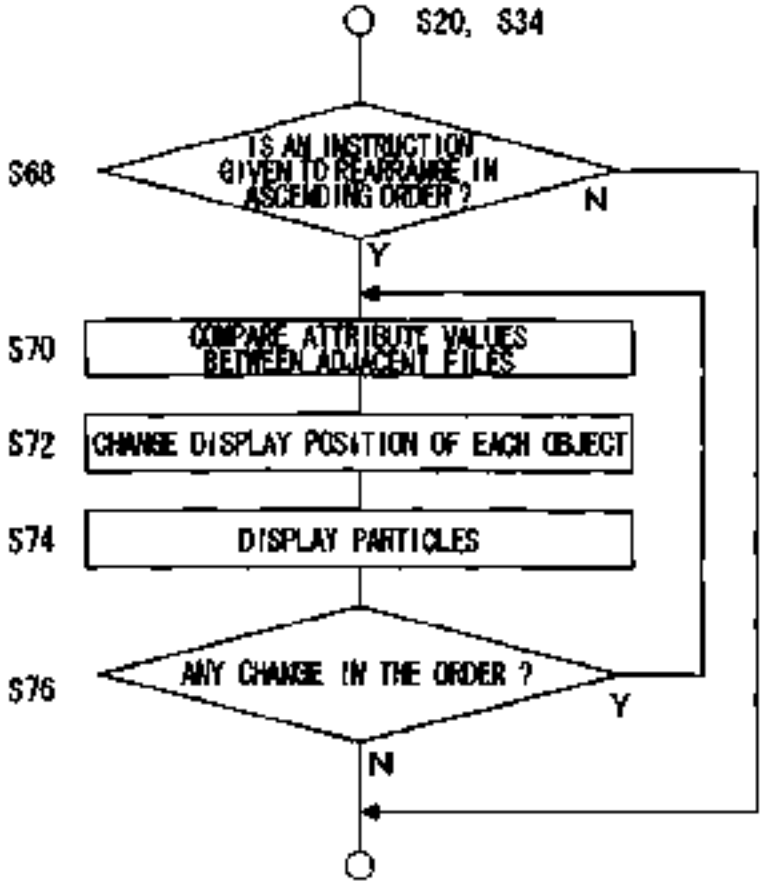
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FIG. 22



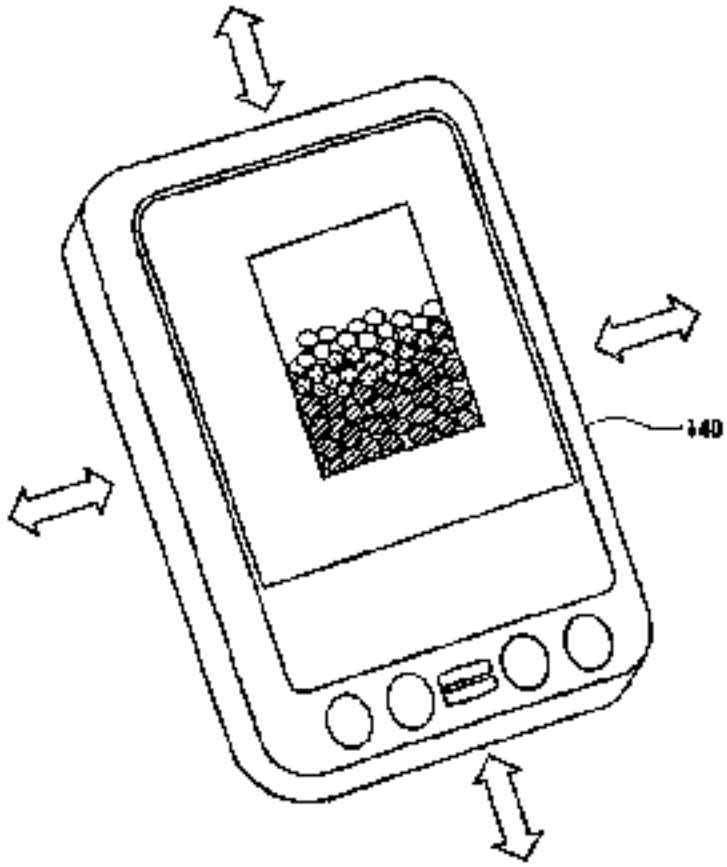
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FIG. 23



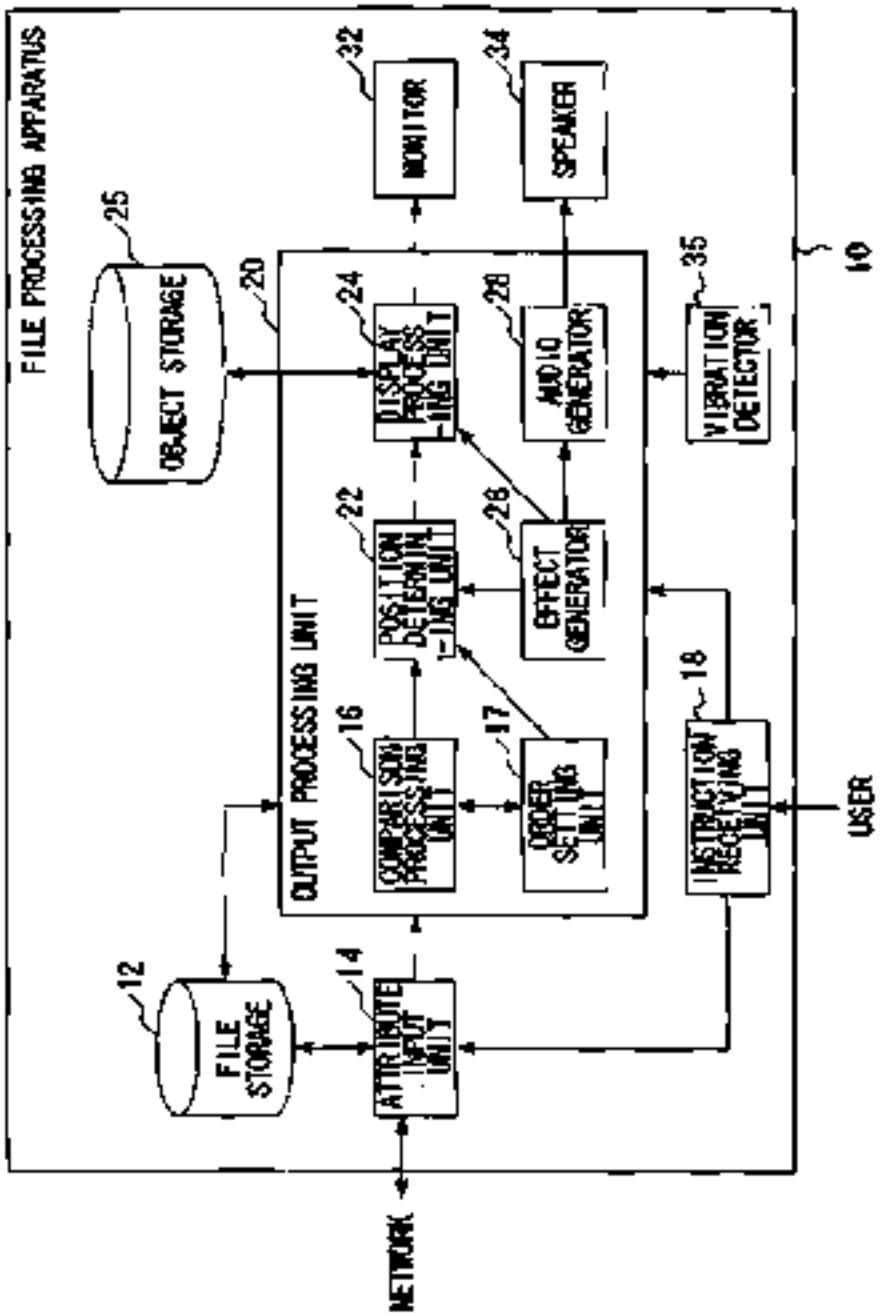
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FIG. 24



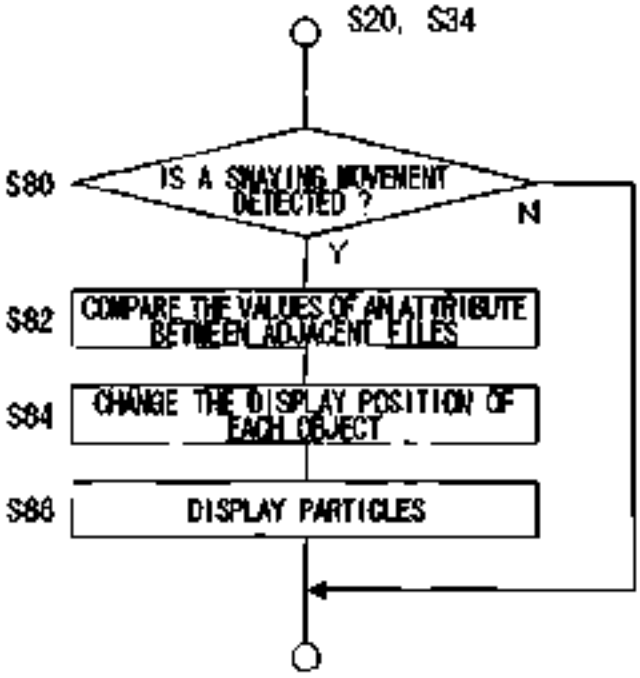
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FIG. 25



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FIG. 26



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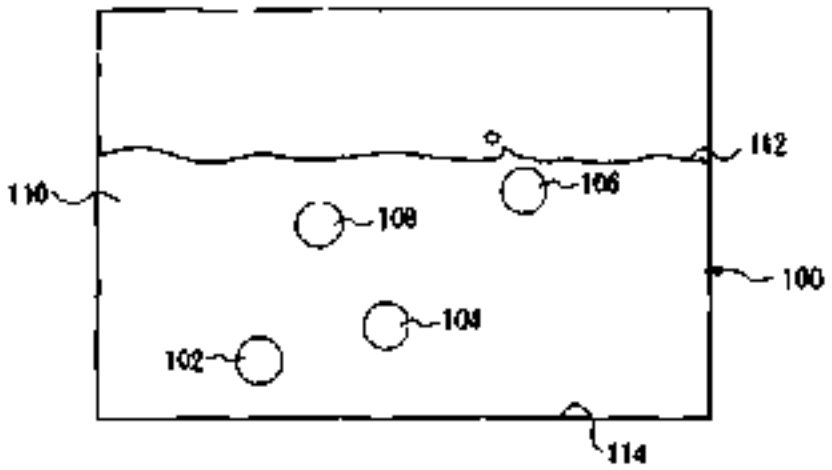
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(54) Title: METHOD AND APPARATUS FOR PROCESSING FILES UTILIZING A CONCEPT OF WEIGHT SO AS TO VISIBLY REPRESENT THE FILES IN TERMS OF WHETHER THE WEIGHT THEREOF IS HEAVY OR LIGHT



(57) Abstract: On a screen, a file processing apparatus displays spaces of an aquarium related to a plurality of files using a concept of weight. The weight of each file is represented by spherical objects submerged into the water and displayed on the screen. For example, a first spherical object represents a file whose data size is large, and is sunk near bottom. And a second spherical object represents a file whose data size is light and is floating near the water surface.

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FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

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According to International Patent Classification (IPC) or to both national classification and IPC

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Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 253 218 B1 (OBUCHI YASUMI ET AL) 26 June 2001 (2001-06-26) column 26, line 23 - line 67; figures 67,68	1-22
A	WO 98/14863 A (PHILIPS ELECTRONICS NV ; PHILIPS NORDEN AB (SE)) 9 April 1998 (1998-04-09) page 3, line 19 - page 4, line 17; figure 1	2,11
A	EP 0 899 651 A (XEROX CORP) 3 March 1999 (1999-03-03) paragraphs '0057!, '0059!; figure 10	7,8,15
X	US 2002/075322 A1 (PRABHU PRASAD V ET AL) 20 June 2002 (2002-06-20) paragraph '0029! - paragraph '0034!; figures 1,2,6-9	1,12,18, 21

☐ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search	Date of mailing of the international search report
30 August 2004	03/09/2004

Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Authorized officer Nguton, B

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			JP 10307936 A	17-11-1998
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			JP 11134087 A	21-05-1999
US 2002075322	A1	20-06-2002	NONE	

FITBIT 1002
Fitbit v. Immersion

FITBIT 1002
Fitbit v. Immersion

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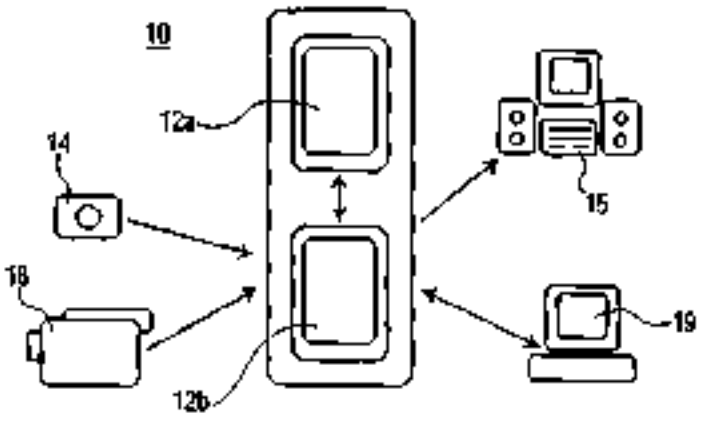
(74) Common Representative: KONINKLIJKE PHILIPS ELECTRONICS, N.V.; c/o THOOMI, Gregory, L., Groenewoudseweg 1, NL-5621 BA Eindhoven (NL).

(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

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(*Continued on next page*)

(54) Title: SYSTEM FOR AD HOC SHARING OF CONTENT ITEMS BETWEEN PORTABLE DEVICES AND INTERACTION METHODS THEREFOR



(57) Abstract: A user interface concept for wireless ad hoc content sharing between portable devices referred to as portable content containers (PCCs). A user-oriented design approach is provided enabling easy-to-share content such as music and photos. A variety of physical ways of establishing a secure connection between the PCC devices is provided. In addition, a clear view on the location of the content stored on the devices, and a drag & drop interface is provided. Use is made of separate spaces, each containing the corresponding content and wherein a "shared" space such that all connected users may transfer content to and from their own personal devices. The use of a drag & drop interface in combination with the subdivision of the screen into several spaces, provided the user with a clear view on the content location. The close proximity of users is ensured and enhances social interaction.

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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

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SYSTEM FOR AD HOC SHARING OF CONTENT ITEMS BETWEEN PORTABLE DEVICES AND INTERACTION METHODS THEREFOR

The present invention relates to portable device technology including products that implement storage and wireless connectivity, and particularly to a user interface concept for a portable multimedia storage device with the focus on content sharing over ad-hoc networks.

Today's portable "infotainment" (content used for information or entertainment) players have already a large capacity. One examples device is the "iPod" digital music player available from Apple Computer, Inc. However, to exchange music or video files they have to be connected to a PC or audio equipment with connections now mostly established with the use of cables (e.g., USB or FireWire) and the user interface of these products is adapted to that situation.

The Portable Content Container (PCC) is considered to be the next generation portable multimedia player enabled by advances in wireless connectivity, digital data storage and compression, display and power supply technologies.

For example, with respect to wireless connectivity, the PCC device may implement the 802.11b standard, also known as Wireless Fidelity (WiFi™) which makes it possible to create a wireless network. In theory, the bandwidth 3 should be sufficient to transfer a TV signal wirelessly with a range of up to 100 m. Within the WiFi™ connection two modes are defined: 1) an *infrastructure* mode that makes it possible to set up a Wireless Local Area Network (WLAN), for examples, in offices and hotels. This is used to create wireless workspaces. In this mode fixed access points are used to communicate with the portable devices. Each device communicates with one of these fixed access points. Its device's position can be derived from the distance to at least three of these points; 2) the *ad hoc* mode is used to make a link between portable devices for a peer-to-peer (p2p) connection. Operating in this mode, it becomes possible to spot other devices that are within range by sending out a signal now and then to check their presence. When another device or access point is discovered, standardisation in the field of communication between wireless devices makes that a communication link can be established.

Apart from the described WiFi™ connection, also other wireless applications may be added such as Global Positioning System (GPS) and Internet connections. By adding these, worldwide communication and location determination are possible. This way the

FITBIT 1002
Fitbit v. Immersion

PCC concept becomes more an all-purpose device with the functionality of a portable audio player, a PDA and a mobile phone combined.

Currently, the present quality of wireless connections is not sufficient to be used in a product like a portable multimedia player. Especially using the ad hoc mode linking devices in a secure way is a problem.

With respect to data storage, the PCC device may implement distributed or local storage. With stored, distributed content, every time a specific item is rendered, the information has to be transferred. Storing the content locally is the only solution for portable devices that are used on the move when no stationary database is nearby to 'stream' data from. Three types of storage are available: optical (for example the Compact Disc), magnetic (Hard Disc) and solid state (Flash memory). Optical discs are easily exchangeable and relatively cheap; however, a drive is needed. Although, the capacity is increasing and the size decreasing, optical discs in portable devices are sensitive to shocks especially during writing the data. Solid-state memory is one of the fastest, smallest storage available. Because it has no moving parts, it is well protected against shocks. Currently the capacity is insufficient and the price too high. At this moment a hard disc is the cheapest form of storage and its capacity does exceed that of the other two forms of storage. It provides a large capacity on portable size. Currently, a small 1.8-inch hard disc can hold up to 200 Gbyte, while its capacity is still rapidly increasing.

It is understood that music and video requires vast storage capacity and currently, hard discs are the only form of storage that can satisfy this requirement. Since the PCC device combines wireless connectivity with local storage, the memory itself does not have to be exchangeable. Therefore, a hard disc is a preferred solution, however, solid -state memory will be a viable option as the price and capacity will be competitive to that of hard discs.

With respect to the display, the PCC device must implement a color display for rendering photos or videos and to keep the device portable (the size of the present PDA's) a screen size of approximately 4-inch is advantageous. While the screen is illuminated to guarantee good visibility under all conditions, the resolution of present 4-inch screens is 240 x 320 pixels, minimum. Apart from viewing photos and videos the display can be used for controlling the device. For example, adding a touch screen it becomes possible to operate the device by an onscreen interface, and operable with a stylus.

FITBIT 1002
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Almost all portable devices rely on rechargeable batteries. Rendering phones or videos on an illuminated screen consumes lots of energy. Likewise holds for the wireless connection when checking for other devices and when transferring data. With today's capacity the operating time is limited to only a few hours, however, developments like the polymer battery or fuel cell provides a solution for this problem.

Prior art solutions in the field of connecting and transferring data content focused on the interactive use of portable displays include: "Kidcom" (Krasno, Kidcom project, Personal Intelligent Communicator for girls aged 7-12 years old, Master's Industrial Design Engineering Project, Philips Research, Eindhoven, The Netherlands, Faculty of Industriel Design Engineering, University of Delft, Delft, The Netherlands 1994), which is a communication device for children that can communicate with other devices using a short-range infrared connection. Text notes, pictures can be created and sent to other users. The sending is initiated by pushing a button on top while aiming at another device. An LED and an audible signal provide feedback whether the transmission was successful. To send messages to another device, the infrared ports have to be aligned.

Sony's Pick-and-Drop system described in U.S. Patent No. 6,470,341 to Rekimoto, is a manipulation techniques to copy data from one (computer) screen to another. A more natural way to move things: lifting things up, move and drop is used instead of the well-known drag-and-drop way. To do this, a pen and a touch-screen are used. When the user contacts the screen with a pen and lifts the pen a little, the file is 'floating' above the screen using a shadow. When the user completely lifts the pen, the pen virtually holds the file. It is now possible to tap at another screen and copy to the other computer system. Here the mental model of the user is different from the way the system works. For the user it seems like the data is stored locally in the pen, but the pen does not have storage capacity. The pen contains a unique ID tack, which can be read out when close enough to the screen. The network uses this ID to copy the file wirelessly to the designated place, for example another PDA device.

Thus, the new technologies described above make it possible to exchange content wirelessly with other users on the move. This development has great implications for the user interface (UI) of these devices. Aspects like privacy and 'ad hoc' networking are becoming very important issues and personal content or content protected by digital rights should not be available for anyone. Until now there is no existing user interface that deals

FITBIT 1002
Fitbit v. Immersion

with these aspects.

It would be highly desirable to provide a user interface concept for a portable multimedia storage device such as the PCC with the focus on content sharing using current technology.

It is the usability of the PCC device interactions and the development of a user interface that meets the technological constraints, that is the focus of the invention.

According to the principles of the invention, there is provided a system and method for ad hoc sharing of content stored in portable devices, the system comprising: a means for establishing a communications link to connect a single portable device to one or more other portable devices; a means for generating a visualized shared space on a display area of each portable device of a connected user for facilitating content exchange between connected users via established communications links; and a means for enabling each individual connected user to control transfer of content to and from that user's portable device via said communications link in response to manipulation of items representing user content in said shared space.

The objects, features and advantages of the present invention will become apparent to one skilled in the art, in view of the following detailed description taken in combination with the attached drawings, in which:

Figure 1 depicts a generic block diagram depicting the environment 10 of the PCC 12 system that includes input devices, PCC, and playback and back-up devices, according to the invention;

Figures 2(a)-2(i) depict example PCC usage scenarios in the "connect-exchange-disconnect" order according to the invention;

Figures 3(a) - 3(e) depict examples of the "Being connected" variant for establishing ad hoc transfer of media content between PCC devices;

Figures 4(a)-4(c) depict in greater detail the 'point & link' concept and the visualization of content transfer between PCC devices according to the invention;

Figures 5(a) - 5(f) depict examples of the "Connect when sending" variant for establishing ad hoc transfer of media content between PCC devices;

Figures 6(a)-6(c) depict in greater detail the 'point & link' concept and the visualization of content transfer between PCC devices according to the invention;

Figure 7 depicts the generation of the shared space and another space that includes

FITBIT 1002
Fitbit v. Immersion

the content of the other device added to the PCC display screen 13 after making contact to the other device;

Figure 8 illustrates a PCC device having three spaces and a user icon 89a generated for display within a circle 88a and used for indicating connection with that user;

Figure 9(a)-9(b) shows two variations of a border box that borders a space holding the content stored on a PCC device;

Figures 10(a) and 10(b) depict selected content in a text view metadata format (music) and a thumbnail view format (photos);

Figure 11 depicts an exemplary button menu providing buttons enabling functionality for switching between the content type (music and photo) and the presentation mode;

Figure 12 illustrates two example items 95a,b in an example shared space of a user device 75 shown color coded for user identification;

Figures 13(a) and 13(b) illustrate an exemplary user interface scenario for navigating through content; and,

Figures 14(a) – 14(f) illustrate an exemplary user interface concept according to a further embodiment of the invention.

The Portable Content Container (PCC) is the next step in portable multimedia players having dimensions on the order of the size of current PDAs. Since the concept of an PCC audio / photo player with the added functionality of exchanging items is considered to be one aspect of the PCC, this functionality is illustrated in Figure 1 as now described. Particularly, Figure 1 illustrates the environment 10 of the PCC 12 that includes input devices 14, 18 like digital cameras and A/V playback 15 and back-up devices 19, and additionally, the communication between two portable devices (PCCs) 12a, 12b. Particularly, each PCC 12a, 12b is a lightweight and portable device that easily fits in a user's pocket and implements a stylus for the on-screen drag & drop manipulations, as will be further described. Music, photos and videos are obtained from the Internet, capture devices (such as digital cameras 16 or digital camcorders 18) and other PCC's. This content can be rendered on the device itself, however, may be wired or wirelessly connected to stationary devices that provide better quality, such as TV and/or A/V system 15. Since not all content can be exchanged freely, a solution in the field of digital rights is included.

FITBIT 1002
Fitbit v. Immersion

The PCC 12a, 12b is considered the successor of the portable multimedia player, with added functionality to share content wirelessly. For ad hoc communication, a WiFi™ connection with limited range is preferred, but other short range wireless communication standards may be used. Furthermore, it is assumed that users prefer to communicate before they actually exchange music or photos. Thus, the invention assumes a prior face-to-face communication, i.e., social contact, preceding the exchange of content. Thus, a "connect-exchange-disconnect" order is followed so that a user feels in control by being able to decide to whom he/she connects and when he/she aborts the link.

In a first usage scenario 20, depicted in Figure 2(a), a discussion about the content being exchanged between two users and their respective devices 12a, 12b will precede the actual sharing, so it is assumed people would have close contact. Being in close proximity provides privacy and communication is easy (talking to each other is more effective than other ways of communication). When two users are not in close proximity, the users may not appreciate being detected by others.

Figure 2(b) depicts a remote user connection scenario 30. As shown in Figure 2(b), although the person may be in line of sight, the devices 12a, 12b may still not know the presence of each other. The wireless connection may only detect devices within a range of 50 meters, for example. Thus, letting a first device detect other devices automatically when being nearby, all devices within a range are spotted. This results in a list of present devices or friends nearby, from which the user may choose the right one. Since the users are nearby each other, an action executed by the user, which allows him to connect directly and unambiguously to the person standing in front of him, is preferred. Since this action has to be executed every time a connection is made, it has to require low effort. After this connection is made, the distance can be increased to give the users more freedom of movement. Feedback on the connection is given immediately as the feeling of security for the user is important and this feeling is increased when providing clear feedback.

Figure 2(c) depicts a multi-user scenario 40. Due to privacy reasons a third user (depicted by device 12c) should not be able to connect without the notice of the other two users (devices 12a, 12b). When a third user wants to join the group, it would be consistent to use the same action of connecting. Identifying to both users (or more when multiple users are involved) requires effort. However, when all users are in close proximity they can decide by discretion whether they allow the third user to join or not. Identifying to one

FITBIT 1002
Fitbit v. Immersion

user should therefore be enough to join the group.

Figure 2(d) depicts a content display scenario 50. To provide a clear view to the users about the location of the content, it must be clear which items are owned by the user and which items are not or are being transferred. The interface is easily understood and should not require technical knowledge. The experience of the end user is utilized as much as possible.

Figure 2(e) depicts a content exchange scenario 60. The process of exchanging items requires less effort for the users, and it is possible to easily share multiple items with multiple users. Digital Rights Management issues have been taken into account. A recipient of content is additionally provided with feedback about the status of the exchange process.

Figure 2(f) depicts a disconnection scenario 70. Disconnecting is possible at all times by any user. Combining the action of connecting with disconnecting creates a link / unlink association for the user comparable with an on / off button. When devices are connected and the user walks out of range, then automatically the connection is terminated. This also aborts the exchange of items. It is assumed the disconnecting is also regulated by social interaction.

With respect to exchanging content items, a user must indicate to which device he/she wants to communicate. In the absence of wired connections the problem occurs to indicate the desired device to connect with. As the nature of the content may be personal, the user has to be provided with a secure feeling that his content is available for specific users only which requires linking the devices in a secure way without involving other devices by accident. As mentioned, transferring content wirelessly involves a secure transmission as all devices within range can intercept the transferred data. Encryption technologies are thus used to establish this. By encrypting data before transferring it wirelessly, it cannot be decrypted without having the 'key'. Particularly, a content owner encrypts the content and the information about this process in stored in a key. With this key, the receiver can decrypt the data and transform it back in a readable format. The advantage of using encryption in a multi-user situation is that only the users that possess the key can 'read' the data. The owner can provide the key to the users he selects. This key can be combined with personal information about the owner (e.g., a name or icon).

Within encryption, the PGP (Pretty Good Privacy) standard makes use of two keys:

FITBIT 1002
Fitbit v. Immersion

a public and a private one. The public one is available for everyone and is used to encrypt information. The private one is held by one person and is used to decrypt the information. Content transferred PGP makes it possible to build a friend list and send content to the selected person, no matter the location.

Furthermore, Infrared communication is a connection standard can be used to wirelessly 'beam' data from one device to another. It requires facing the transmitter to the receiver and it only works within a short range. Within Infrared connections, there are two modes that may be exploited. A short range, e.g., up to 1.0 meter, connection for sending data called IrDA data. This mode requires the aiming of the infrared port at another infrared port. In this mode, the angle of the beam and the intensity are adjustable. The second mode, called IrDA control functions up to 6 meters, for example, and is used in a wireless mouse and keyboard. It is bi-directional and allows up to eight (8) devices simultaneously.

Furthermore, sensors may determine the location or orientation of the device. Thus, determining locations in an ad hoc network can be realized with the use of ultrasound transceivers, for example. This technology makes use of sound pulses to determine the relative location of nearby devices. A set of orientation sensors can determine the orientation of a device. Thus, for example, it is possible to determine whether a device is in an upside down position or not.

More particularly, as will be described in greater detail, physical contact may also be used in the key exchange. For example, each PCC is equipped with an infrared port. Aligning the infrared ports and pressing a button initiates identification and key exchange between the devices. Once the devices are identified the WiFi™ connection is used to transfer at high speed and wider range. Thus, each device may include a tag that can be read out by other devices when being in very close proximity (centimeters). The tag contains the decryption key and information about the user. To prevent unwanted links, the devices may be held against each other. The action is only performed with the full awareness of both users, like a handshake. The information on the tags can be reprogrammed when the user changes his profile. Furthermore, an infrared beam may be used for the linking. Each device is equipped with an infrared port. Aligning the infrared ports and pressing a button exchange the key and identification between the devices. Once the devices are identified the WiFi™ connection is used to transfer at high speed and wider

FITBIT 1002
Fitbit v. Immersion

range. A stylus exchange may also be performed whereby, after two users meet, they exchange their stylus which includes a tag. The tag is read out when bringing it close to the user's respective touch screen. Information about the ID of the users and the key are stored in here. Giving the stylus to another person calls for trust. Additional hardware in the stylus is needed. The touch screen, in this instance, cannot be operated by finger.

With respect to the graphical user interface, content to be exchanged has to be represented in a way that makes clear to the user on what location the content is stored and what actions can be performed. As will be explained in greater detail, a graphical user interface that follows the desktop metaphor is established. Preferably, all content items are represented by icons and can be moved and handled like real physical objects. Present users are additionally represented by icons. Here the accessibility and the relation between the items and the users are visualized. In a so-called *spaces* concept the different locations on the person are mapped with physical spaces whereby users and content items are moving around in the virtual space. The spaces concept symbolizes the different storage locations. Each storage location (connected device) is represented by an onscreen space. Thus, when functioning as a stand-alone player only a single space (user's own space) is visible, for example. As will be explained in greater detail, moving items from space to space by drag & drop initiates copying and transferring between the devices.

The conceptual structures for physically linking described herein combined with the *spaces* interface result in structural concepts that provide solutions for ad hoc linking and exchanging content items.

It should be understood that the connect-exchange portion of the linking includes two actions: connecting to the right user and exchanging the items. In this, two variants appear: 1) a "Being connected" variant whereby a first the device sets up a connection with the other device and, when this connection is established, the exchange of content can be started. During the status of "being connected" content can be transferred until a user disconnects; and 2) a "Connect when sending" variant whereby there is no status of being connected. Every time the user wants to exchange content, he/she makes a new connection, i.e., between the data packages there is no connection.

Figures 3(a) - 3(c) depict examples of the "Being connected" variant. In a first embodiment 100 depicted in Figure 3(a) when the devices are brought in close proximity (e.g., less than 10 cm) the link establishes automatically ((Figure 3(a)(1)). In this

FITBIT 1002
Fitbit v. Immersion

embodiment, an infrared transmitter may transmit every few seconds to establish the link automatically with a user in close proximity. Alternately, in a further embodiment 101 depicted in Figure 3(b)(1), both devices 12a, 12b may be aimed at each other and the user pushes a 'link' button 17a, 17b when they are "nearby" (e.g., within 30 cm). In this embodiment, an infrared transmitter is activated by a user to establish the link. Preferably, each device gives feedback about the connection made and once the link is established, the devices do not need to be in those ranges anymore, i.e., the users may keep more distance. As depicted by arrows in Figures 3(a)(2) and 3(b)(2) and as will be described in greater detail, a virtual shared space 75 is used to share content items by dragging them into the space, which makes them visible to the other connected users. This space is updated for all connected users each time a new item appears. Pressing a button, for example, on the screen, performs the disconnecting.

The variants depicted in Figures 3(a)-3(b) represent a 'point & link' concept combining an infrared connection with the high speed WiFi™ connection to initiate the contact. Other variants of the "Being connected" concept include: a "Feel the force" type concept 102 as depicted in Figure 3(c) whereby the devices 12a, 12b implement controllable magnetic forces 80 and an automatic infrared connection such that when users bring their devices closer to each other, they feel (magnetic) resistance getting stronger. When users proceed, suddenly the resistance disappears and a link establishes giving physical feedback. While transfer content items, using the virtual shared space, the range may increase without ending the link. Disconnecting is performed by pressing a soft or hard, button on the device. In a 'Right out of the sky' type concept 103 as depicted in Figure 3(d), one user device 12a is transmitting content items and, all devices, e.g., devices 12b, 12c within range (e.g., less than 1 meter) can pick up this content. No link has to be established and disconnecting is not necessary; the user just walks away. It is understood that this technology however, requires the use of encrypted technology and a 'buddy list'. In a 'Radar' type concept variant 104 as depicted in Figure 3(e), the use of ultrasound sensors that measure the position of the other devices 12a, 12b may be used such that when one device, e.g., 12a is close to another device, e.g., 12b, representations of the other devices, e.g., in the form of icons 85a,b, appear on the user's screen. When the device moves, the icon on the screen also moves. Content items, also represented as icons 90, are dragged to these icons 85b to transfer content to the specific user. When out of range (e.g.,

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FITBIT 1002
Fitbit v. Immersion

greater than 3 m) the link is automatically broken as depicted in Figure 3(e).

With further respect to 'point-&-link' concept depicted in greater detail in Figures 4(a)-4(c), when two users meet, they point their devices 12a, 12b each with an infrared port located thereon, at each other, and both press the 'connect' button 17a, 17b at the same time ((Figure 5(a)). This action has to be performed in close proximity in order to prevent unwanted connecting by pointing at another device by accident. After exchanging the key and user information the WiFi™ connection takes over and the users do not have to point their device anymore at each other as a status of 'being connected' is reached. As depicted in Figure 5(b), while being connected, people can exchange items. In this situation, a 'shared space' 75 is created which is a (virtual) space that holds the information both people exchange. This space only has this function during the contact and disappears after the connection is aborted. Translating this to the onscreen interface it means that after making contact the space 75 appears, where people can freely and securely exchange content items represented as icons 90. Items (icons) that are placed in this space are accessible to all connected users. Particularly, in this embodiment, as depicted in Figure 5(c), dragging an item 95 from the transferor's device 12a personal space 25a to the shared space 75, makes it visible on the other transferee's device 12b shared space. The item can now by dragged by the other user to his personal space, e.g., space 25b. The downloaded item 95 is displayed in the shared space as contrasted item 95a in order to distinguish already downloaded items. That is, when an item is placed in the shared space, a copy is made from the original. Since the shared space is continuously updated on all connected devices, a copy in the shared space differs from the original on the device of the device owner to indicate who placed it there. This prevents the owner from downloading items to himself. Thus, it is understood that the content stored on the device is displayed outside the shared space in a so-called personal space. Dragging an item from the shared space 75, into the transferee's device 'personal' space 25b (that includes the items stored on the own device) starts the transfer from the other device. When all connected users, except for the owner have downloaded an item it disappears from the shared space 75. Each of the connected users can disconnect at any time by pushing the button 17a, 17b again. In the case of two connected users the connection is terminated when one of them disconnects. When more than two users are connected one can leave while the others still are connected. The items placed in the shared space by the disconnecting user will disappear

FITBIT 1002
Fitbit v. Immersion

Figures 5(a) - 5(f) depict examples of the "Connect when sending" variant. In a first embodiment 200, depicted in Figures 5(a)(1) - 5(a)(2) a user transferor device 12a first pre-selects the content items (icons) 95 by dragging them in a separate area 75 (Figure 5(a)(1)), and, then pushes a send button 87a while pointing to start the content transfer to the other (transferee) device 12b (Figure 5(a)(2)). In this scenario, an infrared connection is combined with the WIFI™ connection.

The variants depicted in Figures 5(a)(1) and 5(a)(2) represent a 'select & shoot' concept whereby content is first selected and beamed to another user while pointing at the desired device. Both in the selection of the items and in the transfer, the initiative is with the owner. Other variants of the "Connect when Sending" concept include: a "Kiss" type concept 201 as depicted in Figure 5(b) whereby hard buttons 26a,b are implemented such that content items or media collections represented as icons 95 are placed in a respective space 76a,b relating to a button 26a,b. When pressing the buttons 26a,b of respective pro devices 12a,12b against each other as depicted in Figure 5(b), the transfer of the content files is initiated. No disconnecting is needed. In a 'Fly-by' type concept 202 as depicted in Figure 5(c), tags or magnetic induction technology is implemented such that the user pre-selects the content, e.g., represented as icons 95, and places it in a separate space 76. Two devices 12a, 12b are moved along each other in very close proximity in directions as depicted by arrows 86a,b to initiate the copying. As shown in Figure 5(c) the devices are oriented horizontally and are virtually swiped next to each other lengthwise (without contact) to effect the content transfer. Multiple copies may be made this way and disconnecting is not needed. In a 'Gravity' type concept 203 depicted in Figure 5(d), metal contacts, and infrared eye or magnetic induction are implemented such that the pre-selected content represented by icons 95 are put in a special space 76 for example, in device 12a. By placing the device 12a on top of transferee device 12b, as in a stack, for example in the manner as depicted in Figures 5(d), the content transfer is initiated, as shown by the transferred icon in device 12b. After the content is transferred, connection is terminated. In a 'Shake It' type concept 204 as depicted in Figure 5(e), acceleration sensors and infrared eye technology are implemented such that, transfer of pre-selected content, e.g., represented as icons 95, may be initiated when the devices 12a, 12b are placed together in an abutting fashion as depicted in Figure 5(d) and shaken. After the 'shaking', the content items are transferred, e.g., from device 12a to device 12b. Disconnecting is performed automatically

FITBIT 1002
Fitbit v. Immersion

thereafter. In a 'Liquid Content' type concept 205 as depicted in Figure 5(f), rotation sensors and infrared eye technology may be implemented such that transfer of pre-selected content, represented as icons 95, are first placed in a separate corner 77 of the screen display of a transferor device 12a, for example. The content transfer is then initiated when the transferor device 12a is held vertical and in close proximity to another transferee device 12b. When all content is transferred the connection is stopped.

With further respect to 'Select & shoot' concept depicted in greater detail in Figures 6(a)-6(c), the transferor user pre-selects the content he/she wants to send to another user. Selecting the content items represented as icons 95, is performed by the user himself/or after getting an indication from the other (transferee) user which items he/she would like to receive. As shown in Figure 6(a), the user selects the items that will be copied to the other user and drags the items (icons) 95 into a separate send space 78 of the transferor device 12a. It is understood that a copy of each item is made to preserve the original. Until the moment of transfer there is no connection between the devices. When the devices are pointed at each other, a send button, e.g., 17a, is pressed and the transfer starts. In the visualization depicted in Figure 6(b), the send space 78 moves towards the upper edge of the screen collapsing in size as depicted by arrows and effectively pushing the items 95 to the transferee device 12b. It is understood that the key and identification is exchanged before starting with the actual transfer. As shown in Figure 6(c), after the transfer, the user's send space 78 lowers again as depicted by the arrows, however, items 95 may still remain in the 'send space' 78 for a second transfer to another user. The owner may add or remove some items before sending them to another user. It is also possible to permanently place popular items in the 'send space' 78. After transferring the items to the transferee device 12b, the devices do not have to be pointed at each other anymore. The transfer is carried out by the WiFi™ connection with a range up to 100 m. As further shown in Figure 6(c), the items 95a transferred to the transferee's device 12b are placed in the user's personal space 25b between other possessed items. That is, incoming items 95a appear on the screen outside that devices 'send space' 78b. Feedback about new items may be given by an audible signal and the blinking of the items. Since the users are generally in close proximity, social interaction may be used to get feedback about whether the transfer was successful or not.

It is a feature of the invention to make content accessible for other users with

FITBIT 1002
Fitbit v. Immersion

decreased effort, e.g., a single action. Thus, adding a third space to the embodiments described with respect to Figures 4(a)-4(c) and 6(a)-6(c) that enables visualization of the items stored on other devices may reduce the effort needed for the owner when distributing items. With the permission of the owner, users can browse the items themselves instead of asking to place them in the shared space.

Thus, as shown in Figure 7, after making contact to another device (not shown) the shared space 75 and a space 79 that includes the content of the other device (other space) is added to the PCC display screen 13 of the user device 12a. During contact, the spaces can be resized to maximize the work area. The presence of the three spaces 25a, 75, 79 adjacent each other creates a model in which the content items can be dragged, e.g., vertically, from space to space. The minimizing of spaces when not needed or the absence of them (when not connected), does not affect this model. Inaccessible spaces have minimal dimensions and are not resizable in order to maintain the spaces model. To keep the effective working space maximal, horizontal lines separate the spaces. Preferably, to give the user the control the spaces may be resized manually. The user can determine the size of the spaces to make the drag & drop actions easier to accomplish.

It should be further understood that as the stored content has a private nature it must therefore not be accessible to everyone. It is understood that, while this solution minimizes the combined effort for all users, privacy and security is still maintained.

As mentioned herein, when contact is made with another device, feedback is provided as to whether the connection was successful and with whom the connection has been made. This is realized by representing the connected user on the screen. Representing the connected user(s) may be done by displaying their names in a list or, preferably, as shown in Figure 8, indicating their presence with an icon 88 which will enable the user more space to personalize on the screen 13. A picture or a character 89 may be used to identify the user which is sufficient when a small number of users are connected at the same time. Thus, just as the *spaces* concept relates the content to the storage locations, the same holds for the use of user icons. That is, the icon of the connected user is related to the space that represents his content. To keep consistency the own space will also display an icon. The user can see how he/she is visualized on the other connected device. In one embodiment, the icons are placed in the border of the spaces to show their relation with the space. That is, when a connection is made, the user icon of the other user

FITBIT 1002
Fitbit v. Immersion

appears on the screen, preferably at the border of a space, e.g., a space dividing line. In a two-user situation both users see the icon of the other user on their screen.

When more users are connected, more icons appear on the screen. Giving each connected user his own space would make the screen overcrowded. The shared space shown in Figure 8 still has the same meaning: the space 75 including all shared content. The upper space 79 however now gets the meaning of space 'that holds the content of the other user(s)'. The content displayed here belongs to the user that is selected at that moment. The icons are used for switching: tapping one of the user-icons makes that the upper space shows the content of that user, if accessible. Figure 8 illustrates a PCC device 12a having three spaces 25a, 75, 79 and a user icon 89a generated for display on the border 99 of the upper space 79 within a circle 88a for example, and used for indicating connection with that user. In one embodiment, the spaces may be rendered in a different color to make them better distinguishable. In the embodiment shown in Figure 8, two users are shown connected and one user represented by icon 89 within circle 88 has opened his/her space and the other user, indicated by icon in circle 91 shows a connected user that has closed his/her space. Preferably, each user 89, 91 can 'flip' his personal icon from the left to the right to 'open' his/her space for the other users. On the screen of the connected users his icon then changes from 'closed' to 'open'.

When two devices are connected items can be shared using the shared space. This provides the user total control about the content that is accessible for other users. As mentioned herein, when an item is dragged to the shared space, a copy is made. When the other user is looking for a specific item or just wants to browse through the items of another user, permission from the latter is needed. In most cases, this will be done simply by asking. When two users are familiar with each other, the permission can also be given without asking. Since no distinction is made in access level concerned the shared space, the same will be done with the 'browsing' mode. When a user gives permission, all users can browse his personal content. Apart from indicating the presence of other users, their access level ('open' or 'closed') is also visualized by the user icons.

Figures 9(a)-9(b) show two example variations of a lower border bar 29 that borders the lower space holding the content stored on the own device. The width of both lower bar 29a,b depicted match the device screen size. Since opening the user's personal space means giving access to other users and permitting them to drag items from this space to

FITBIT 1002
Fitbit v. Immersion

their own, it was chosen to visualize this by creating an opening in the closed border. Opening the own space (Figure 9(b)) swaps the user icon 89 to the right creating a passage in the normally closed border. The little toggle button 32 allows the user to switch at any moment he wants. When at least one of the connected users has opened his space, the upper space is accessible and thus reachable. A handle 83 in the middle of the border allows the user to resize the space manually. Preferably, when none of the connected users have opened their spaces the handle is not available. The user's own space is always accessible and therefore always reachable. Each user can at any time 'open' or 'close' his space by creating or closing a passage in the border. This provides the two ways of sharing content: *sharing* with a maximum of privacy and security and *browsing*, providing access to content stored on other devices, making it possible to quickly locate an item without effort needed from the owner. Spaces can only be resized when access is granted.

The huge collection of content, e.g., music and photos has to be organized in such a way that the user can easily and quickly navigate through all his content. Two ways of content organization can be distinguished: A hierarchical structure including organizing all content by placing it in folders that may include several related items. The same can be done with folders. Such an organization with multiple levels arises related to the way people store their content in the real world. Network structures only have one level. To find the way in this large pile of items smart search engines and filtering systems are put on top. The user can use keywords or indicate a direction and the system automatically generates a set of items that meets the criteria. To accomplish, this metadata is needed. Often a combination is used since people have the need to store related items in albums (photo books, CD's). The combination of a flexible structure and albums on the lowest level is proven.

The metadata available is often limited to song title and artist regarding downloaded MP3 songs. In the case of photos, the user often transfers them from his digital camera without renaming them or adding extra information (such as the location the photo was taken). In most cases only date information is included. Although technologies that generate or extract metadata automatically such as integrated GPS systems and photo analyzing software are gaining ground, with the expected usage scenarios not much metadata will be available. The lack of metadata makes the classic hierarchical structure more suitable. At little levels as needed were added to minimize the effort for the user.

FITBIT 1002
Fitbit v. Immersion

Photos, as well as music songs, are considered to be stored in albums.

The photos and music songs are stored in albums, which when opened, its contents are made visible. Preferably, music and photos are stored separately, for example, and the content of an album may be displayed in the same level, e.g., opening a folder in left column of a Windows Explorer type folder structure. Preferably, a one level structure is provided in order to avoid buttons to switch between the levels. Tapping it once can open an album and the album's metadata content may be displayed below the album icon that now indicates it has been opened as shown in Figure 10(a) with an example text view (music) and in Figure 10(b) with an example thumbnail view (photos). Closing an album may be performed by tapping it again or opening one of the other albums that are lined up under the opened album.

To perform a drag & drop operation (e.g., by tapping & dragging an item with the stylus) possible between all spaces, only one content type at the time is displayed in all spaces. This is to avoid a situation of dragging a photo into a space where music songs are displayed. A switch button allows the user to switch between the content types when he/she wants. Items can be represented by thumbnails 95a (e.g., for Figure 10(b) photos) or by text 95b (e.g., for Figure 10(a)), or both. Text specifies the picture in the case two photos look the same. With music albums, thumbnails can help identify an album when the user knows what it looks like. Separate songs often do not have a picture. For quick browsing, a text presentation is more effective while thumbnails are more fun to use. For these reasons two modes were created between which the user can switch. Since the items can be dragged, they may look like objects, e.g., by adding a little shadow. As shown in Figures 10(a) and 10(b), to browse through the content, standard scrollbars or like scroll mechanisms 66 may be used. To indicate their relation with the space, the scrollbar preferably has the same color of the space it is in.

As shown in Figure 11, the lower part of the screen 13 includes a button menu 115 providing buttons enabling functionality for switching between the content type (music and photo) buttons 116, 117, and the presentation mode, e.g., thumbnail and text, 118, 119. These text and thumbnail buttons may also appear on the side of the content type that is selected to indicate their relation. Feedback is given to change the color of the selected button and the type of content that is played on the screen. Thus, to indicate the origin of a content item, the items have the same color as the background color of the space they

FITBIT 1002
Fitbit v. Immersion

originate from.

Figure 12 illustrates two example items 95a,b in the shared space 75 of a user device 12a. One item 95a is of a first color (e.g., blue) indicating that it was transferred from the blue space and thus provided by the owner of this device 12a. Assigning the personal colors to the items in the shared space makes it easy to distinguish items from the various owners. When an item is retracted to the personal space again, it is removed from the space. Dragging a second item, e.g., a yellow colored item 95b, owned by a connected user, into the personal space starts the copying. The yellow item changes slowly into blue when placed in the personal blue space. This color change provides two kinds of information at the same time. It indicates the other user now also owns the item. Transfer feedback is given by using the text bar as a progress bar (not shown). Dragging items indicating actions that cannot be performed (like dragging an item into the personal space of the other user) are cancelled accompanied by a sound signal.

Since the users can always disconnect, it is only allowed to transfer one item at the time. This avoids situations were multiple items are being downloaded. While the owner disconnects and all downloads are lost. Dragging items to the personal space and releasing them places them between the albums. Releasing items on an album, places them into this album so as to avoid an 'inbox' where items are stored temporarily.

A first exemplary embodiment illustrating the user interface concept according to the present invention is now described. As described herein, pointing two PCC devices at each other and pressing the link buttons, for example, will establish a connection between the devices. Keeping the buttons pressed for a short time, establishes a link. Feedback about the successful connection may be given by a sound signal.

In operation, a start screen on a device provides an upper border (not shown) that is dynamically lowered to indicate a second border to expose the presence of the shared space region. The user icons are placed in the circles as described herein with respect to Figure 8. The content type switch buttons as well as the content view buttons (Figure 11) are placed on the bottom. When a third user joins by connecting and linking with one of the devices, all three users see each other as shown in the screen display (Figure 8) which shows the presence of two connected users, for example, one 'open' and the other one 'closed'. The owner has also closed his space here (Figure 9(a)).

With respect to navigating through content, as now depicted as a scenario 300 in

FITBIT 1002
Fitbit v. Immersion

Figure 13(a), a screen 300 is generated depicting that the owner of the PCC device 12a and all connected (second and third) users have opened their personal spaces as represented by respective icons 301, 302 and 303. The personal space 25a is maximized by dragging the handle 83 upwards as depicted by arrow 84. This action automatically minimizes the other spaces. Albums 95 may then be opened by tapping on them so that the content is displayed underneath. Scrollbars 66 depicted in Figure 13(a) may then be used to browse through all items in a space. Although not shown, selecting the 'text view' button 119 for instance, will generate for display all items without thumbnails and a larger name (e.g., metadata description).

With respect to exchanging items, an item may be placed in the shared space 75 and initially hold the color of the space they originate from. Upon dragging an item 95a to the personal space as shown in Figure 13(b), a transfer starts with feedback given by changing color of the copied item. The same holds for downloading items from the personal space of other users. Items can be retracted from the shared space 75, simply by dragging them back to the personal space.

With respect to rendering of items in the display screen, only items that are located in the personal space can be rendered. When tapping items in other spaces, a sound gives feedback this is not possible. Photos may be displayed full screen; and music can be listened through a speaker or headphones. To view landscape photos, the device has be rotated 90 degrees. Disconnecting is performed by pressing the same button that is pressed for connecting. Pointing at the other device is not necessary as the action may be performed without the cooperation of another user.

It should be understood that items may be placed in the 'shared space' 75 without being connected. The items placed here are immediately accessible for others after connecting. The space is opened by dragging down the border, and, just like sharing when connected, a copy is initiated. Since the shared space holds the items shared by all users, when disconnecting the space empties. However, in a not connected state it still remained possible to copy items to the shared space. Pre-placed items (by others) appear in the shared space upon connecting with them. The temporary character of the items in this space interferes with the possibility to use it also in the stand-alone mode. Dragging an item to the shared space is obvious making a copy, leaving the personal collection untouched.

FITBIT 1002
Fitbit v. Immersion

Thus, after disconnecting, the shared space disappears completely to emphasize its temporary character, i.e., there is no shared space in the stand-alone mode. Thus, as shown in a further embodiment for the user interface 400 depicted in Figure 14(a), only the user's personal space 410 is provided in a stand-alone mode. In the view depicted in Figure 14(a), three collections 405a-405c are available in a top level navigation view. The border 401 has moved automatically to the top of the screen, and an audio/video player 415 appears below the screen. As shown in Figure 14(a), the personal icon is hidden to save screen space in the stand-alone mode. Although not shown, in this second embodiment, a multi level structure is supported for content navigation. Tabs appearing on the left side of the screen provide feedback about the present location. Clicking an underlying tab shows a level more on top.

The temporary character of the shared space implies that items disappear after the owner disconnects. This might necessitate quick grabbing of the items. The small screen does not offer enough space to visualize both spaces completely. In order to copy the items into the right location, actions like scrolling and navigating between different levels in the hierarchy are needed. Since these actions take time, an option to place the downloaded items on the temporary location is preferable, and subsequent thereto, organization of the content can be performed. Preferably, this 'temporary location' does not interfere with the concept of the spaces and, thus, a temporary space is located within the user's personal space, since the items are already downloaded and does not increase the complexity of the user interface.

A temporary place to park items (i.e., shared space) is opened when sliding over with an item and closes again when it includes no items anymore. Dragging an item to this area makes a *copy*, dragging an item from the area involves a *move* action. To minimize the number of items in the shared space, items are deleted from the space when every connected user has downloaded them. On the other hand, items that are still not downloaded by everyone should be accessible as long as possible. When the original owner disconnects, the item also disappears. However, when at least one of the others users has already downloaded the item, he/she could replace this item. This action can also be performed by the system. The item simply changes color in the shared space, indicating another user is now controlling it.

Functionality for enabling users to preview items before downloading them is

FITBIT 1002
Fitbit v. Immersion

provided. This can be useful since the screen space only offers a minimal amount of information of the items. Thus, to be sure to download the right item or when just browsing, the option of previewing is provided. The rendering of items from the shared space is aborted when the owner disconnects. The user should therefore be informed when viewing or listening to items he does not own. This may be indicated to a user by changing the color of the audio and video player 415, for example by enabling the player to take the color of the user to which the item belongs.

As mentioned, the personal space in the stand-alone mode is illustrated in Figure 14(a). Here, the top level shows three collections 405a-405c. After connecting with another user, the border 401 lowers, the owner's icon 408 is generated for display as is the user icon 409 of the other connected user, and the shared space 475 is generated as shown in Figure 14(b). The audio player is minimized to provide more screen space. In Figure 14(c), the 'music albums' collection 405b is opened. A tab 412 on the left appears, indicating the current location. By tapping a portion of the tap, the user is returned to the top level. As shown in Figure 14(d), dragging an item 415 to the shared space 475 makes a copy. The item now becomes visible on all connected devices. The transparency indicates the user already possesses the item, to clear the view on the 'new' content.

As shown in Figure 14(e), the connected user shares his phone collection indicated by icon 416 with the original user as indicated by its addition to the shared space 475. As shown in Figure 14(e), the collection 415 on top level is dragged into the shared space 475. Tapping the collection via a touch screen interface shows the albums it contains, such as album 425 indicated in Figure 14(f). The tab 422 on the left side of the screen provides an indication of the navigation and preferably, is rendered the same color of the other user. Opening the album 425 shows the picture contents 435 as shown in Figure 14(g). As shown in Figure 14(g), a scrollbar 430 is displayed to provide a scrolling function when the amount of items 435 can not fit in the screen display area. The tab 432 shows the third level and gives metadata information about the opened album 425. As shown in Figure 14(h), two photos 435a,b are dragged to the user's (temporary) personal space 485. By sliding over the border, the 'temporary space' 485 opens and copies are made. The item can be placed here or can be stored in an album at once. Feedback about the transfer progress is given by the changing color. As depicted in Figure 14(i), after minimizing the shared space 475, the downloaded items 435a,b can be organized, for example, by moving

FITBIT 1002
Fitbit v. Immersion

them to an album or collection. When the temporary area 485 is empty, it closes automatically.

After pointing and linking to another user in the manner as described herein, the icon 497of that new user appears on all connected devices as shown in Figure 14(j). When maximizing the shared space 475, the user's temporary space 485 automatically becomes visible to enable quick downloading (organizing may be performed later). As shown in Figures 14(k)-14(l), the third user's content items 490 have been placed in shared space 475. Figure 14(l) particularly depicts content items 495 rendered in the color identifying the third user's content.

When a hard button is pushed again, the device disconnects from the group. After disconnecting, the shared space disappears. When a photo is rendered in the shared space, the player gets the color of the user that owns the item. This emphasizes a preview is being made which can be aborted when the owner disconnects.

While there has been shown and described what is considered to be preferred embodiments of the invention, it will, of course, be understood that various modifications and changes in form or detail could readily be made without departing from the spirit of the invention. It is therefore intended that the invention be not limited to the exact forms described and illustrated, but should be constructed to cover all modifications that may fall within the scope of the appended claims.

FITBIT 1002
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CLAIMS

1. A system for ad hoc sharing of content stored in portable devices, said system comprising:

a) a means for establishing a communications link to connect a single portable device to one or more other portable devices;

b) means for generating a visualized shared space on a display area of each portable device of a connected user for facilitating content exchange between connected users via established communications links; and

c) means for enabling each individual connected user to control transfer of content to and from that user's portable device via said communications link in response to manipulation of items representing user content in said shared space.

2. The system as claimed in Claim 1, wherein said display area comprises a user space for displaying items representing content stored in said portable device, wherein a copy of said content is available for transfer to a connected user by moving an item representing said content from said user space to said shared space, said moved item being displayed in a shared space on each connected user's device.

3. The system as claimed in Claim 2, wherein a copy of said content is transferred from a transferor device to a transferee device via an established communications link in response to moving an item representing said content from said shared space to said user space of a transferee device.

4. The system as claimed in Claim 1, further comprising means for indicating to a user a status of being connected during which time content items can be freely exchanged between portable devices of all connected users.

5. The system as claimed in Claim 4, whereby said means for establishing a communications link further includes means for enabling secure encrypted communications.

6. The system as claimed in Claim 5, whereby said means for establishing a communications link with a connecting user is by wireless RF communications.

FITBIT 1002
Fitbit v. Immersion

7 The system as claimed in Claim 5, whereby said means for establishing a communications link with a connecting user is by infrared communications.

8. The system as claimed in Claim 5, whereby a communications link connecting a single portable device to one or more other devices is established when said devices are in close distance range to each another.

9. The system as claimed in Claim 8, whereby a communications link becomes automatically disconnected when said devices are out of communication range from each another.

10 The system as claimed in Claim 5, whereby a communications link connecting a single portable device to another device is established when said devices contact each other, wherein content may be transferred between devices while in said contact.

11. The system as claimed in Claim 5, whereby a communications link connecting a single portable device to another device is established when said devices are positioned one on top of another, wherein content may be transferred between devices while in said on top position.

12. The system as claimed in Claim 5, whereby a communications link connecting a single portable device to another device is established when said devices are first in close proximity and in motion relative to one another, wherein content may be transferred between devices while in said motion.

13. The system as claimed in Claim 5, further including means for generating a space in said display area on a transferee portable device indicating content included in a transferor portable device, said transferee user being enabled to transfer content from said transferor portable device to said shared space via said transferee device.

14. The system as claimed in Claim 4, wherein said means indicating status of a user includes means for generating a graphic for display to indicate the presence and identity of a connected user and providing indication of whether content is or is not provided by said connected user in said shared space.

15 The system as claimed in Claim 12, further including means for providing visual indication for identifying content in said shared space owned by a particular connected user.

FITBIT 1002
Fitbit v. Immersion

16. The system as claimed in Claim 15, wherein said visual indication is a color indication.

17. The system as claimed in Claim 12, further including means enabling switching display of content items in said portable device according to graphic or textual views.

18. The system as claimed in Claim 14, further including means providing metadata information associated with content items displayed in said display area.

19. The system as claimed in Claim 14, wherein said shared space of a user's device is populated with items already in said shared space as placed by other users upon connection.

20. The system as claimed in Claim 14, wherein said content items associated with a first user are removed from the shared area of a connected user's portable device when the first user's communications link is disconnected.

21. A method for ad hoc sharing of content stored in portable devices, said method comprising steps of:

a) establishing a communications link to connect a single portable device to one or more other portable devices;

b) generating a visualized shared space on a display area of each portable device of a connected user for facilitating content exchange between connected users via established communications links; and

c) enabling each individual connected user to control transfer of content to and from that user's portable device via said communications link in response to manipulation of items representing user content in said shared space.

22. The method as claimed in Claim 21, wherein said display area comprises a user space for displaying items representing content stored in said portable device, said step c) of controlling transfer comprising: moving an item representing said content from said user space to said shared space for making a copy of said content available for transfer to a connected user, said moved item being displayed in a shared space on each connected user's device.

23. The method as claimed in Claim 22, wherein said step c) of controlling transfer comprises: moving an item representing said content from said shared space to said user space of a transferee device and initiating transfer of a copy of said content from

FITBIT 1002
Fitbit v. Immersion

a transferor device to a transferee device via an established communications link in response to.

24. The method as claimed in Claim 21, further comprising the step of indicating to a user a status of being connected during which time content items can be freely exchanged between portable devices of all connected users.

25 The method as claimed in Claim 24, whereby step of establishing a communications link further includes communicating first information enabling secure encrypted communications between connected devices.

26 The method as claimed in Claim 25, whereby said step of establishing a communications link with a connecting user includes implementing wireless RF communications.

27. The method as claimed in Claim 25, whereby said step of establishing a communications link with a connecting user includes implementing infrared communications.

28. The method as claimed in Claim 25, wherein said step of establishing a communications link occurs between a single portable device and one or more other devices according to distance range of said devices with respect to each other.

29. The method as claimed in Claim 25, further including the step of automatically disconnecting a communications link when said devices are out of communication range from each another.

30. The method as claimed in Claim 25, wherein said step of establishing a communications link to connect a single portable device to another device includes touching said devices with each other, and transferring content between said devices while in said contact.

31. The method as claimed in Claim 25, wherein said step of establishing a communications link to connect a single portable device to another device includes positioning a portable device on top of another device, and transferring content between said devices while in said on top position.

32 The method as claimed in Claim 25, wherein said step of establishing a communications link to connect a single portable device to another device includes moving

FITBIT 1002
Fitbit v. Immersion

said devices in close proximity relative to one another, and transferring content between said devices while moving.

33. The method as claimed in Claim 25, further including the step of generating a space in said display area on a transferee portable device indicating content included in a transferor portable device, said method including enabling a transferee user to transfer content from said transferor portable device to said shared space via said transferee device.

34. The method as claimed in Claim 24, further including the step of: generating a graphic for display to indicate the presence and identity of a connected user and providing indication of whether content is or is not provided by said connected user in said shared space.

35. The method as claimed in Claim 33, further including the step of: providing visual indication for identifying content in said shared space owned by a particular connected user.

36. The method as claimed in Claim 35, wherein said visual indication is a color indication.

37. The method as claimed in Claim 32, further including the step of switching display of content items in said portable device according to graphic or textual views.

38. The method as claimed in Claim 32, further including the step of providing metadata information associated with content items displayed in said display area.

39. The method as claimed in Claim 24, further including the step of populating said shared space of a user's device with items already in said shared space as placed by other users upon connection.

40. The method as claimed in Claim 24, further including the step of removing content items associated with a first user in said shared space of a connected user's portable device when the first user's communications link is disconnected.

FITBIT 1002
Fitbit v. Immersion

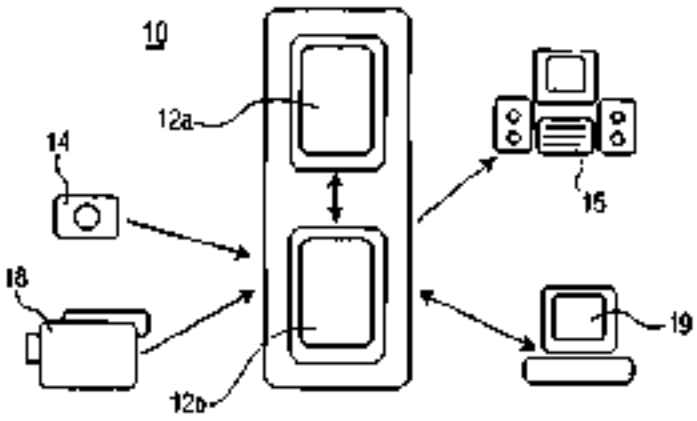


FIG. 1

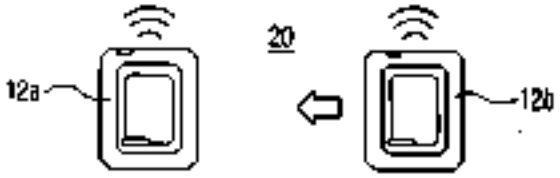


FIG. 2A

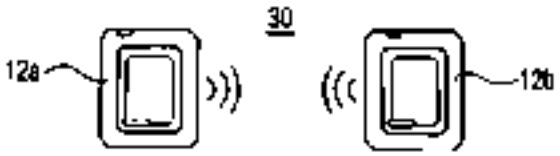


FIG. 2B

FITBIT 1002
Fitbit v. Immersion

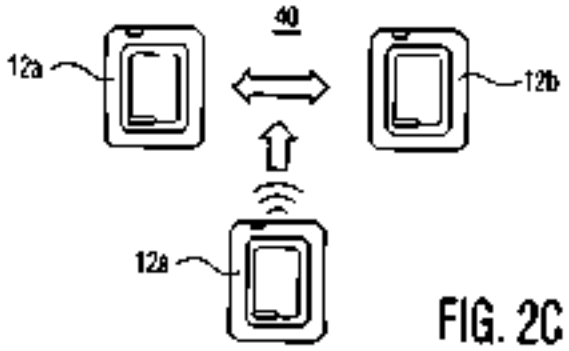


FIG. 2C

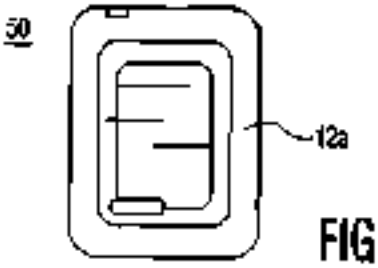


FIG. 2D



FIG. 2E

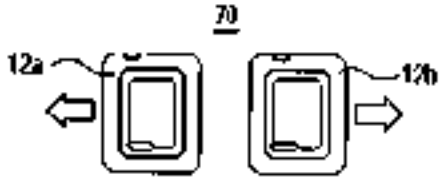


FIG. 2F

FITBIT 1002
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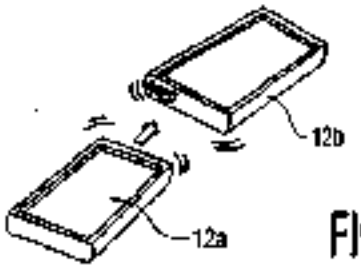


FIG. 3A1

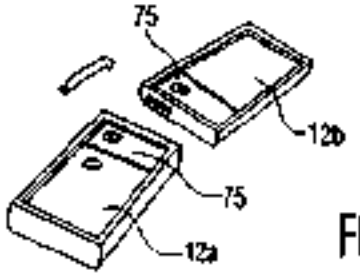


FIG. 3A2

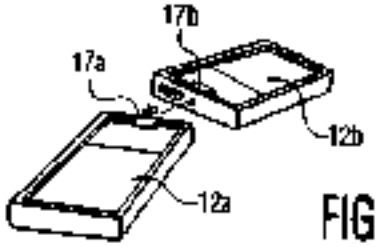


FIG. 3B1

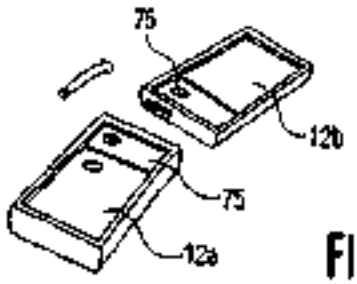


FIG. 3B2

FITBIT 1002
Fitbit v. Immersion

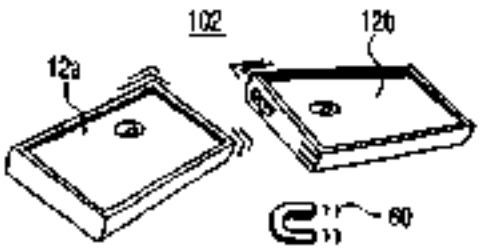


FIG. 3C



FIG. 3D

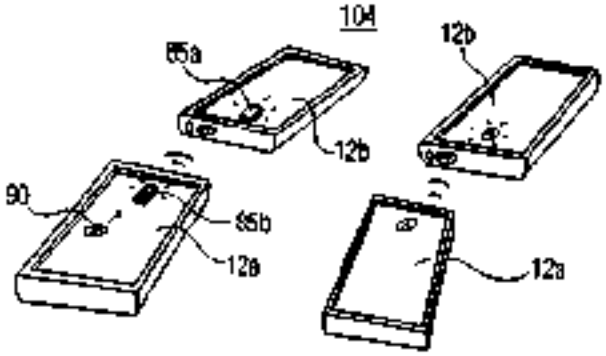


FIG. 3E

FITBIT 1002
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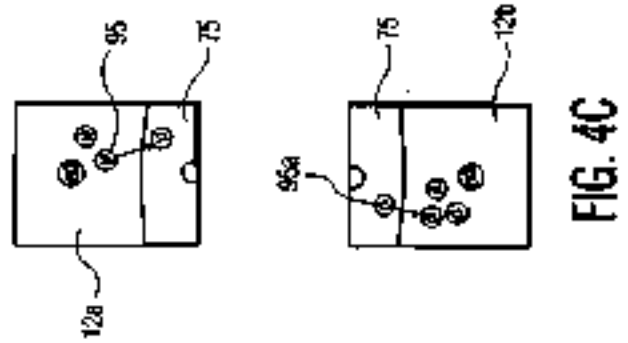


FIG. 4C

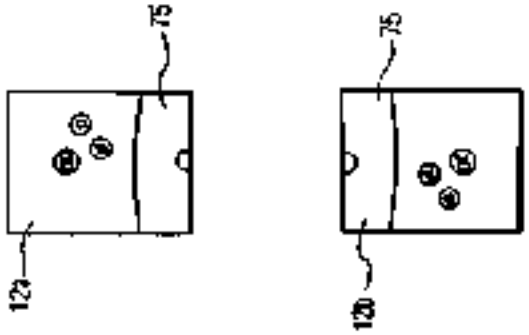


FIG. 4B

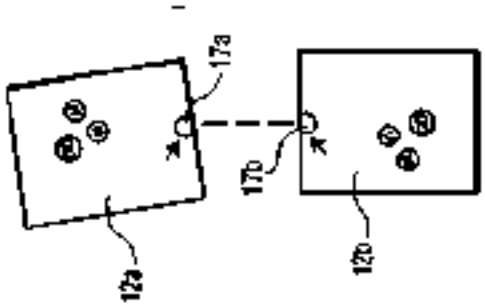


FIG. 4A

FITBIT 1002
Fitbit v. Immersion

6/19

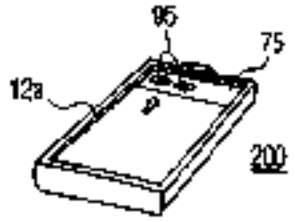


FIG. 5A1

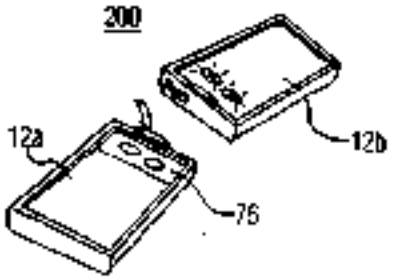


FIG. 5A2

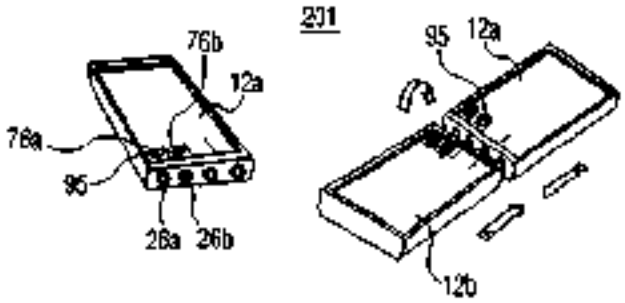


FIG. 5B

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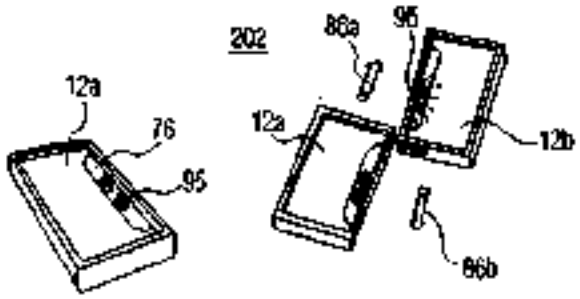


FIG. 5C

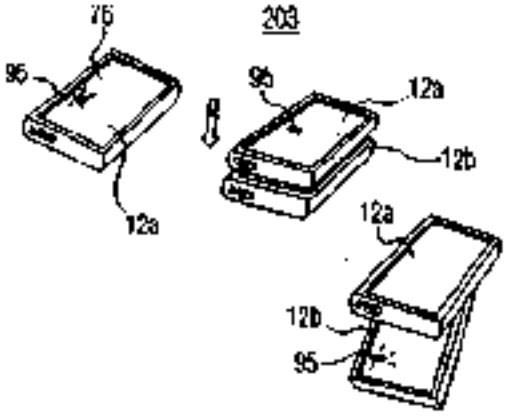


FIG. 5D

FITBIT 1002
Fitbit v. Immersion

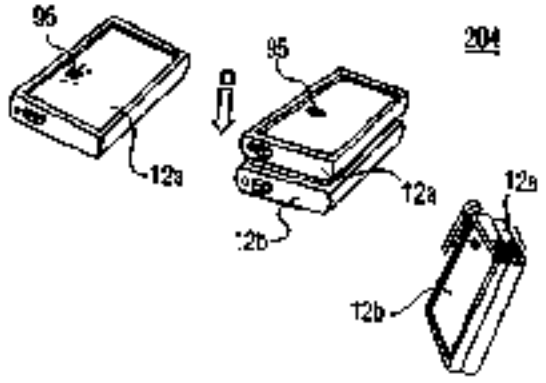


FIG. 5E

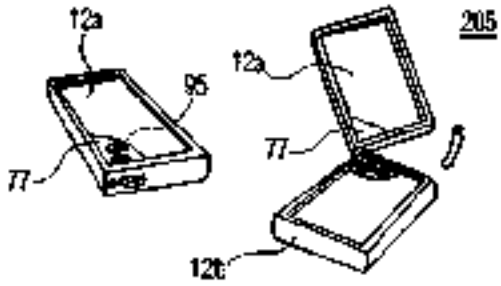


FIG. 5F

FITBIT 1002
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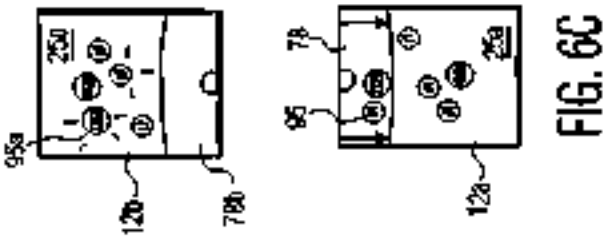


FIG. 6C

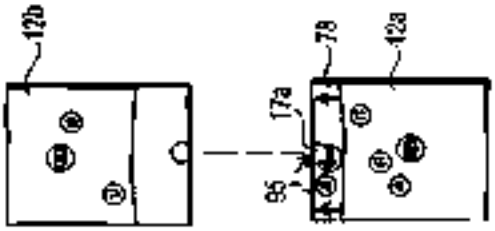


FIG. 6B

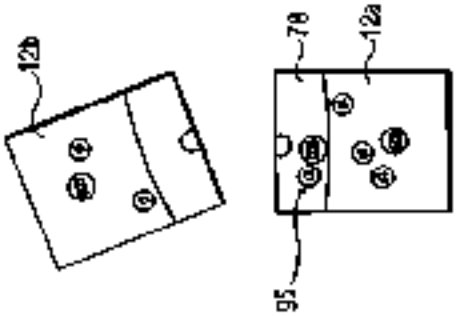


FIG. 6A

FITBIT 1002
Fitbit v. Immersion

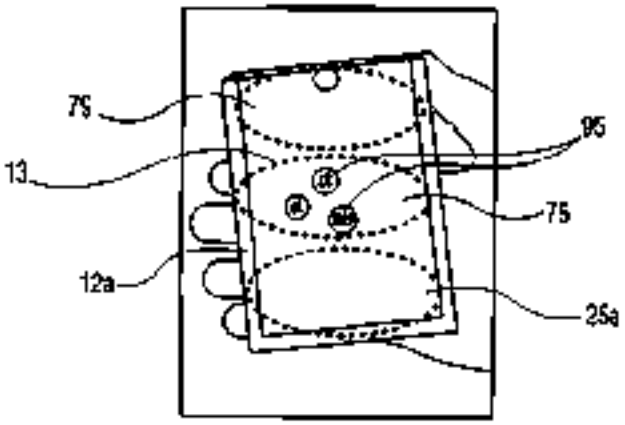


FIG. 7

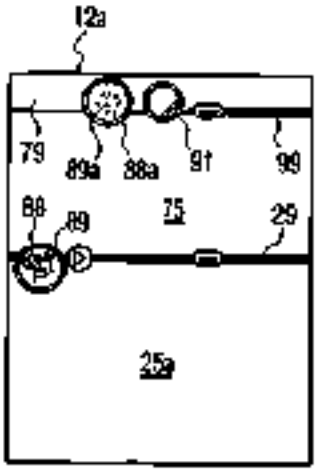


FIG. 8

FITBIT 1002
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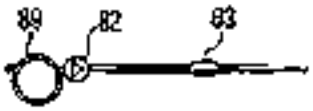


FIG. 9A



FIG. 9B

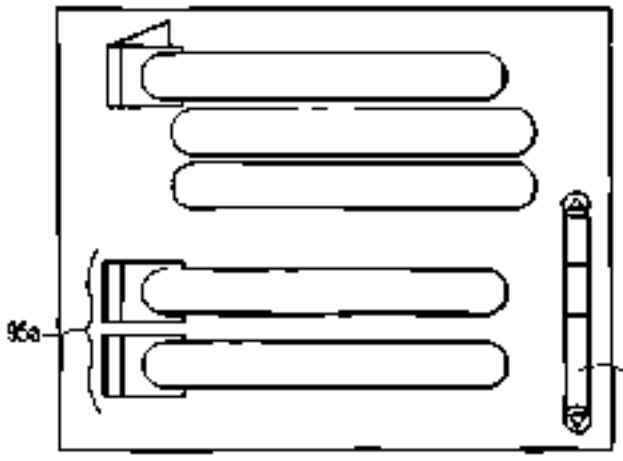


FIG. 10A

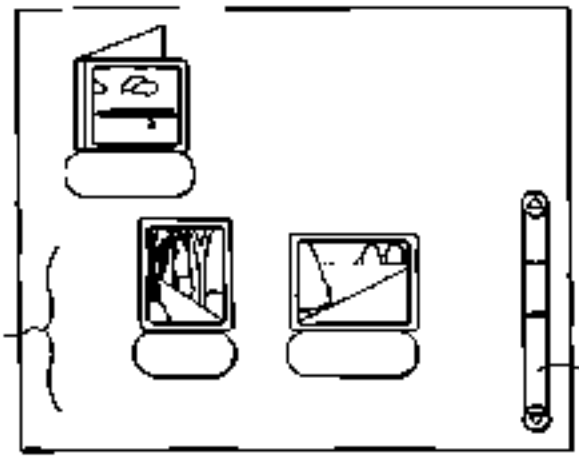


FIG. 10B

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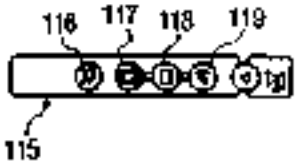


FIG. 11

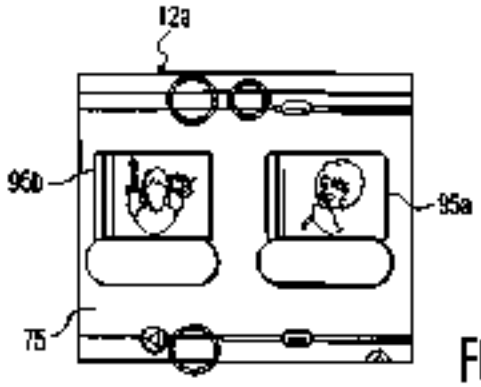


FIG. 12

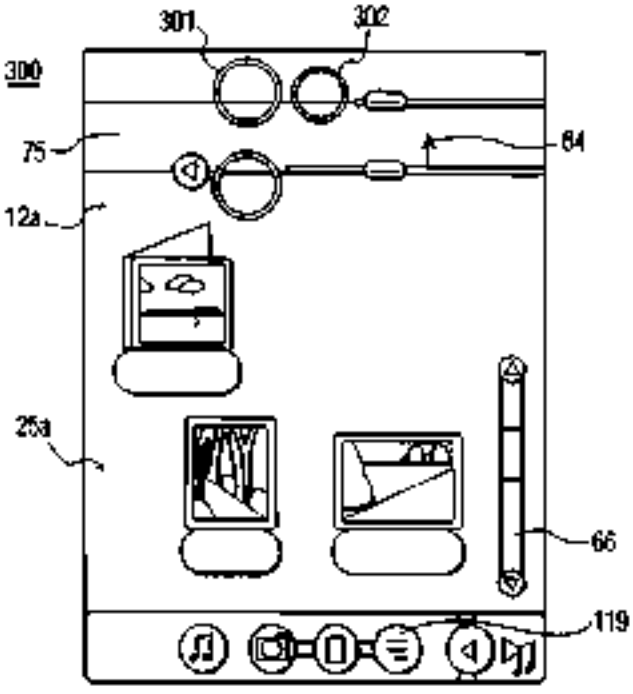


FIG. 13A

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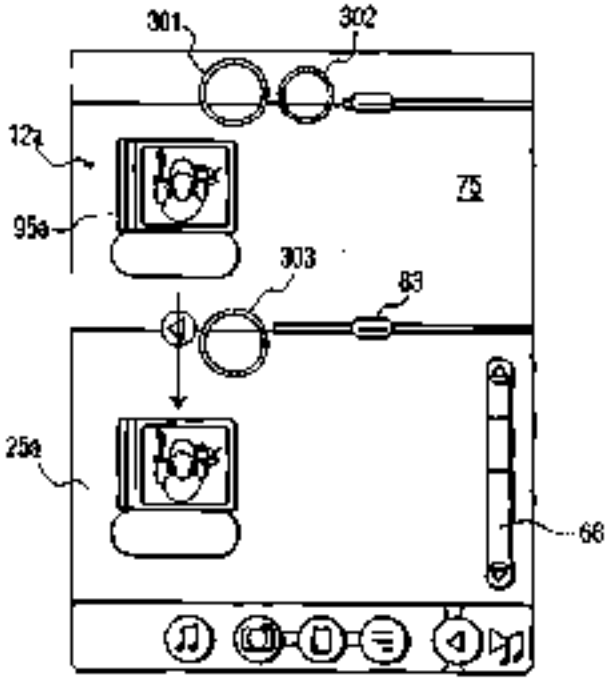


FIG. 13B

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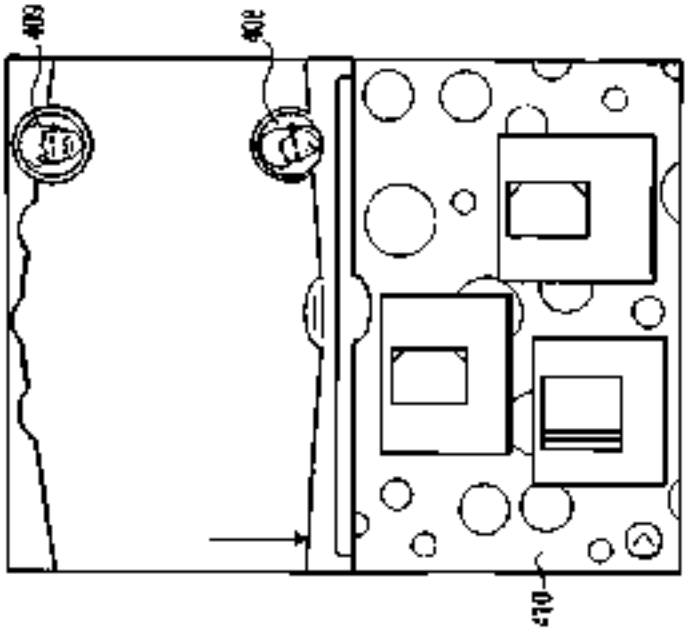


FIG. 14B

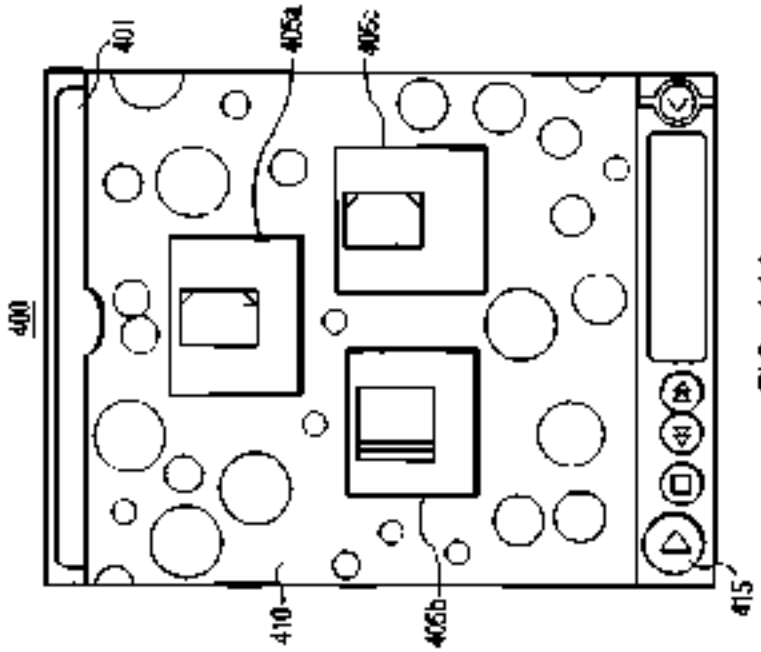


FIG. 14A

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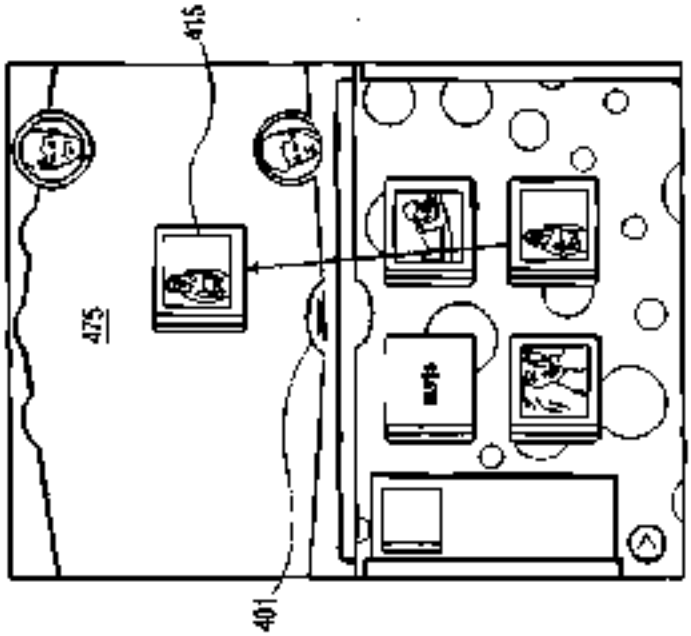


FIG. 14D

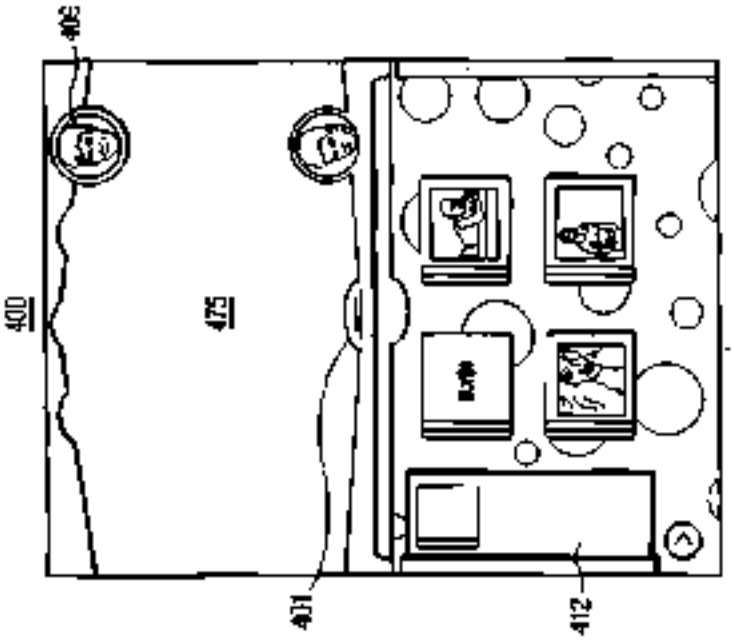


FIG. 14C

FITBIT 1002
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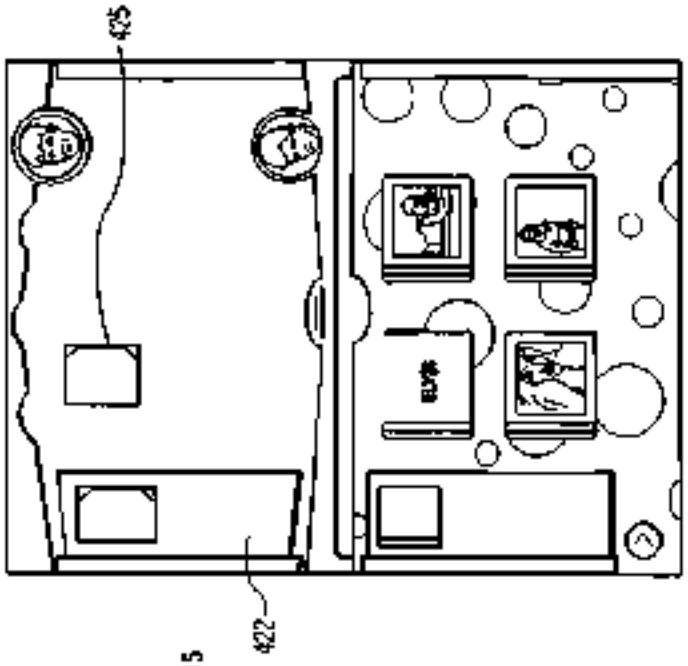


FIG. 14F

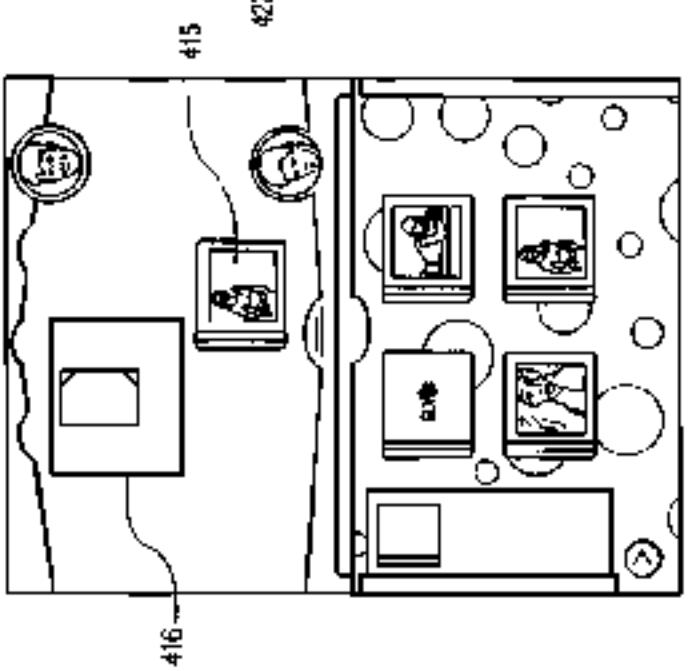


FIG. 14E

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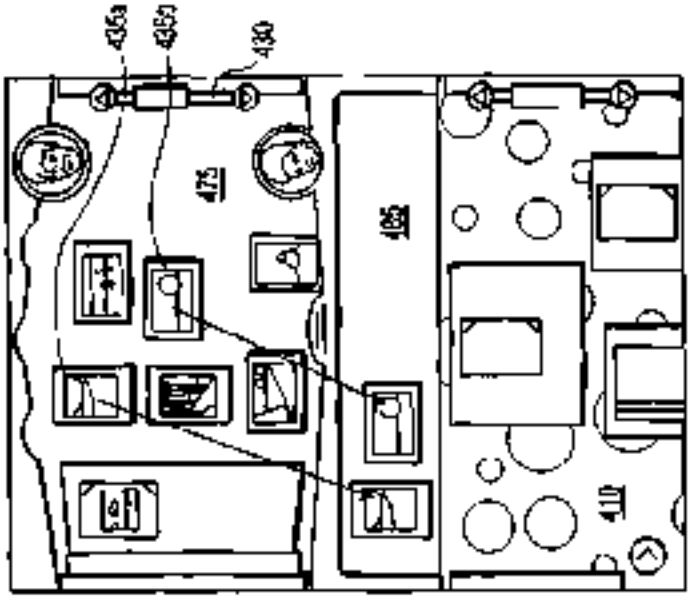


FIG. 14H

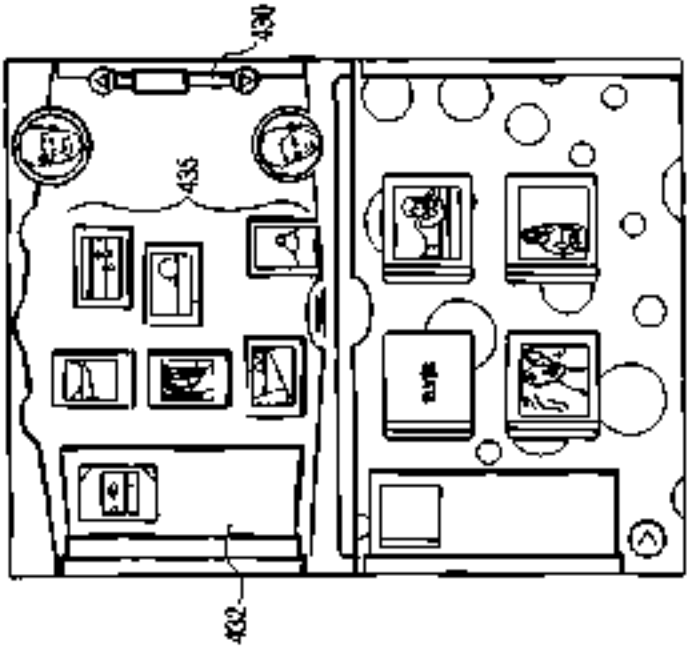


FIG. 14G

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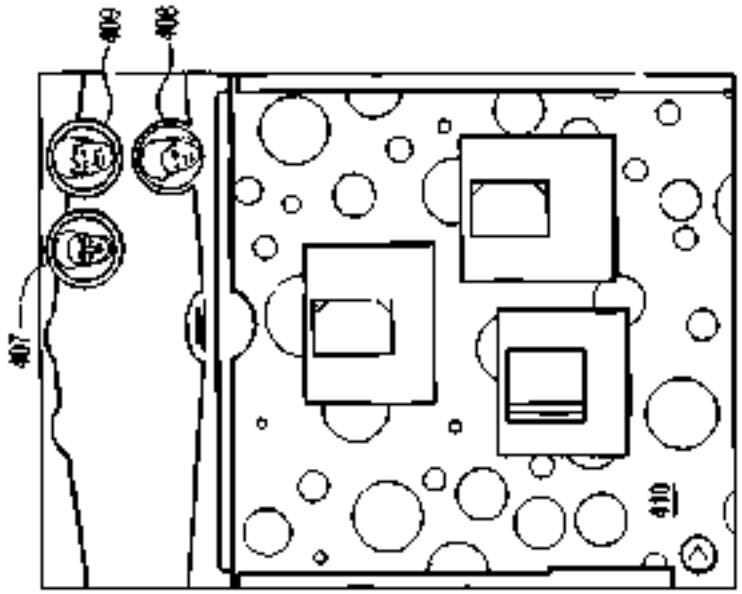


FIG. 14J

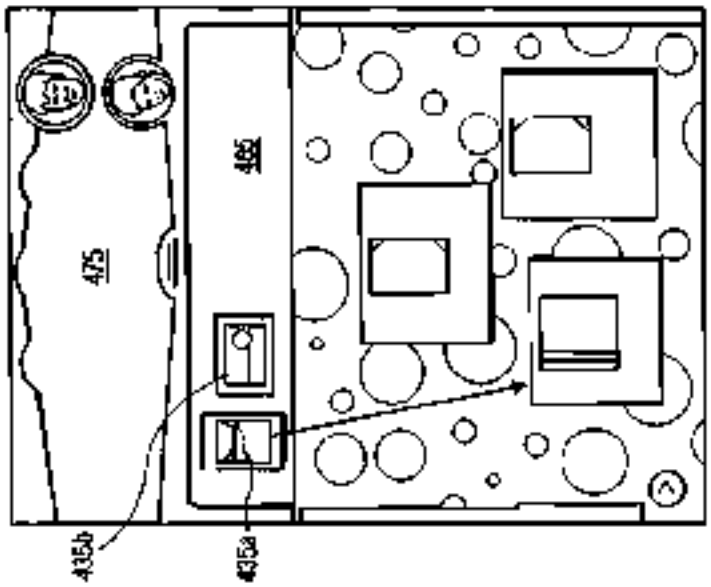


FIG. 14I

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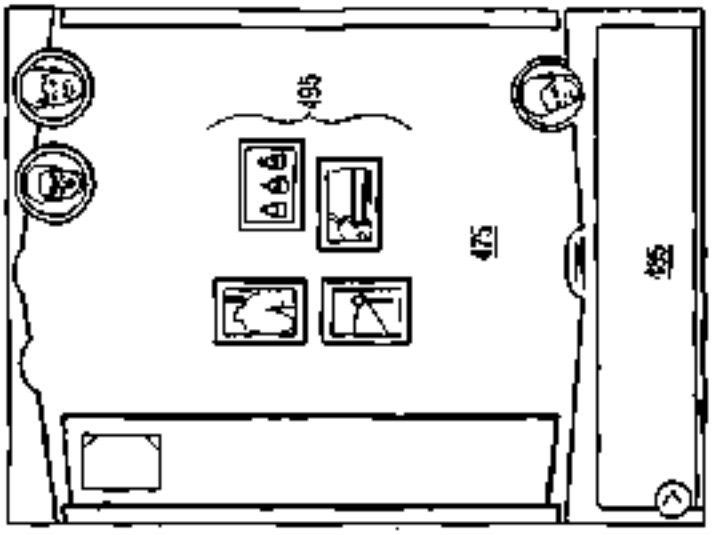


FIG. 14L

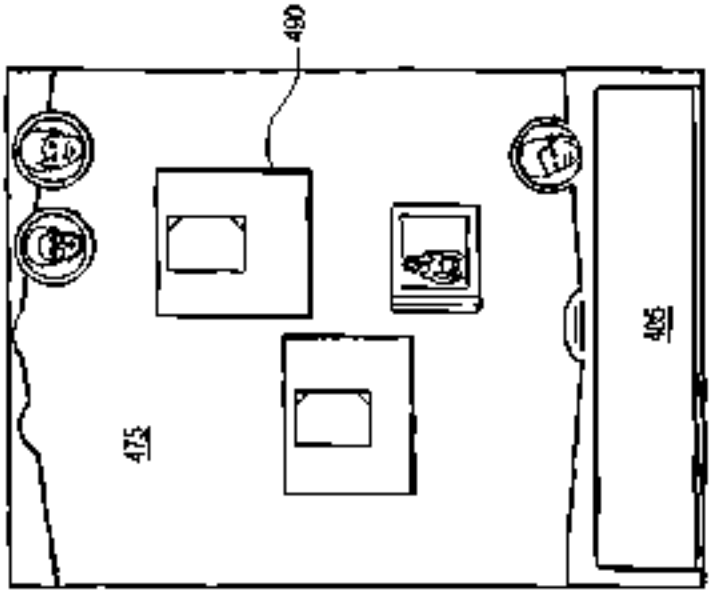


FIG. 14K

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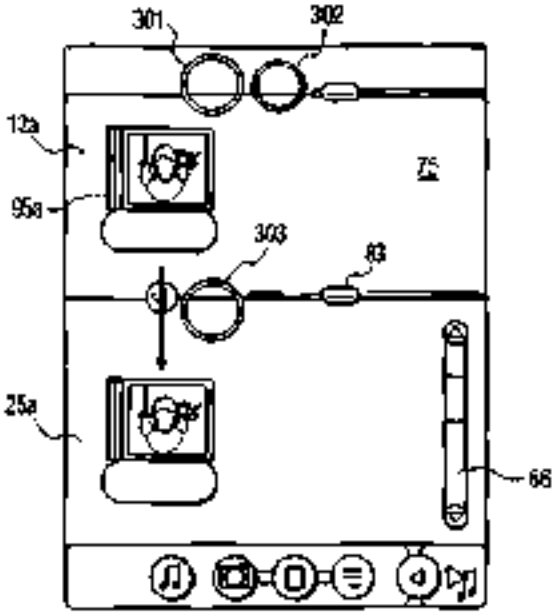
(74) Common Representative: KONINKLIJKE PHILIPS ELECTRONICS, N.V.; c/o THORNE, Gregory, L., P.O. Box 3001, Briarcliff Manor, NY 10510-8001 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (regional): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(Continued on next page)

(54) Title: SYSTEM FOR AD HOC SHARING OF CONTENT ITEMS BETWEEN PORTABLE DEVICES AND INTERACTION METHODS THEREFOR



(57) Abstract: A user interface concept for wireless ad hoc content sharing between portable devices referred to as portable content containers (PCCs). A step-oriented design approach is provided enabling users to share content such as music and photos. A variety of physical ways of establishing a secure connection between the PCC devices is provided. In addition, a clear view on the location of the acquired content on the devices, and a drag & drop interface is provided. The UI is made of separate spaces, each containing the corresponding content and includes a "shared" space such that all connected users may manage content on and from their own personal devices. The use of a drag & drop interface in combination with the subdivision of the screen into several spaces provided the user with a clear view on the content location. The close proximity of users is assumed and enhances social interaction.

WO 2004/075169 A3

FITBIT 1002
Fitbit v. Immersion

GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for the following designations* AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG)

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

Published:

— *with international search report*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

(88) **Date of publication of the international search report:**
29 December 2004

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International Application No
../162004/000408

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04L29/06 H04L12/28 G06F3/033 G06F17/30

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04L G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2002/052918 A1 (KARASAWA HIDEMORI ET AL) 2 May 2002 (2002-05-02) paragraphs '0021!, '0022! paragraphs '0024! - '0028! paragraphs '0030! - '0034! paragraphs '0075!, '0080!, '0083!, '0086! paragraph '0094! paragraphs '0108! - '0112! paragraphs '0120!, '0121! paragraphs '0157!, '0158! paragraphs '0161!, '0162! -/--	1-40

[X] Further documents are listed in the continuation of Box C.

[X] Patent family members are listed in annex

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search	Date of mailing of the international search report
28 October 2004	05/11/2004

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Losseau, O

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C(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	MICHELITSCH G ET AL: "A user-centric view of QoS aware communication" COMPUTER COMMUNICATIONS, ELSEVIER SCIENCE PUBLISHERS BV, AMSTERDAM, NL, vol. 21, no. 15, 1 October 1998 (1998-10-01), pages 1310-1319, XP004145245 ISSN: 0140-3664 section 3 "Shared Virtual spaces" page 1312, right-hand column - page 1314, right-hand column section 5 "Shared Spaces Implementation Strategies" page 1316, right-hand column - page 1318, left-hand column	1-40
A	US 6 493 001 B1 (ISHIKAWA MASAYUKI ET AL) 10 December 2002 (2002-12-10) column 4, lines 19-36 column 13, line 4 - column 14, line 14	1-3,13, 15,17, 21-23, 33,35,37
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3

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No
.../182004/000408

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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FITBIT 1002
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Fitbit v. Immersion

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(74) Agent: AWAPATENT AB, Box 5117, SE-200 71 Malmö (SE)

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60/914,124 26 April 2007 (26.04.2007) US

(71) Applicant (for all designated States except US): NOKIA CORPORATION [FI/FI], Keilalahdentie 4, FIN-02150 Espoo (FI).

(72) Inventors; and

(75) Inventors/Applicants (for US only): LEPPÄNEN, Petteri [FI/FI], Tampellan Esplanadi 6 D 35, FIN-33100 Tampere (FI). KAUKO, Jarmo [FI/FI], Teuvolantie 20 B 6, FIN-33100 Tampere (FI). HONKALEHTO, Sami [FI/FI], Pattiteenrinne 2 as 6, FIN-90650 OULU (FI). RÄKKÖLÄ, Jouni [FI/FI], Uusikatu 2, FIN-90450 Kempele (FI).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— with international search report

(54) Title: METHOD AND MOBILE TERMINAL WITH USER INPUT BASED ON MOVEMENT OF THE TERMINAL DETECTED BY A SENSOR

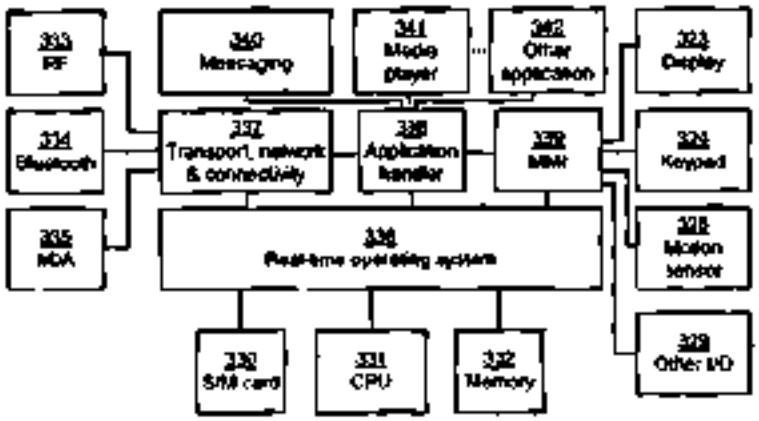


Fig 3

(57) Abstract: It is presented a method for a portable apparatus (200) comprising, detecting a movement of the portable apparatus, and determining that the movement is associated with a user input for retrieving a value of a status of the portable apparatus, determining a value of the status and processing the value to the user. The status can for example be battery level, signal strength, available memory, number of unread messages, etc. Corresponding portable apparatus and computer program product are also presented.

WO 2008/132540 A1

FITBIT 1002
Fitbit v. Immersion

METHOD AND MOBILE TERMINAL WITH USER INPUT BASED ON MOVEMENT OF THE TERMINAL DETECTED BY A SENSOR

Field of the invention

The present invention generally relates to portable apparatuses and more particularly to providing statuses of portable apparatus.

Background of the invention

Mobile terminals, or mobile (cellular) telephones, for mobile telecommunications systems like GSM, UMTS, D-AMPS and CDMA2000 have been used for many years now. In the older days, mobile terminals were used almost exclusively for voice communication with other mobile terminals or stationary telephones. More recently, the use of modern terminals has been broadened to include not just voice communication, but also various other services and applications such as www/wap browsing, video telephony, electronic messaging (e.g. SMS, MMS, email, instant messaging), digital image or video recording, FM radio, music playback, electronic games, calendar/organizer/time planner, word processing, etc.

Being portable, there are a number of statuses of modern mobile terminals that vary over time. Such statuses can for example be battery level, mobile network signal strength, wireless local area network signal strength, available memory, number of unread messages etc.

One way to solve this is to always present on the display the most important statuses, such as the battery level and mobile network signal strength. However, this is not always available, for example when a screen saver has been activated, nor is it particularly exciting or fun for the user.

Consequently, there is a need to provide an improved way of presenting statuses of the mobile terminal to the user.

Summary

In view of the above, an objective of the invention is to solve or at least reduce the problems discussed above.

Generally, the above objectives are achieved by the attached independent patent claims.

According to a first aspect of the present invention there has been provided a method for a portable apparatus comprising: detecting a movement of the portable apparatus, and determining that the movement is associated with a user input for retrieving a value of a status of the portable

FITBIT 1002
Fitbit v. Immersion

apparatus; determining a value of the status; and presenting the value to the user. This allows the user to, simply by moving the portable apparatus according to a user input movement, effect the portable apparatus to present the desired status. There is therefore no need to touch the keypad, allowing the user to get information about the status in situations where key presses may be difficult, such as when the user is wearing gloves, etc.

In the presenting, a plurality of indicators may be presented on a display of the portable apparatus, and the appearance of the plurality of indicators may indicate the value.

The presenting may comprise presentation of moving particles.

Icons may be displayed on the display and the presenting may comprise presentation of a subset of the particles proximate one of the icons and presented with an appearance representing a status of an application related to the icon. This allows for intuitive identification of the application area indicated by the indicators.

In the presenting, the movement of the particles may be affected by the orientation of the portable apparatus. For example, the particles can appear to be affected by gravity this way.

In the presenting, the movement of the particles may be affected by a time elapsed since a last detected movement of the portable apparatus and by an intensity of the last detected movement of the portable apparatus. In other words, effects initiated by movement can for example fade over time. Also, effects could be stronger if the last detected movement is stronger.

In the presenting, the value may be indicated by a characteristic of at least some of the indicators, the characteristic selected from the group consisting of color, size, shape, movement behavior or any combination of these characteristics.

In the presenting, the number of indicators may be associated with the value. In other words, many indicators indicate a high value and fewer indicators indicate a low value, or vice versa.

The indicators may be indicators selected from the group consisting of snowflakes, shining stardust, pearls, jewels, dust, flies, butterflies or any combination of these indicators.

In the detecting a movement, the user input may be associated with a user input for retrieving values of a plurality of statuses of the portable apparatus; in the determining, values may be determined for all of the plurality of statuses; and in the presenting, the values may be presented to the user.

FITBIT 1002
Fitbit v. Immersion

In other words, the value of several different statuses may efficiently be presented to the user simultaneously.

In the presenting, vibration pulses may be generated, the vibration pulses indicating the value.

The presenting may comprise generating vibration pulses at specific intervals, the duration of the intervals being indicative of the value.

The presenting may comprise generating vibration pulses with a specific duration, the duration being indicative of the value.

In the presenting, audio effects may be generated, the audio effects indicating the value.

The presenting may comprise generating audio effects at specific intervals, the duration of the intervals being indicative of the value.

The presenting may comprise generating audio effects with a specific duration, the duration being indicative of the value.

In the presenting, the audio effect may differ for different statuses.

In the detecting a movement, other movements of the portable apparatus may be associated with other user inputs, and each of these other user inputs may be used for retrieving other statuses of the portable apparatus.

The status may be a status selected from the group consisting of battery level, available memory, reception level for a mobile communication network, reception level for a wireless local area network, number of unread messages and number of missed calls.

A second aspect of the present invention is a portable apparatus comprising: a controller; a motion sensor capable of detecting a movement of the apparatus, wherein the controller is configured to determine if the movement is associated with a user input for retrieving a value of a status of the apparatus; and the controller is further configured to, when it is determined that the movement is associated with the user input, determine a value of the status and present the value to the user, as a response to the user input.

The portable apparatus may be an apparatus selected from the group consisting of a mobile communication terminal, a digital music player, a pocket computer and a digital camera.

A third aspect of the present invention is a portable apparatus comprising: means for detecting a movement of the portable apparatus, and determining that the movement is associated with a user input for retrieving a

FITBIT 1002
Fitbit v. Immersion

value of a status of the portable apparatus; means for determining a value of the status; and means for presenting the value to the user.

A fourth aspect of the present invention is a computer program product comprising software instructions that, when executed in a portable apparatus, performs the method according to the first aspect.

A fifth aspect of the present invention is a user interface comprising: a movement detector, and an output device, wherein the user interface is arranged to: detect a movement of the portable apparatus, and determine that the movement is associated with a user input for retrieving a value of a status of the portable apparatus; and presenting a value of the status to the user.

Other objectives, features and advantages of the present invention will appear from the following detailed disclosure, from the attached dependent claims as well as from the drawings.

Generally, all terms used in the claims are to be interpreted according to their ordinary meaning in the technical field, unless explicitly defined otherwise herein. All references to "a/an/the [element, device, component, means, step, etc]" are to be interpreted openly as referring to at least one instance of the element, device, component, means, step, etc., unless explicitly stated otherwise. The steps of any method disclosed herein do not have to be performed in the exact order disclosed, unless explicitly stated.

Brief Description of the Drawings

Embodiments of the present invention will now be described in more detail, reference being made to the enclosed drawings, in which:

Fig 1 is a schematic illustration of a cellular telecommunication system, as an example of an environment in which the present invention may be applied.

Fig 2 is a schematic front view illustrating a mobile terminal according to an embodiment of the present invention.

Fig 3 is a schematic block diagram representing an internal component, software and protocol structure of the mobile terminal shown in Fig 2.

Fig 4 is a flow chart illustrating a method for status check performed in the mobile terminal of Fig 2.

Figs 5a-d are schematic display views illustrating one embodiment of the mobile terminal of Fig 2.

FITBIT 1002
Fitbit v. Immersion

Figs 6a-b are schematic diagrams illustrating how tactile and/or audio feedback can be generated in an embodiment of the mobile terminal of Fig 2.

Figs 7a-b are graphs illustrating how different statuses can be represented in tactile and/or audio signals in the mobile terminal of Fig 2.

Detailed Description of Embodiments

The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which certain embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided by way of example so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

Fig 1 illustrates an example of a cellular telecommunications system in which the invention may be applied. In the telecommunication system of Fig 1, various telecommunications services such as cellular voice calls, www/wap browsing, cellular video calls, data calls, facsimile transmissions, music transmissions, still image transmissions, video transmissions, electronic message transmissions and electronic commerce may be performed between a mobile terminal 100 according to the present invention and other devices, such as another mobile terminal 106 or a stationary telephone 119. It is to be noted that for different embodiments of the mobile terminal 100 and in different situations, different ones of the telecommunications services referred to above may or may not be available; the invention is not limited to any particular set of services in this respect.

The mobile terminals 100, 106 are connected to a mobile telecommunications network 110 through RF links 102, 108 via base stations 104, 109. The mobile telecommunications network 110 may be in compliance with any commercially available mobile telecommunications standard, such as GSM, UMTS, D-AMPS, CDMA2000, FOMA and TD-SCDMA.

The mobile telecommunications network 110 is operatively connected to a wide area network 112, which may be Internet or a part thereof. An Internet server 115 has a data storage 114 and is connected to the wide area network 112, as is an Internet client computer 116. The server 115 may host a www/wap server capable of serving www/wap content to the mobile terminal 100.

FITBIT 1002
Fitbit v. Immersion

A public switched telephone network (PSTN) 118 is connected to the mobile telecommunications network 110 in a familiar manner. Various telephone terminals, including the stationary telephone 119, are connected to the PSTN 118.

The mobile terminal 100 is also capable of communicating locally via a local link 101 to one or more local devices 103. The local link can be any type of link with a limited range, such as Bluetooth, a Universal Serial Bus (USB) link, a Wireless Universal Serial Bus (WUSB) link, an IEEE 802.11 wireless local area network link, an RS-232 serial link, etc.

An embodiment 200 of the mobile terminal 100 is illustrated in more detail in Fig 2. The mobile terminal 200 comprises a speaker or earphone 222, a microphone 225, a display 223 and a set of keys 224 which may include a keypad 224a of common ITU-T type (alpha-numerical keypad representing characters "0"-"9", "*" and "#") and certain other keys such as soft keys 224b, 224c and a joystick 226 or other type of navigational input device

The internal component, software and protocol structure of the mobile terminal 200 will now be described with reference to Fig 3. The mobile terminal has a controller 331 which is responsible for the overall operation of the mobile terminal and is preferably implemented by any commercially available CPU ("Central Processing Unit"), DSP ("Digital Signal Processor") or any other electronic programmable logic device. The controller 331 has associated electronic memory 332 such as RAM memory, ROM memory, EEPROM memory, flash memory, or any combination thereof. The memory 332 is used for various purposes by the controller 331, one of them being for storing data and program instructions for various software in the mobile terminal. The software includes a real-time operating system 336, drivers for a man-machine interface (MMI) 339, an application handler 338 as well as various applications. The applications can include a messaging application 340 for sending and receiving SMS, MMS or email, a media player application 341, as well as various other applications 342, such as applications for voice calling, video calling, web browsing, an instant messaging application, a phone book application, a calendar application, a control panel application, a camera application, one or more video games, a notepad application, etc.

The MMI 339 also includes one or more hardware controllers, which together with the MMI drivers cooperate with the display 323/223, keypad 324/224, motion sensor 325, such as an accelerometer, as well as various

FITBIT 1002
Fitbit v. Immersion

other I/O devices 329 such as microphone, speaker, vibrator, ringtone generator, LED indicator, etc. As is commonly known, the user may operate the mobile terminal through the man-machine interface thus formed.

The software also includes various modules, protocol stacks, drivers, etc., which are commonly designated as 337 and which provide communication services (such as transport, network and connectivity) for an RF interface 333, and optionally a Bluetooth interface 334 and/or an IrDA interface 335 for local connectivity. The RF interface 333 comprises an internal or external antenna as well as appropriate radio circuitry for establishing and maintaining a wireless link to a base station (e.g. the link 102 and base station 104 in Fig 1). As is well known to a man skilled in the art, the radio circuitry comprises a series of analogue and digital electronic components, together forming a radio receiver and transmitter. These components include, i.a., band pass filters, amplifiers, mixers, local oscillators, low pass filters, AD/DA converters, etc.

The mobile terminal also has a SIM card 330 and an associated reader. As is commonly known, the SIM card 330 comprises a processor as well as local work and data memory.

Fig 4 is a flow chart illustrating a method for status check performed in the mobile terminal of Fig 2.

In a detect motion as user input to for status check step 450, it is detected that the user has moved the mobile terminal in a particular way. This can for example be a shake of the mobile terminal, a tap on the screen, a double tap on the screen, a circular motion of the apparatus, etc. As a person skilled in the art will realize, there is a large number of ways the mobile terminal can be moved to indicate that a status check is desired. The motion is detected by the motion sensor 325 (Fig 3). One motion can be used to check several statuses. Optionally, different movements can be used to check different statuses. Typical statuses that can be checked can be battery status, reception strength for mobile network, reception strength for wireless local area network, number of new messages, number or missed calls, etc.

In a determine value of status(es) step 452, the one or several statuses associated with the detected motion are determined. This information is typically available in the mobile terminal and is readily retrieved.

In a present value to user step 454, the status or statuses are presented to the user. As will described in more detail below, this

FITBIT 1002
Fitbit v. Immersion

presentation can be visual on the display 223/323, audio, tactile, or any combination of these.

Figs 5a-d are schematic display views 560 illustrating one embodiment of the method of Fig 4. The display views are shown on the display 223/323.

Fig 5a shows a display view 560 before the status check has been initiated. As is customary, there are a number of icons 561 representing different applications or functions of the mobile terminal. Additionally, there is a seperate reception level indicator 562 and a battery level indicator 563.

Fig 5b shows the display view 560 after the status check has been initiated. A large number of particles 564 are then shown on the display. The particles can be any designed as any visual particle; some examples are: snowflakes, shining stardust, pearls, jewels, dust, flies, and butterflies. The particles may vibrate or change color in their default behavior. Optionally, the particles fall to the bottom of the screen, or if there is a positional detector in the mobile terminal, the particles may fall towards the ground, based on a signal from the positional detector.

Fig 5c shows the display view 560 when a status of an application is presented. The application represented by the icon 565 here has a status that is presented to the user. For example, the icon 565 may be an icon for the messaging application and there are unread messages in the inbox. This status is indicated by particles 566 in the proximity of the messaging icon 565 being larger than the other particles 564. Optionally, if particles move around the screen, the particles grow bigger as they approach the messaging icon. The particles can change any other characteristic to indicate a status of an icon or other user interface element. For example, the particles can change color, shape, movement speed, movement behavior, etc. As an example of movement behavior, the particles could fall into orbit around an icon when they are in proximity to indicate a particular status.

Fig 5d shows the display view 560 when a general status of the mobile terminal is presented. In this example, the battery level is low, which can be seen on the battery indicator 568. Additionally, particles 567 in the proximity of the battery indicator grow larger.

It is to be noted that several statuses could be indicated at any one time. Fig 5e shows the display view 560 when a low battery level is indicated with particles 567. Additionally, particles 566 in the proximity of the messaging icon 565 indicate that there are unread messages in the inbox. In one embodiment the particles 567 indicating low battery have one color, e.g.

FITBIT 1002
Fitbit v. Immersion

red, and the particles 566 indicating a new message have another color, e.g. green.

The particles illustrated above could be generated through particle functionality of a graphics interface, e.g. a 3D-graphics interface of the mobile terminal.

In one embodiment, some of the user interface elements affect the behavior of the particles, even if the state related to the user interface element is a normal state.

In one embodiment, the particles are snow flakes and are affected by gravity (virtual or real) as discussed above, and the particles are activated by shaking the mobile terminal. The combined effect of this is similar to a snow globe, where little snow flakes inside are agitated when shaken and slowly fall to the bottom of the snow globe.

Figs 6a-b are schematic diagrams illustrating how tactile and/or audio feedback can be generated in an embodiment of the method of Fig 4.

In Fig 6a, a ball 670 is shown within a confined space 672. This has a certain velocity and direction and will bounce 671 on the wall and continue until it bounces again etc. It is possible to generate a sound effect and/or a vibration corresponding to the times when the ball 670 bounces on the wall, optionally without showing this situation graphically on a display.

In Fig 6b, a relatively large number of balls 670 are present within the confined space 672, generating more bounces 671 per unit of time. Again, these bounces 671 can be represented with sound and/or vibration effects. The user will thus get a sensation that something is more full, compared to the situation in Fig 6a.

The situation illustrated by Figs 6a-b can thus be used to convey information to the user about the status of one or more applications. Optionally, several statuses can be multiplexed using different vibration patterns and/or sound effects for the different statuses, as is explained below.

Figs 7a-b are graphs illustrating how different statuses can be represented in tactile and/or audio signals. The horizontal axis represents time and the vertical axis represents vibration and/or audio signal level.

In Fig 7a, a first status is represented by pulses 782 and 783. The interval 786 between the pulses 782 and 783 is an indicator of the first status. Note the profile of the pulses 782 and 783, where each pulse consists of four equidistant vibrations/sounds of equal length.

FITBIT 1002
Fitbit v. Immersion

In Fig 7b, a second status is represented by pulses 784 and 785, where the interval 787 between the pulses 784 and 785 indicate the value of the second status. Here the profile of the pulses 784 and 785 are different from the pulses 782 and 783 for the first status. As can be seen in the graph, the vibrations/sounds first increase and then decrease in length.

Consequently, the pulses 782 and 783 for the first status and the pulses 784 and 785 for the second status can be multiplexed, whereby the user still can sense the values of the individual statuses. If the pulses are kept sufficiently short and distinct, three or more statuses can be multiplexed. As can be readily understood by a person skilled in the art, many other pulse profiles than those shown here can be used without departing from the scope of the appended claims.

The tactile feedback can be created with vibration motor. Alternatively, a piezoelectric actuator can be used, whereby more control over different sensations is achieved, resulting in possibly even more different statuses which could be presented simultaneously.

Although the invention has above been described using an embodiment in a mobile terminal, the invention is applicable to any type portable apparatus, including portable mp3-players, cameras, pocket computers etc.

The invention has mainly been described above with reference to a few embodiments. However, as is readily appreciated by a person skilled in the art, other embodiments than the ones disclosed above are equally possible within the scope of the invention, as defined by the appended patent claims.

FITBIT 1002
Fitbit v. Immersion

CLAIMS

1. A method for a portable apparatus comprising:

detecting a movement of said portable apparatus, and determining that said movement is associated with a user input for retrieving a value of a status of said portable apparatus;

determining a value of said status; and

presenting said value to said user.

2. The method according to claim 1, wherein in said presenting, a plurality of indicators are presented on a display of said portable apparatus, and the appearance of said plurality of indicators indicates said value.

3. The method according to claim 2, wherein said presenting comprises presentation of moving particles.

4. The method according to claim 3, wherein icons are displayed on said display and said presenting comprises presentation of a subset of said particles proximate one of said icons and presented with an appearance representing a status of an application related to said icon.

5. The method according to claim 3, wherein in said presenting, the movement of said particles are affected by the orientation of said portable apparatus.

6. The method according to claim 3, wherein in said presenting, the movement of said particles are affected by a time elapsed since a last detected movement of said portable apparatus and by an intensity of said last detected movement of said portable apparatus.

7. The method according to claim 2, wherein in said presenting, said value is indicated by a characteristic of at least some of said indicators, said characteristic selected from the group consisting of color, size, shape, movement behavior or any combination of these characteristics.

8. The method according to claim 2, wherein in said presenting, the number of indicators are associated with said value.

FITBIT 1002
Fitbit v. Immersion

9. The method according to claim 2, wherein said indicators are indicators selected from the group consisting of snowflakes, shining stardust, pearls, jewels, dust, flies, butterflies or any combination of these indicators.

10. The method according to claim 1, wherein

in said detecting a movement, said user input is associated with a user input for retrieving values of a plurality of statuses of said portable apparatus;

in said determining, values are determined for all of said plurality of statuses; and

in said presenting, said values are presented to said user.

11. The method according to claim 10, wherein in said presenting, vibration pulses are generated, said vibration pulses indicating said value.

12. The method according to claim 11, wherein said presenting comprises generating vibration pulses at specific intervals, the duration of said intervals being indicative of said value.

13. The method according to claim 11, wherein said presenting comprises generating vibration pulses with a specific duration, said duration being indicative of said value.

14. The method according to claim 10, wherein in said presenting, audio effects are generated, said audio effects indicating said value.

15. The method according to claim 14, wherein said presenting comprises generating audio effects at specific intervals, the duration of said intervals being indicative of said value.

16. The method according to claim 14, wherein said presenting comprises generating audio effects with a specific duration, said duration being indicative of said value.

17. The method according to claim 14, wherein in said presenting, said audio effect differs for different statuses.

FITBIT 1002
Fitbit v. Immersion

18. The method according to claim 10, wherein in said detecting a movement, other movements of said portable apparatus are associated with other user inputs, and each of these other user inputs are used for retrieving other statuses of said portable apparatus.

19. The method according to claim 10, wherein said status is a status selected from the group consisting of battery level, available memory, reception level for a mobile communication network, reception level for a wireless local area network, number of unread messages and number of missed calls.

20. A portable apparatus comprising:

a controller;

a motion sensor capable of detecting a movement of said apparatus,

wherein said controller is configured to determine if said movement is associated with a user input for retrieving a value of a status of said apparatus; and

said controller is further configured to, when it is determined that said movement is associated with said user input, determine a value of said status and present said value to said user, as a response to said user input.

21. The portable apparatus according to claim 20, wherein

said controller is further configured to present a plurality of indicators on a display of said portable apparatus, and the appearance of said plurality of indicators indicates said value.

22. The portable apparatus according to claim 20, wherein:

said user input is associated with a user input for retrieving values of a plurality of statuses of said portable apparatus;

said controller is configured to determine values for all of said plurality of statuses and present said values said user.

23. The portable apparatus according to claim 20, wherein said portable apparatus is an apparatus selected from the group consisting of a mobile communication terminal, a digital music player a pocket computer and a digital camera.

FITBIT 1002
Fitbit v. Immersion

24. A portable apparatus comprising:

means for detecting a movement of said portable apparatus, and determining that said movement is associated with a user input for retrieving a value of a status of said portable apparatus:

means for determining a value of said status; and

means for presenting said value to said user.

25. A computer program product comprising software instructions that, when executed in a portable apparatus, performs the method according to any one of claims 1 to 19.

26. A user interface comprising:

a movement detector, and

an output device,

wherein said user interface is arranged to

detect a movement of said portable apparatus, and determine that said movement is associated with a user input for retrieving a value of a status of said portable apparatus, and

presenting a value of said status to said user.

FITBIT 1002
Fitbit v. Immersion

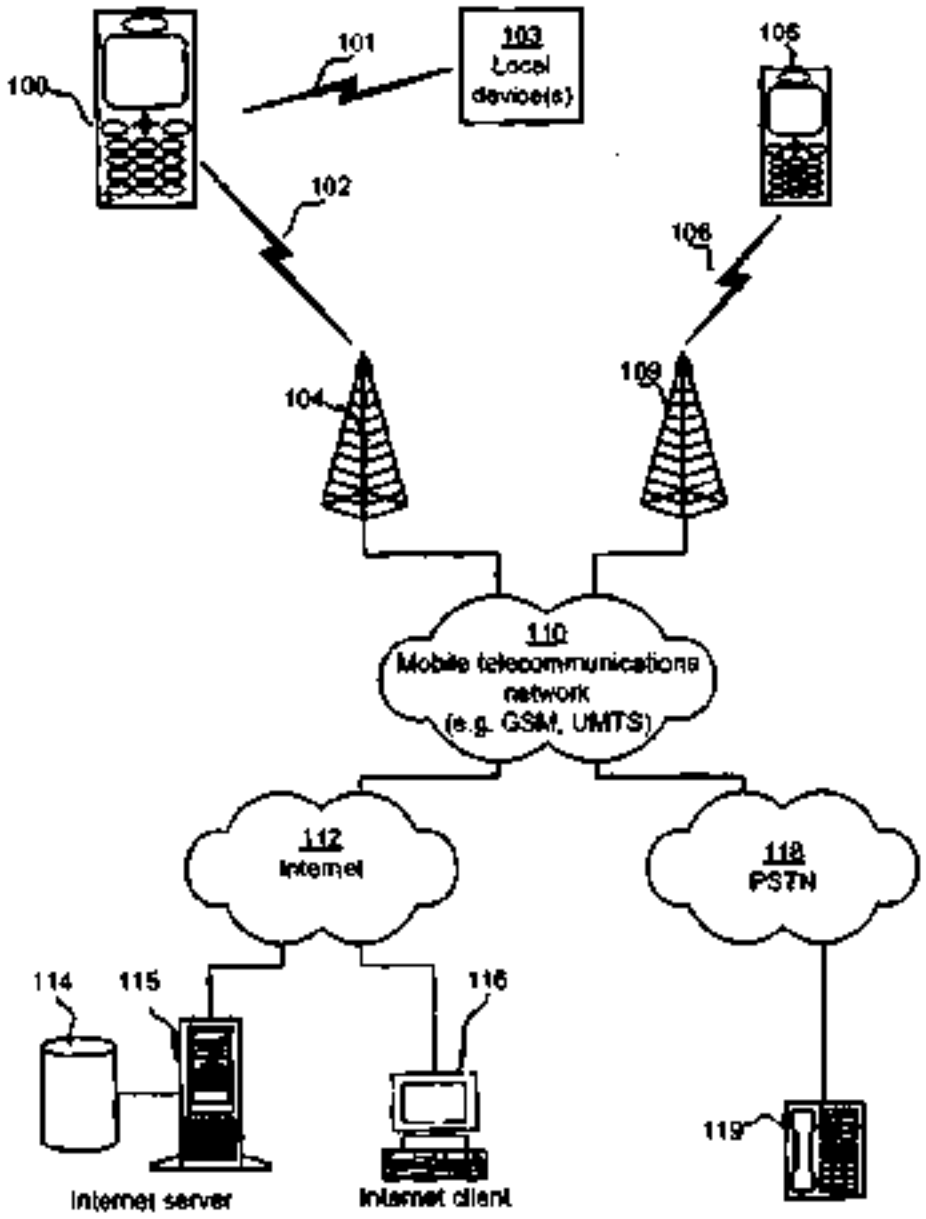


Fig 1

FITBIT 1002
Fitbit v. Immersion

2/5

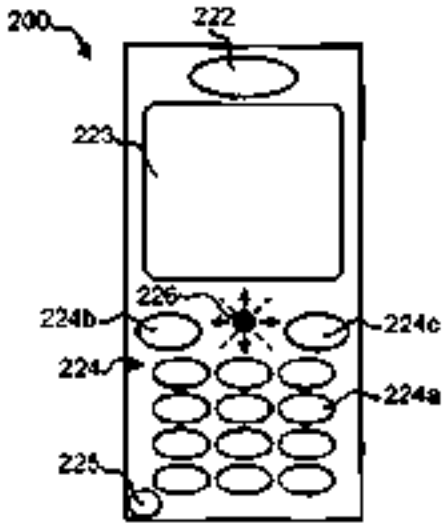


Fig 2

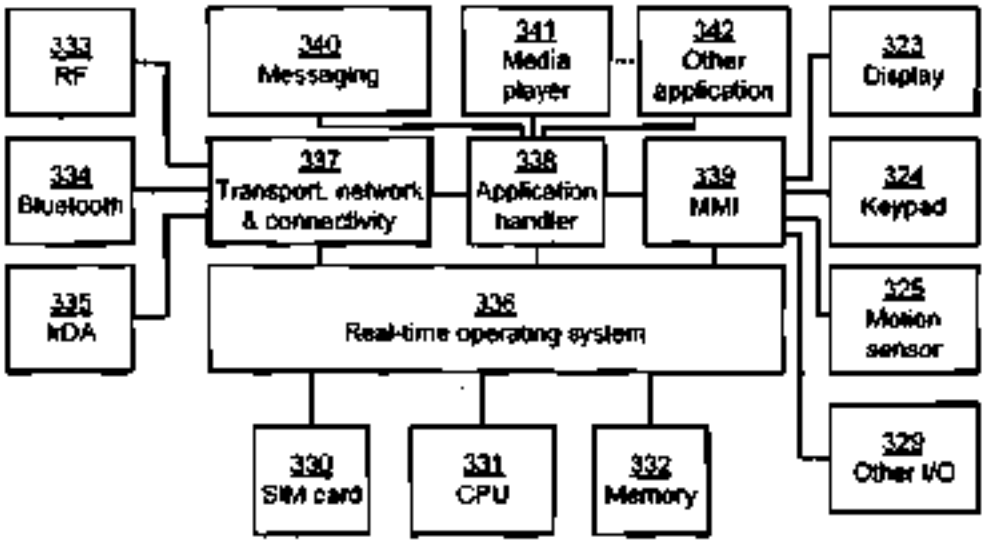


Fig 3

FITBIT 1002
Fitbit v. Immersion

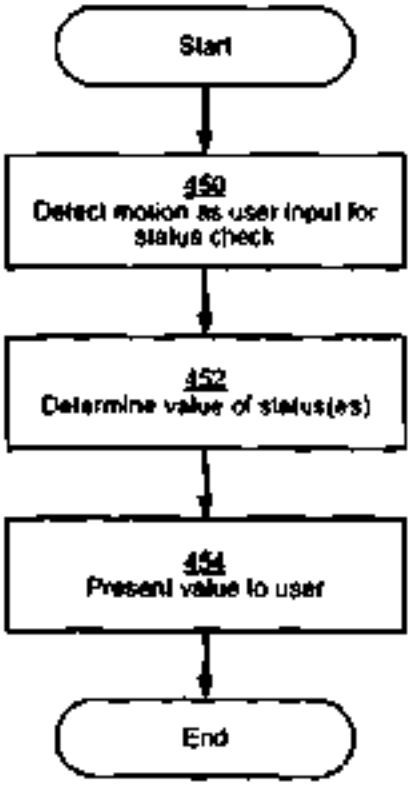


Fig 4

FITBIT 1002
Fitbit v. Immersion

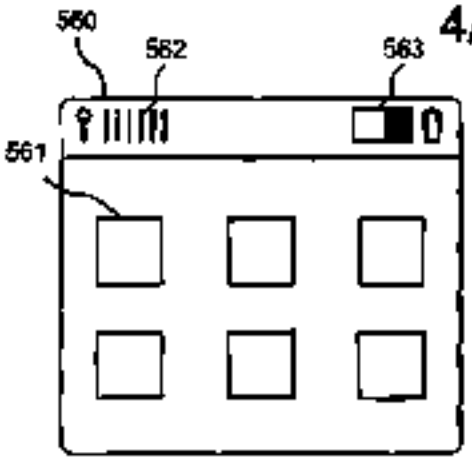


fig 5a

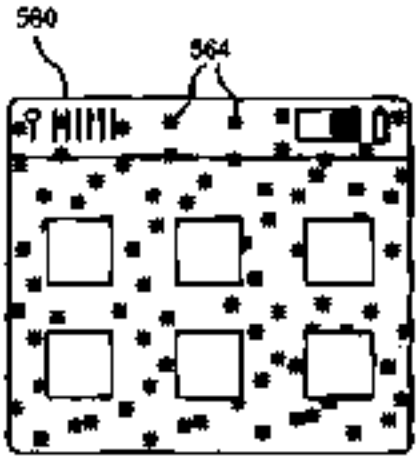


fig 5b

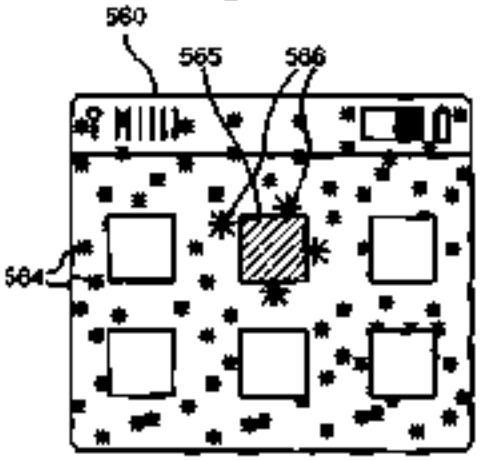


fig 5c

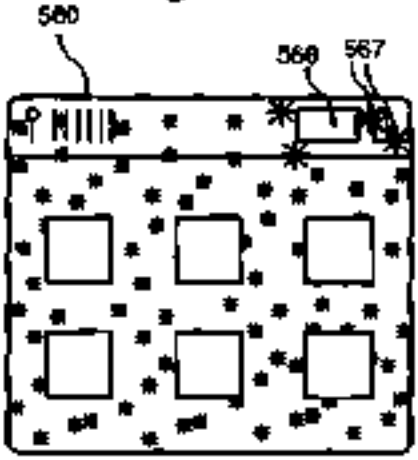


fig 5d

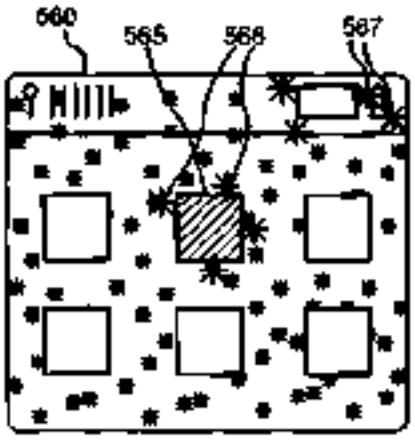


fig 5e

FITBIT 1002
Fitbit v. Immersion

5/5

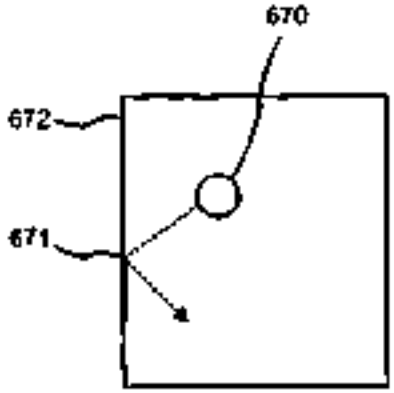


Fig 6a

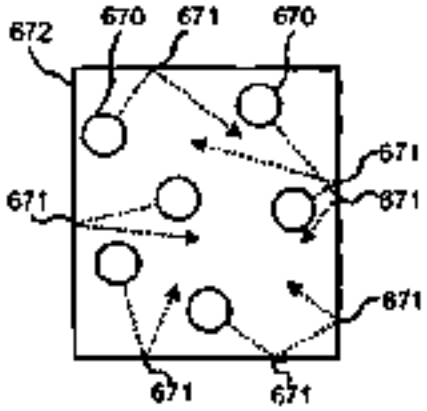


Fig 6b

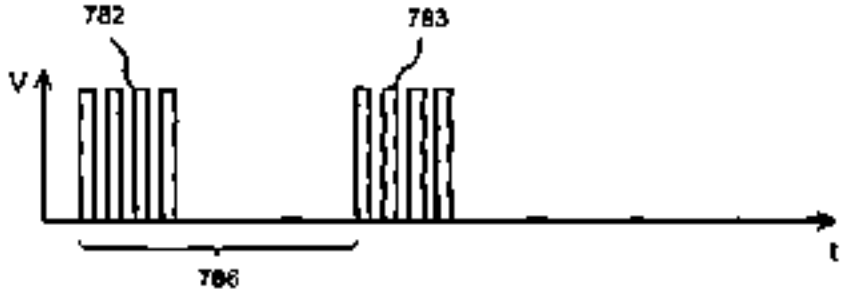


Fig 7a

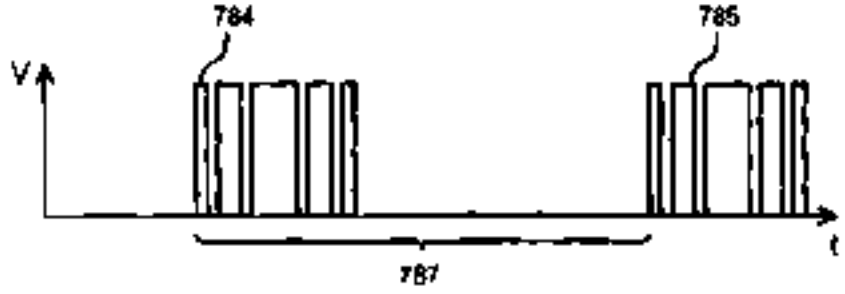


Fig 7b

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2007/001962

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F1/16 H04M1/725

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H04M G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	MOTOROLA: "HELLOMOTO - Manual of Motorola C139 wireless phone" MOTOROLA, [Online] 2005, pages 1-72, XP002465839 Retrieved from the Internet: URL:http://www.motorola.com/Hellomoto/Master%20Lists/Product%20Manuals/Static%20Files/GB-EN/30294_1026_ENG.pdf> [retrieved on 2008-01-22] page 22 pages 32,33 page 39 page 42 page 55 -/-	1-26

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
23 January 2008	11/02/2008
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Mäll, Hans-Peter

Form PCT/ISA/210 (second sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2007/001962

(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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FITBIT 1002
Fitbit v. Immersion

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FITBIT 1002
Fitbit v. Immersion

FITBIT 1002
Fitbit v. Immersion

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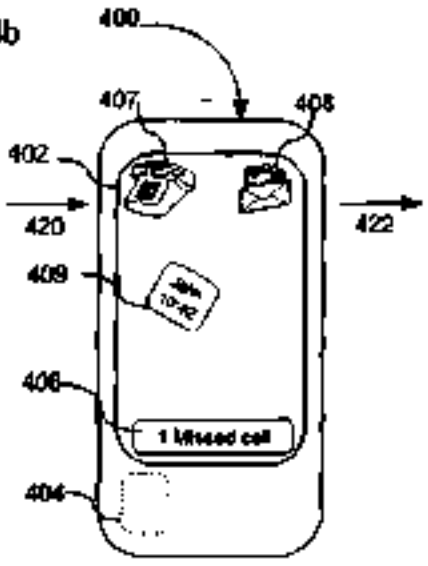
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(54) Title: IMPROVED USER INTERFACE HAVING REALISTIC PHYSICAL EFFECTS



(57) Abstract: A user interface module comprising a display and a motion detector arranged to detect a motion. The module is arranged to display an emulated movement of a graphical representation of a first object on the display according to a motion detected by the motion detector. The first object comprises a physical characteristic, and said user interface module further comprises a controller module arranged to generate said emulated movement based on said physical characteristic.

WO 2009/074185 A1

FITBIT 1002
Fitbit v. Immersion

IMPROVED USER INTERFACE HAVING REALISTIC PHYSICAL EFFECTS

The present application relates to a device and a method for providing quick access to information stored on or accessible through a device, and in particular to a device and a method for providing quick access to data stored on or accessible through a device by using tap commands.

BACKGROUND OF THE INVENTION

More and more electronic devices such as mobile phones, MP3 players, Personal Digital Assistants (PDAs) are becoming smaller and smaller while having more and more information stored and/or accessible through them. Users are relying on these devices and becoming all the more dependant on them. Due to the devices' complexity they can sometimes be difficult for a user to learn and understand. There is a plethora of functionalities, features, applications and shortcuts available through a wide variety of user inputs such as touch input, key pad input, stylus input and recently also sensor based input such as tap input or tilting movement input using accelerometers. The sheer amount of possibilities can thus become bewildering to a user and increase the effort required to learn and understand the device significantly.

The environments in which these devices are used are also becoming more and more hectic with higher demands on fast access and multitasking, and not only in a professional environment but also in private and social environments. For example a user should be able to read a book, while holding a grocery bag in a rattling subway train and

FITBIT 1002
Fitbit v. Immersion

still be able to access the information stored in the device for the device to live up to the many requirements posed upon it by a user buying and using the device. This requires that the device is simple to learn and intuitive to use.

DISCLOSURE OF THE INVENTION

On this background, it is an object of the present application to provide a device and a method that overcomes or at least reduces the drawbacks indicated above by providing user interface, a device and a method that is easy to learn and understand and intuitive to use.

This objective is achieved by providing a user interface module comprising a display and a motion detector arranged to detect a motion, said module being arranged to display an emulated movement of a graphical representation of a first object on said display according to a motion detected by said motion detector.

By controlling a user interface with movements o there through any objects a user interface that is simple to use is achieved.

In one embodiment the first object comprises a physical characteristic and said user interface module further comprises a controller module arranged to generate said emulated movement based on said physical characteristic.

Through having a physical model and basing the movements on this model and thereby on physical characteristics of the objects the object's behaviour becomes more intuitive

FITBIT 1002
Fitbit v. Immersion

and easy to understand by a user thereby rendering the user interface easy to learn and use.

In one embodiment the physical characteristic is a mass for emulating inertia of said object, in one embodiment the physical characteristic is a velocity vector and in one embodiment the physical characteristic is an extent. This enables realistic dynamic behaviour to be modelled on physical laws.

In one embodiment the display has a display area and the graphical representation of said object is smaller than the display area. This enables an overview of more than one object and a visual indication of the object's movement and interaction with other objects displayed on the same display and the resulting emulated behaviour. This further increases the intuitive association between a physical motion with a resulting action.

In one embodiment the physical characteristics comprise a spring coefficient and a damping coefficient and wherein said generation of said emulated movement is based on a damped spring dynamic.

In one embodiment the generation of said emulated movement comprises determining an updated position from an original position depending on said physical characteristics and said motion detected by the motion detector and wherein said displaying of said emulated movement comprises displaying said object at said updated position.

In one embodiment the user interface is further arranged to display graphical representations of at least one

FITBIT 1002
Fitbit v. Immersion

additional object, wherein said at least one additional object has physical characteristics and said generation of said emulated movement of said first object is further based on said physical characteristics of said at least one additional object. In a user interface with more than one object a co-relation or dependency between data entities can be established thus making the user interface more versatile.

In one embodiment the first object and/or said at least one additional object has a data value wherein said user interface module is further arranged to display said data value as part of said graphical representation of said object. This makes it easy to display information to a user.

In one embodiment the user interface is further arranged to execute a function associated with a movement pattern and wherein said controller module is arranged to execute said function on said object upon detection of said movement pattern. This makes the control and activation of operations or functions easy to initiate as no precise movement, like hitting a specific key, is required and the user interface is further intuitive as the function is visibly connected to an object.

In one embodiment the movement pattern corresponds to a throwing movement and said movement function is a delete operation and in one embodiment the movement pattern corresponds to an upwards movement and said movement function is an open operation.

In one embodiment an object has an associated function. Directly associating a function with an object makes it

FITBIT 1002
Fitbit v. Immersion

further intuitive to execute the function and does not clutter the display area with functional labels.

In one embodiment a movement pattern corresponds to an emulated collision between one object having a data value and one object having an associated object function, and wherein said user interface is arranged to execute said function on said data value upon detection of said emulated collision. Causing a collision or forcing to objects to touch provides a mental image of how to execute a function that correlates function and data value in a simple and easy to learn and remember manner.

In one embodiment the function is any taken from the group comprising: a delete operation, a call operation, a send message operation, a postpone operation, an open operation and a read out operation.

In one embodiment the object is an area object. In one embodiment the additional object is static.

In one embodiment the display and the motion detector are arranged in the one and same housing which further increases the intuitive connection or coupling between the motions and the realistically modelled resulting movements and associated actions.

The objectives above are also achieved by providing a device having a module as above. In one embodiment the device is a mobile terminal.

The objectives above are also achieved by providing a method for controlling a user interface comprising a display, a motion detector and at least one object, said

FITBIT 1002
Fitbit v. Immersion

method comprising detecting a motion, emulating a movement for said at least one object according to said motion, wherein an updated position is determined, and displaying said at least one object at said updated position, wherein the movement emulation is based on a physical characteristic of said object. This provides for a dynamic method for controlling a user interface that is easy to control and intuitive to learn yet versatile and expandable.

In one embodiment the method further comprises determining whether a collision between a first and a second object is caused by said emulated movement and emulating said movement accordingly. The collision concept simulates or models co-dependencies between objects in a way that is easy to control and intuitive to use, learn and understand.

In one embodiment an object has an associated function corresponding to a movement pattern and said method further comprises determining whether said detected motion completes said movement pattern and if so execute said function. This associates an object with a functionality in a realistic and intuitive manner.

In one embodiment the movement pattern is a collision.

In one embodiment the at least one object has a data value and said method further comprises executing said associated function on said data value upon a completed movement pattern. This provides a manner in which a data is related to a function in a very intuitive manner.

FITBIT 1002
Fitbit v. Immersion

In one embodiment the execution of said associated function comprises generating an additional object.

According to another aspect of this application the objectives above are achieved by providing a user interface module comprising motion detector means for detecting a motion, and display means for displaying an emulated movement of a graphical representation of a first object according to a motion detected by said motion detector means.

In one embodiment the first object comprises a physical characteristic and said user interface module further comprises controller means for generating said emulated movement based on said physical characteristic.

In one embodiment the first object and/or at least one additional object has a data value wherein said user interface module further comprises display means for displaying said data value as part of said graphical representation.

In one embodiment the user interface further comprises means for executing a function associated with a movement pattern on said object upon detection of said movement pattern.

A user interface such as this has the same benefits as explained for the user interface and method above.

According to another aspect of this application the objectives above are achieved by providing a computer readable medium including at least computer program code for controlling a user interface comprising a display,

FITBIT 1002
Fitbit v. Immersion

motion detector and at least one object, said computer readable medium comprising software code for receiving a motion through said motion detector, software code for emulating a movement for said at least one object, and software code for displaying said movement of said at least one object.

In one embodiment the computer readable medium further comprises software code for determining whether said motion completes a movement pattern and if so for executing an associated function corresponding to said movement pattern.

This enables a device to benefit from the advantages as described above and also later in the detailed description by executing the software code.

In one aspect the objectives are achieved by a device incorporating and implementing a computer readable medium according to above.

Further objects, features, advantages and properties of device, method and computer readable medium according to the present application will become apparent from the detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following detailed portion of the present description, the teachings of the present application will be explained in more detail with reference to the example embodiments shown in the drawings, in which:

FITBIT 1002
Fitbit v. Immersion

Fig. 1 is an overview of a telecommunications system in which a device according to the present application is used according to an embodiment,

Fig. 2 is a plane front view of a device according to an embodiment,

Fig. 3 is a block diagram illustrating the general architecture of a device of Fig. 1 in accordance with the present application,

Fig. 4 a, b, c, d, e, f, g, h and i are plane front views of a device according to an embodiment,

Fig. 5 is a schematic view of a model used in an embodiment,

Fig. 6 a and b are flow charts describing a method each according to an embodiment,

Fig. 7 is a schematic view of a model used in an embodiment, and

Fig. 8 is a plane front view of a device according to an embodiment.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

In the following detailed description, the device, the method and the software product according to the teachings for this application in the form of a cellular/mobile phone will be described by the embodiments. It should be noted that although only a mobile phone is described the teachings of this application can also be used in any electronic device such as in portable electronic devices such as laptops, PDAs, mobile communication terminals, electronic books and notepads and other electronic devices offering access to information.

FITBIT 1002
Fitbit v. Immersion

FIG. 1 illustrates an example of a cellular telecommunications system in which the teachings of the present application may be applied. In the telecommunication system of FIG. 1, various telecommunications services such as cellular voice calls, www/wap browsing, cellular video calls, data calls, facsimile transmissions, music transmissions, still image transmissions, video transmissions, electronic message transmissions and electronic commerce may be performed between a mobile terminal 100 according to the teachings of the present application and other devices, such as another mobile terminal 106 or a stationary telephone 132. It is to be noted that for different embodiments of the mobile terminal 100 and in different situations, different ones of the telecommunications services referred to above may or may not be available; the teachings of the present application are not limited to any particular set of services in this respect.

The mobile terminals 100, 106 are connected to a mobile telecommunications network 110 through RF links 102, 108 via base stations 104, 109. The mobile telecommunications network 110 may be in compliance with any commercially available mobile telecommunications standard, such as GSM, UMTS, D-AMPS, CDMA2000, FOMA and TD-SCDMA.

The mobile telecommunications network 110 is operatively connected to a wide area network 120, which may be Internet or a part thereof. An Internet server 122 has a data storage 124 and is connected to the wide area network 120, as is an Internet client computer 126. The server 122 may host a www/wap server capable of serving www/wap content to the mobile terminal 100.

FITBIT 1002
Fitbit v. Immersion

A public switched telephone network (PSTN) 130 is connected to the mobile telecommunications network 110 in a familiar manner. Various telephone terminals, including the stationary telephone 132, are connected to the PSTN 130.

The mobile terminal 100 is also capable of communicating locally via a local link 101 to one or more local devices 103. The local link can be any type of link with a limited range, such as Bluetooth, a Universal Serial Bus (USB) link, a Wireless Universal Serial Bus (WUSB) link, an IEEE 802.11 wireless local area network link, an RS-232 serial link, etc. The local devices 103 can for example be various sensors that can communicate measurement values to the mobile terminal 100 over the local link 101.

An embodiment 200 of the mobile terminal 100 is illustrated in more detail in FIG. 2. The mobile terminal 200 comprises a speaker or earphone 202, a microphone 205, a main or first display 203 and a set of keys 204 which may include a keypad 204a of common ITU-T type (alpha-numerical keypad representing characters "0"-"9", "*" and "#") and certain other keys such as soft keys 204b, 204c and a joystick 211 or other type of navigational input device. The mobile phone may also comprise an extra display, a secondary display arranged on the backside of the mobile phone 200 (shown in figure 4).

In the following a display will be referred to as being inactive when it or the display image on it is not visible to a user and it is not used to display any information or other data. A skilled person will realize that the display can still be functioning although at

FITBIT 1002
Fitbit v. Immersion

using less power than when it is active, i.e. the displayed image is visible to a user.

The internal component, software and protocol structure of the mobile terminal 200 will now be described with reference to FIG. 3. The mobile terminal has a controller 300 which is responsible for the overall operation of the mobile terminal and may be implemented by any commercially available CPU ("Central Processing Unit"), DSP ("Digital Signal Processor") or any other electronic programmable logic device. The controller 300 has associated electronic memory 302 such as RAM memory, ROM memory, EEPROM memory, flash memory, or any combination thereof. The memory 302 is used for various purposes by the controller 300, one of them being for storing data used by and program instructions for various software in the mobile terminal. The software includes a real-time operating system 320, drivers for a man-machine interface (MMI) 334, an application handler 332 as well as various applications. The applications can include a calendar application 350, a notepad application 360, as well as various other applications 370, such as applications for voice calling, video calling, sending and receiving Short Message Service (SMS) messages, Multimedia Message Service (MMS) messages or email, web browsing, an instant messaging application, a phone book application, a calendar application, a control panel application, a camera application, one or more video games, a notepad application, etc.

The MMI 334 also includes one or more hardware controllers, which together with the MMI drivers cooperate with the first display 336/203, the secondary display 340, the keypad 338/204 and a movement sensor or

FITBIT 1002
Fitbit v. Immersion

detector 342 as well as various other I/O devices such as microphone, speaker, vibrator, ringtone generator, LED indicator, etc. As is known to a man skilled in the art the movement detector 342 can be implemented with for example an acceleration sensor or an other sensor capable of detecting a motion. Examples of such sensors are micro-electromechanical systems (MEMS), nano-electromechanical systems (NAMS), piezo acceleration sensors, vibration sensors, laser accelerometers, resonance accelerometers, strain gauge accelerometers, capacitive spring Mass based accelerometers, electromechanical accelerometers, optical accelerometers or gyroscopes. As is commonly known, the user may operate the mobile terminal through the man-machine interface thus formed.

The software also includes various modules, protocol stacks, drivers, etc., which are commonly designated as 330 and which provide communication services (such as transport, network and connectivity) for an RF interface 306, and optionally a Bluetooth interface 308 and/or an IrDA interface 310 for local connectivity. The RF interface 306 comprises an internal or external antenna as well as appropriate radio circuitry for establishing and maintaining a wireless link to a base station (e.g. the link 102 and base station 104 in FIG. 1). As is well known to a man skilled in the art, the radio circuitry comprises a series of analogue and digital electronic components, together forming a radio receiver and transmitter. These components include, band pass filters, amplifiers, mixers, local oscillators, low pass filters, AD/DA converters, etc.

FITBIT 1002
Fitbit v. Immersion

The mobile terminal also has a SIM card 304 and an associated reader. As is commonly known, the SIM card 304 comprises a processor as well as local work and data memory.

Figure 4 show a device in the form of a mobile phone 400 according to the present application. The mobile phone 400 has a user interface enabling a user to interact with the device through a display 402 and some input. This input can either be a keypad 204, as in figure 2, or a movement sensor 404 such as an accelerometer. The keypad can have physical keys, soft keys, virtual keys or any combination of these depending on design choices. A combination of movement sensors and keys is also plausible and highly beneficial. In the following description focus will only be given to the motion detector 402, but it should be understood that the teachings herein work equally well with any combination of a motion detector and keys as above.

A motion detector 404 (342 in fig 3) is arranged in the mobile phone 400. The motion detector is shown in dashed lines as it is part of the internal circuitry of the mobile phone and not is visible as disclosed above. Upon detection of a motion or a movement pattern a detection signal is generated and processed by the controller (300 in fig 3) of the mobile phone 400. It should be understood that the motion detector 404 could comprise both a sensor for detecting the physical movement and a controller for differentiating between different physical movements and movement patterns, which controller could be the same as the controller 300 of the mobile phone 400.

FITBIT 1002
Fitbit v. Immersion

It should be noted that as the display 402 and the motion detector 404 are arranged in the same housing of a device, in this embodiment a mobile phone 400, the user interface may respond to physical forces which the device is subjected to and it may serve as part of a multimodal feedback.

As is commonly known the display 402 is used to relay information to a user and enable him to interact with the mobile phone 400. The information is relayed by being displayed on the display 402. Traditionally this information is displayed statically. As motion control of a mobile phone is in its very nature dynamic it can be confusing to a user to relate the dynamical control movements to the static functions and behaviour of the mobile phone 400.

To overcome this, a dynamic model, with user interface elements or objects, is used to create a dynamic relationship between objects that are used to relay information. The objects 406, 407 and 408 can have different traits or characteristics which will be discussed in more details below. Three examples of characteristics are a data value, an associated function and if the object is movable or not. An object with a data value is usually used to display this data value. An object with an associated function is used to inform the user that the function is available and if effected to initiate or execute the function. Non-movable objects can be used for interacting with a movable object and to put some movement restraints on the graphical representation of the user interface.

FITBIT 1002
Fitbit v. Immersion

To further increase the understanding of the connection between the physical motion and the resulting emulated movement of an object a physically realistic behaviour is needed. If the resulting emulated movement is not realistic it will be confusing and bewildering to a user.

The dynamic model is based on that all objects have some physical characteristics and that they are affected by the motions detected through a motion sensor in the same way as a normal, physical object would be affected having the same characteristics.

The physical characteristics can be a mass and a physical extent. The mass will emulate inertia in the object determining how quickly it accelerates and rotates as well as how it behaves upon collision with other objects. The physical extent defines the object's borders and is used to determine whether an object collides with another or not.

Some objects are without mass and have no borders this makes them purely graphical and they can accelerate and move at any speed and they do not collide, they merely overlap. Such objects can be used to model information entities for which no function is to be taken such as labels or time notifications. Labels for softkeys should not be movable except as explained with reference to fig 7a as they should be kept close to the associated softkey.

Other possible characteristics are friction, elasticity (surface elasticity and volume elasticity).

FITBIT 1002
Fitbit v. Immersion

To realistically model all physical aspects of moving objects and their interaction with each other the dynamic model makes use of: physics modelling, friction modelling, multi-object collision modelling, collision detection based feedback, centre of mass modelling and other techniques used to model dynamic movement. In an embodiment algorithms were used to model Rigid body dynamics, such as linear momentum, angular momentum and torque, simulation methods for motions using a Lagrange multiplier velocity based model and a contact and friction model based on the Dantzig LCP solver.

As is known to a man skilled in the art optimisation problems are can be investigated using Lagrange's method of multipliers which is a method for finding the extrema of a function of several variables subject to one or more constraints; it is the basic tool in nonlinear constrained optimization. It reduces finding stationary points of a constrained function in n variables with k constraints to finding stationary points of an unconstrained function in n+k variables.

As is also known to a person skilled in the art The Dantzig LCP solver solves friction modelling problems by applying Linear Complimentary Programming, LCP as introduced by George Dantzig.

This dynamic model requires heavy computing power and an optimization is used for low resource devices such as a mobile phone. The optimization is based on replacing floating point presentations with fixed-points presentations in calculations to be made by the controller 300. This can be done by performing the replacement from floating-point to fixed-point directly

FITBIT 1002
Fitbit v. Immersion

as in table 1, in which Q denotes the mantissa of the fixed point operation and ">>" which entity that is to be replaced. For fast calculations values of 16 or 32 for Q are used. Other values are also possible as will be clear to a skilled person depending on the controller used for the replacement. A direct replacement saves time as no further procedural calls are necessary.

Figure 5 show a dynamic model 500 for a user interface, UI, having a controller 510. The controller 510 is arranged to create and control one or more objects 540. These objects 540 have some characteristics that are common to all objects and these are their position and their extent. These characteristics are necessary to generate a graphical representation of an object. Some objects have no representation but the position and the extent of the object is still needed to determine its interaction with other objects. Such objects are from hereafter called area objects. Other characteristics are shown in table 2 along with their purposes. The model 500 also has a motion detector 520 from which information is provided to the controller 300 regarding motions the device is subjected to and forces applied to it. The motion detector 520 can be implemented through an acceleration sensor. An integrator can be used to integrate the acceleration detected and from this generate a movement or motion. These motions can be a movement pattern through which a user controls one or more objects. The modelling of the motion of the objects has been discussed and explained above.

In one embodiment a collision detector 530 is also used in the model 500. The collision detector 520 could be made part of the controller 510, but in this description

FITBIT 1002
Fitbit v. Immersion

it is described as a separate entity to better illustrate its functionality. If two objects are active, for example one stationary and one dynamic, and a motion is detected the collision detector will start monitoring if any of the objects' positions and extent overlap. A simplified formula for a collision is:

$$pos\ A + EXTENT\ A \subseteq pos\ B + EXTENT\ B\ OR$$
$$pos\ B + EXTENT\ B \subseteq pos\ A + EXTENT\ A \Rightarrow COLLISION$$

where pos is a position that is uniformly added to the extent of an object.

The formula is to be understood as if any part of object A overlaps with any part of object B then there is a collision.

The objects can be either stationary, which can be modelled as having an infinite mass, dynamic, having a finite mass or purely graphical, having a mass of 0. A purely graphical object will be able to travel at any speed and overlap other objects and are used for informative purposes such as labelling.

For dynamic objects an emulated motion is determined between updates of a display. The emulated motion is a function of the current position, current velocity, mass or inertia, the body's orientation, friction of object's surface or surface of surrounding and the force and there from derived applied acceleration subjected to the object. An updated position is calculated from the current position using the known characteristic values and the modelling techniques described herein. The position, velocity and angular velocity can be expressed

FITBIT 1002
Fitbit v. Immersion

by vectors and the orientation can be expressed as a 3x3 rotation matrix.

Characteristics such as mass can also be expressed as a matrix. For mass a constant can be used to describe the total mass. A centre vector to express the centre of mass seen from a reference point and an inertia matrix describing how the mass is distributed.

An object can have a data value assigned to it. These data values can be used to notify the user of certain events or they can have other meaning.

An object 540 can additionally or alternatively have one or more functions associated with it. As such an objected is activated the corresponding function is executed. Examples of such functions are: OPEN, DELETE, CLOSE or POSTPONE. A function can also be designed to work on one or more data values, either being carried by the object itself or by another object. If a collision between a data value object and a function object takes place the function is executed using the data value as a parameter. As can be seen in figure 5b when a function object 540A and a data object 540B collides as a result the function is executed on the data.

If an object carries more than one function, the function to be executed can depend upon the object collided with and also on the data carried by the object collided with.

For the special objects referred to as area objects explained above a collision occurs when another object enters the area, or in other words, the areas extent overlaps with another objects extent. Area objects can be

FITBIT 1002
Fitbit v. Immersion

used as function carrying objects. An example of such an object is a delete zone modelled through an area object having the associated function DELETE.

An object's position might be so that as the graphical representation is shown on a display the object may be partially or completely missing from the display, i.e. it is not visible as it is outside the displayed area.

It should be understood that in this model a collision can be regarded as a movement pattern and a function is to be executed as a certain movement pattern is detected. The movement pattern can then be a controlled movement or a collision. Collisions are thus assumed to be controlled by a user for initiating a certain action. It should also be understood that a motion can be part of a movement pattern (possibly the only part of the movement pattern) and the movement pattern is completed by said motion which causes any corresponding action or function to be taken or executed.

For example, by having an object area virtually positioned in the top of the screen and assigned the function DELETE another object can easily be deleted by throwing it upwards or turning the phone upside down and allowing the object to fall out of the user interface and thereby be deleted. To safeguard against accidental deletion the area object can be assigned a friction which would slow down any object coming over it and thus prevent unwanted execution of the assigned operation, in this case deletion.

A function could also be activated if the carrying object is subjected to a movement pattern, i.e. a sequence of or

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Fitbit v. Immersion

a single controlled movement that is specific in its nature. Examples can be throwing away (signified by strong acceleration over a period of time), hoisting (signified by a strong upward acceleration followed by a downward acceleration) or a tap (signified by a short pulse or shock).

To safeguard against accidental execution of functions resulting from random collisions and movement patterns a confirmation object can be created and displayed prompting the user to confirm whether the action is deliberate or not. A tap to the device, thereby inducing a slight shock which is detected by the motion detector will execute the function. Alternatively a double tap can be used to accept the action and a single tap to reject or cancel it.

In one embodiment a tactile feedback is generated by the collision detector as soon as a collision is detected. Such a tactile feedback can be in the form of a vibration. For some purposes it is also possible to give a small electric shock. Naturally, also visible and audible feedbacks are possible either alone or in any combination. If two objects collide one type of vibration can be generated and if an object collides with a wall object another type of vibration can be generated. Thus a user can differentiate between different events taking place on the screen and be able to control the device even with out looking. Especially if the user interface is equipped with a text to speech or other voice coder so that information can be read out loud to the user.

To illustrate with an example: a device receives an incoming message and the user is alerted with an audible

FITBIT 1002
Fitbit v. Immersion

signal. As the user is partly occupied with another task, but still wants to see what the message is the user can quickly take out the phone, perform an open action, which can be a hoisting motion that will open the object with the message notification as will be described below. The user knows that in the left hand side of the display there is an area for reading the message out loud and leans or tilts the phone to the left side. Due to other factors influencing the motion (such as if the user is riding a train) the object slightly misses the read out loud area and a vibration followed by a screeching sound is emitted from the device informing the user that the object is about to travel through an area associated with a delete operation. The user reacts to the feedback and changes the movement to be more clearly to the left side and as the object collides with the message read area another softer vibration and a pleasant sound is emitted as a feedback. The user is informed that the action is correct, or at least it does not have irrevocable consequences, and to finish it of exaggerates the motion so as to make sure the action is undertaken and area's function to run a text through a text to speech coder is executed on the object's data value, being the text of the message, and the message is read out loud while the object is in the area. To silence the read out, the user simply moves the object out of the area again by controlling the motion of the device. Thus an incoming message can be opened, read and even paused by simple hand gestures that are easy to learn, intuitive to use and without requiring much attention by a user.

In one embodiment a device is subjected to a keylock function and while the keylock function is active only notifying actions will be accepted. For example, if a

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Fitbit v. Immersion

keylock is activated and there are missed calls, only actions to show the missed calls will be accepted. Any action to delete or call back will be ignored or cancelled by the keylock function. Thus if the motion triggering an action is by coincidence the status of the device will be the same when the user directs his attention to it as it was before the actions were taken.

Returning to figure 4 an embodiment is shown of a user interface in a device 400 using the models above making the user interface more intuitive to use with a motion sensor 404. The device is as stated above a mobile phone 400 and it has a display 402. In fig 4a three objects are displayed on the display 402. They are all stationary which can be modelled by giving them an infinite mass or by simply setting a flag stating that they are stationary. The first object 406 is in the shape of a box with a text indicating or notifying a user that there are 2 Missed Calls. If the user wants to see what the missed calls are, but is currently unavailable or unwilling to reach some control keys (not shown) he simply makes an upward movement 420 imitating a movement pattern for hoisting the box up in the air and down again. This triggers the motion detector 404 to send a signal carrying details describing the movement, such as speed vectors to the controller 300. The controller determines that an open operation has been initiated and executes this. The open operation creates another fourth object 409 and makes it float up from inside the box. This fourth object 409 is a dynamic object and its motion is being emulated whereby the direction is dependant on the original motion detected by the sensor and the speed dependant on the object's 409 mass and the force applied to the mobile phone 400. As can be seen in figure 4b, the

FITBIT 1002
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object 409 has a data value which is displayed on the object 409 indicating that a contact "John" had called at 10:42. The user notices this but chooses not to take action at this point and decides to delete the notification. The user performs a movement pattern simulating a throwing movement 422 that is detected by the motion detector 404 and a signal is sent to the controller 300 that determines that a delete action has been taken and initiates the delete action on the object 409. The object's 409 emulated movement will be displayed as it is being hurdled to the side of the phone in the direction in which the throwing motion was made and the object 409 disappears from the display 402 as seen in figure 4c. The movement pattern of throwing away the object thereby causes a function to delete the object 409. As the object's 409 graphical representation has left the display 402 the display is now as in fig 4d with the three original objects. The first object 406 now has a data value notifying one missed call and a repeated hoisting movement 420 makes a fifth object 411 to float or fly up from the missed call box object 406. This fifth object also has a data value which is displayed notifying that a contact "Jane" made a call at 9:34 as is shown in fig 4e. The user now has four options. He can choose to delete as he did with the previous notification or he can steer or control the movement of the object 411 through the motion detector 404 by controlling the movement of the device 400 to collide with any of the stationary objects displayed. The three stationary objects are the missing call box object 406, now indicating that there are no missing calls, a phone call object 407 and a send message object 408. The two objects, phone call 407 and send message 408, have functions associated with them which functions are clear from the appearance of the

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Fitbit v. Immersion

graphical representation of the object. Upon collision with such an object the associated function will be initiated. The first object 406 also has an associated function which is to store any object colliding with it. The user chooses to call the contact by controlling or steering, through a motion or movement pattern 424, the fifth object 411 to collide with the Phone call object 407. As the two objects 407 and 411 collide in fig 4f the collision is detected in the controller and the associated function of the phone call object 407 is executed on the data value associated with the fifth object 411. As the user has chosen not to save the notification object 411, the missed call box object 406 is deleted.

Alternatively the delete operation initiated by the throwing motion 422 in figure 4b and c can be determined as a collision between the object 409 and a side wall of the display 402 modelled to have no surface so no collision occurs and where the emulated movement clearly brings the object outside the display 402. The side wall can be modelled as an area object.

Alternatively, if both notifying objects 409 and 411 were in the air at the same time and the both collided with the phone symbol 407 a conference call could be initiated to both of them. Thus a function can also be set to operate on more than one data value.

Other notifications that could be displayed are status reports of incoming calls, missed calls, received messages (SMSes, MMSes, emails etc), download status or a special message fetched by a specially adapted

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Fitbit v. Immersion

application for example arranged to show cartoons according to preset parameters.

Alternatively, functions can be assigned to areas of the display 402 as can be seen in fig 4g. These areas can be modelled as stationary objects having a non-reflective border i.e. capable of overlapping. In fig 4g two operations are assigned to the walls and these operations are CALL and DELETE. The operations can be marked with indications 411 and 412. As previously described a user can open the missed call box 406 by a hoisting movement 420 upon which the call notification 409 flies up, see fig 4h. To delete it the user controls the object 409 through a movement pattern 426 to collide with the area marked DELETE 411 as shown in fig 4i.

Further examples of functions and corresponding movement patters are listed in table 3.

In one embodiment a collision is not necessary to initiate an action. An object that has a data value can also have an associated function with a corresponding movement pattern. In the example above the object 409 could have the associated function of calling the contact with a corresponding movement pattern of a shaking movement. If a user wanted to call the contact displayed he would simply shake the phone and the controller would execute the associated function of calling on the data value being the contact.

Another example is when a downloaded item has been fully downloaded a download box appears. A user can open the item by hoisting it and if the item is a media file a

FITBIT 1002
Fitbit v. Immersion

shaking movement would execute a media player to play the downloaded media file.

Most commonly, the more advanced the motion or movement pattern is the safer it is to assume that it has been done on purpose thus safe guarding from coincidental movements. However, a more advanced or complicated motion is more difficult for a user to achieve. Which movement patterns and what combinations that are to be used depend on usability aspects for the phone whether it is a heavy duty modal or a fashion model etc as well as the intended user group and a combination of these and other factors.

Figure 6a show a method according to the teachings of the present application. In a first step 610 a notification is displayed. As a motion is detected in an event 615 the motion is determined to be a movement pattern corresponding to an OPEN command and an object carrying the data for the notification is created. Its movement is emulated in step 620 and the object is displayed in step 630. If other objects are present their movements are also emulated in step 620 and the display is updated with the new positions in step 630. As further motions are detected in event 625, the movements are emulated and the positions are updated in step 640. In step 650 it is determined whether any collisions between two objects have taken place. If there are no collisions the objects are displayed in the updated positions in step 630. If there is a collision the associated function is determined in step 660 and executed on the data carried by the object in step 670. As the function is executed the method can return to step 630 of displaying the objects as indicated by the dashed line. Or, the method

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can terminate depending on the number of remaining objects and the nature of the function.

Figure 6b show a method according to the teachings of the present application. In a first step 601 a motion is detected by a controller 300 through a motion detector 404. In the next step 602 a movement for an object 409 is emulated and a check is made if a movement pattern has been completed in step 603. A movement pattern can in this method be any of a collision or other movement patterns. In step 604 it is checked if an object has an associated function which will then be executed in step 605. A movement pattern does not need to be a collision but can for an object having both a data value and a function be a specific movement pattern corresponding to the function. An example of this has been given above with reference to figure 4 such as when a user has downloaded a media file and plays it by shaking the device.

Figure 7a show a model 700 used to emulate an object's physical behaviour and movement in one axel. To correctly emulate a three dimensional movement one model would be needed for each axel in all requiring three models. This model is used for objects having a fixed point in the user interface thus creating a dynamic behaviour also for stationary objects.

The model 700 is based on a damped spring and an object 702 is connected by a spring 704 and a damper 706 to a fixed position 708. According to Hooke's law the spring has a spring constant k and the force Fs exerted on the string equals the displacement vector x multiplied by this string constant, $F_s = kx$. In real life the spring

FITBIT 1002
Fitbit v. Immersion

constant is not always constant but varies a little bit with the displacement and a better word would therefore be the spring coefficient. The damper 706 is also subjected to a force Fd which equals a damping coefficient c multiplied with a velocity v of an object 702 attached to the damper 706 in the negative, Fd= -cv. These two relationships in combination with Newton's second law of motion, stating that the force F applied to an object equals the mass m multiplied with the acceleration a, F = ma, make up the damped spring model which is used to emulate an object's 702 movement.

Using this model a stationary object can be made to behave dynamically and respond to user induced commands and thereby confirming the actions taken in an intuitive way. The model can also be used to anchor stationary objects but enable them to have an emulated movement as a result of physical reactions, such when a collision is detected the stationary object could react by shaking or bouncing as a result of the shock from the collision with the moving object.

It can also be used as a safe guard feature as the movements of some objects for which the damped spring is applied become more restricted and to allow an object to collide with another a more forceful and deliberate motion is needed to overcome the simulated resistance offered by the spring. In other words, a realistic bounce back effect provides protection for erroneous movements as a more deliberate movement is needed to touch or collide with other object before bouncing back.

The damped spring model can also be used when moving an object. In figure 7b an illustrative example is shown. An

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object 700 is to be moved to a new position 708 and the new position 708 is set to be the fixed point 708 of the model. A modelled spring is then automatically stretched to a displacement x equal to the distance from the fixed point 708 and the object 700 subjecting the object to a force Fs = kx. Also a modelled damper is also stretched. As the object 700 is let go the force Fx will accelerate the object 700 towards the fixed point 708 and due to this the object 700 starts to move towards the fixed point 708 and build up a speed v. The damper will then exert a force Fd acting in the opposite direction and in size equal to Fd=cv which will slow down the object 700. As the object 700 comes closer to the fixed point 708 the accelerating force Fs will decrease at the same time as the de-accelerating force Fd will grow. The object 700 will most often overshoot the fixed point's position 708 and the modelled spring will force the object 700 towards the fixed point 708 again and the object 700 will eventually rest at the new position 708. The time to reach the new position for the first time is denoted as a rise time and the time for it to settle on the new position is denoted as a settling time.

This principle can be applied to key events and scroll events, motion gesture control and touch control such as tap input for example.

It is also possible to maintain a virtual or emulated constant force affecting all dynamic objects, much like a gravitational force. The gravitational force can either be directed internally in the phone for example always towards the bottom of the screen or externally as in coinciding with the direction of the Earths gravitational field. This will enable the objects to behave even more

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realistic and also safeguard against accidental movements as the objects always strive to fall down and a safe place, object or area like the originating place should be positioned at the lowest point of gravity. For an action to be initiated the controlling motion would thus need to overcome the gravitational field or force and thus be required to be more deliberate. An opened object that is left alone or undisturbed will thus simply fall back into the originating box which in practise will implement a timeout feature for any action taken by the user.

In one embodiment an area object having an associated function DELETE is arranged in the very top of a display. The user interface is also arranged with an externally directed gravitational force. To delete an object a user simply turns a device having such a user interface on its head and allows the object to be deleted to be affected by the simulated gravity and sink into the delete area and be deleted. This leads to the mental image of deleting an object by pouring it out of the top of the device.

It should be understood for all embodiments described herein that an object can also exist outside of the graphical representation, the graphical representation thus only acting as a window into the user interface.

It should also be noted that for some objects a collision is determined to have happened only if there is a total overlap of two objects' extents. This can be used for areas wherein the object to be effected by a function of an area is only effected if it totally enters the area. In the example above this would mean that if the delete

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Fitbit v. Immersion

area is said to be just outside the displayed area the object would have to leave the screen completely before being deleted.

Figure 8 show an example of how a gravitational force would affect the situation in fig 6b. An object 809 has been opened from the missed call box object 806 and is currently hanging in mid air. A gravitational force denoted F in the figure is acting on the notification object 409 causing it to fall back towards the missed call box 806. Unless the user controls the objects movement by motioning the device 800 to make it fly up towards one of the other objects 807, 808 to initiate a function the notification object 809 will fall back into the missed call box object 806 and will be saved there for a later time. Thus a variable timeout for the operation of opening the missed call box is achieved during which time period it is possible to either perform an action on the produced notification object 809 or to postpone or reset the time out by hoisting the object 809 further.

It could also be possible to introduce an element, possibly as a stationary object, in which the other objects will be moving. Such an element can be used to simulate different environment having particular properties. One example is to simulate a water-filled screen in which the objects float around. Depending on their extent, their body mass and the density of the surrounding element or water, they will either sink or float up as is known from Archimedes' principle.

For example if a user interface surface or area is designed to be half-filled with water a model for

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Fitbit v. Immersion

functions only applicable to some objects or where some functions requires added security is achieved. One such situation could be where all other objects float and the delete operation is modelled in an object at the bottom. To delete an object a forced movement pushing the object under water is thus required and will most likely not happen by chance.

The elements can also be used to implement different timeouts and timeout functions for different objects by making some float and some sink and at speeds that depend on their density or mass. Some objects will thus rise to one function object and some will sink to another function object if left alone or undisturbed. The density will determine the speed i.e. the timeout time period.

It is also possible to add texture objects having a certain friction or other characteristic influencing the movements of the other objects as well as creating a visual effect that can be used to increase the visual conception of the graphical representation of the user interface and thus further the understanding of how it works leading to an easier and more intuitive user interface.

As the object behaves like a real object, the mental connection between the operation and its effect becomes more intuitive and thus easy to learn.

The various aspects of what is described above can be used alone or in various combinations. The teaching of this application may be implemented by a combination of hardware and software, but can also be implemented in hardware or software. The teaching of this application

FITBIT 1002
Fitbit v. Immersion

can also be embodied as computer readable code on a computer readable medium. It should be noted that the teaching of this application is not limited to the use in mobile communication terminals such as mobile phones, but can be equally well applied in Personal digital Assistants (PDAs), MP3 players, personal organizers or any other device designed for providing information while maintaining low power consumption.

The teaching of the present application has numerous advantages. Different embodiments or implementations may yield one or more of the following advantages. It should be noted that this is not an exhaustive list and there may be other advantages which are not described herein. One advantage of the teaching of this application is that a device can be made to display information in a manner that is easy to learn and intuitive to use.

Another advantage of the teaching of the present application is that a user can operate certain functions such as retrieving information from a device with only a simple and imprecise command or movement not requiring the full attention of a user.

Although the teaching of the present application has been described in detail for purpose of illustration, it is understood that such detail is solely for that purpose, and variations can be made therein by those skilled in the art without departing from the scope of the teaching of this application.

For example, although the teaching of the present application has been described in terms of a mobile phone, it should be appreciated that the teachings of the

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Fitbit v. Immersion

present application may also be applied to other types of electronic devices, such as music players, palmtop computers and the like. It should also be noted that there are many alternative ways of implementing the methods and apparatuses of the teachings of the present application.

The term "comprising" as used in the claims does not exclude other elements or steps. The term "a" or "an" as used in the claims does not exclude a plurality. A unit or other means may fulfil the functions of several units or means recited in the claims.

FITBIT 1002
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TABLES

Table 1: Floating-point to fixed-point replacements.

Floating point operation	Fixed point operation
x*y	(x*y)>>Q
x/y	(x<<Q)/y
sqrt(x)	sqrt(x<<Q)
sin(x)	sinT[(x>>Q)]
cos(x)	sinT[(x>>Q) + 90]

Table 2: Object characteristics and corresponding purposes.

Characteristic	Purpose
Extent	To determine graphical representation and for collision detection.
Position	To determine graphical representation and for collision detection.
Mass	For determining movement through acceleration, de-acceleration, inertia and effect upon collision.
Elasticity	The object's behaviour upon collision both for continued movement and for graphical appearance.
Friction	To determine continued movement upon collision.
Data value	Used to notify or carry a value.
Function	Enables a function to be initiated upon activation through a movement pattern or a collision.
Spring coefficient	To determine movement.

FITBIT 1002
Fitbit v. Immersion

Damping coefficient	To determine movement.
Velocity	To determine movement.
Acceleration	To determine movement. This is an implicit value that can also be handled exclusively by the controller.
Force	To determine movement. This is an implicit value that can also be handled exclusively by the controller.
Orientation	To determine what to show in the graphical representation and how to determine further movement.

Table 3 Functions and their associated movement patterns.

Function	Movement pattern
For a call reminder:	
Hoist	OPEN
Throw away	DELETE
Collide with phone symbol	Place call
Collide with trash can	Delete
Collide with mail symbol	Send message
Repeated hoist	Open next reminder
For an alarm	
Throw away	Postpone - the acceleration determines how much the alarm will be delayed.
Tap	Snooze
Double tap	Start media player and snooze.

FITBIT 1002
Fitbit v. Immersion

CLAIMS:

1. A user interface module comprising a display and a motion detector arranged to detect a motion, said module being arranged to display an emulated movement of a graphical representation of a first object on said display according to a motion detected by said motion detector, wherein said first object comprises a physical characteristic and said user interface module further comprises a controller module arranged to generate said emulated movement based on said physical characteristic.

2. A user interface module according to claim 1, wherein said generation of said emulated movement comprises determining an updated position from an original position depending on said physical characteristic and said motion detected by the motion detector and wherein said displaying of said emulated movement comprises displaying said object at said updated position.

3. A user interface module according to claim 1, wherein said physical characteristic comprise a mass for emulating inertia of said object.

4. A user interface module according to claim 1, wherein said physical characteristic comprise a spring coefficient and a damping coefficient and wherein said generation of said emulated movement is based on a damped spring dynamic.

5. A user interface module according to claim 1, wherein said physical characteristic comprises an extent.

FITBIT 1002
Fitbit v. Immersion

6. A user interface module according to claim 1, wherein said display has a display area and wherein said graphical representation of said object is smaller than said display area.

7. A user interface module according to claim 1, wherein said physical characteristic comprises a velocity vector.

8. A user interface module according to claim 1 further arranged to display graphical representations of at least one additional object, wherein said at least one additional object has a physical characteristic and said generation of said emulated movement of said first object is further based on said physical characteristic of said at least one additional object.

9. A user interface module according to claim 1 or 8 wherein said first object and/or said at least one additional object has a data value wherein said user interface module is further arranged to display said data value as part of said graphical representation of said object.

10. A user interface module according to claim 1 further Arranged to execute a function associated with a movement pattern and wherein said controller module is arranged to execute said function on said object upon detection of said movement pattern.

11. A user interface module according to claim 10, wherein said movement pattern corresponds to a throwing movement and said function is a delete operation.

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FITBIT 1002
Fitbit v. Immersion

12. A user interface module according to claim 10, wherein said movement pattern corresponds to an upwards movement and said function is an open operation.

13. A user interface module according to claim 1, wherein an object has an associated function.

14. A user interface module according to claim 13, wherein a movement pattern corresponds to an emulated collision between one object having a data value and one object having an associated function, and wherein said user interface is arranged to execute said function on said data value upon detection of said emulated collision

15. A user interface module according to claim 14, wherein said movement function is any taken from the group comprising: a delete operation, a call operation, a send message operation, a postpone operation, an open operation and a read out operation.

16. A user interface module according to claim 1, wherein said motion detector and said display are arranged in one housing.

17. A device having a module as in claim 1.

18. A device according to claim 17, wherein said device is a mobile terminal.

19. A method for controlling a user interface comprising a display, a motion detector and at least one object, said method comprising:

detecting a motion,

FITBIT 1002
Fitbit v. Immersion

emulating a movement for said at least one object according to said motion,

wherein an updated position is determined, and

displaying said at least one object at said updated position,

wherein said movement emulation is based on a physical characteristic of said object

20. A method according to claim 19, further comprising determining whether a collision between a first and a second object is caused by said emulated movement and emulating said movement accordingly.

21. A method according to claim 19,

wherein an object has an associated function corresponding to a movement pattern and said method further comprises

determining whether said detected motion completes said movement pattern and if so execute said function.

22. A method according to claim 19 and 20, wherein said movement pattern is a collision.

23. A method according to claim 20, wherein said at least one object has a data value and said method further comprises executing said associated function on said data value upon a completed movement pattern.

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FITBIT 1002
Fitbit v. Immersion

24. A method according to claim 20, wherein said execution of said associated function comprises generating an additional object.

25. A computer readable medium including at least computer program code for controlling a user interface comprising a display, motion detector and at least one object, said computer readable medium comprising:

software code for receiving a motion through said motion detector,

software code for emulating a movement for said at least one object, and

software code for displaying said movement of said at least one object.

26. A computer readable medium as in claim 25 further comprising software code for determining whether said motion completes a movement pattern and if so for executing an associated function corresponding to said movement pattern.

27. A device incorporating and implementing a computer readable medium according to claim 25.

28. A user interface module comprising motion detector means for detecting a motion, and display means for displaying an emulated movement of a graphical representation of a first object according to a motion detected by said motion detector means.

29. A user interface module according to claim 28, wherein said first object comprises a physical characteristic and said user interface module further

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FITBIT 1002
Fitbit v. Immersion

comprises controller means for generating said emulated movement based on said physical characteristic.

30. A user interface module according to claim 28, wherein said first object and/or at least one additional object has a data value wherein said user interface module further comprises display means for displaying said data value as part of said graphical representation.

31. A user interface module according to claim 28 further comprising means for executing a function associated with a movement pattern on said object upon detection of said movement pattern.

FITBIT 1002
Fitbit v. Immersion

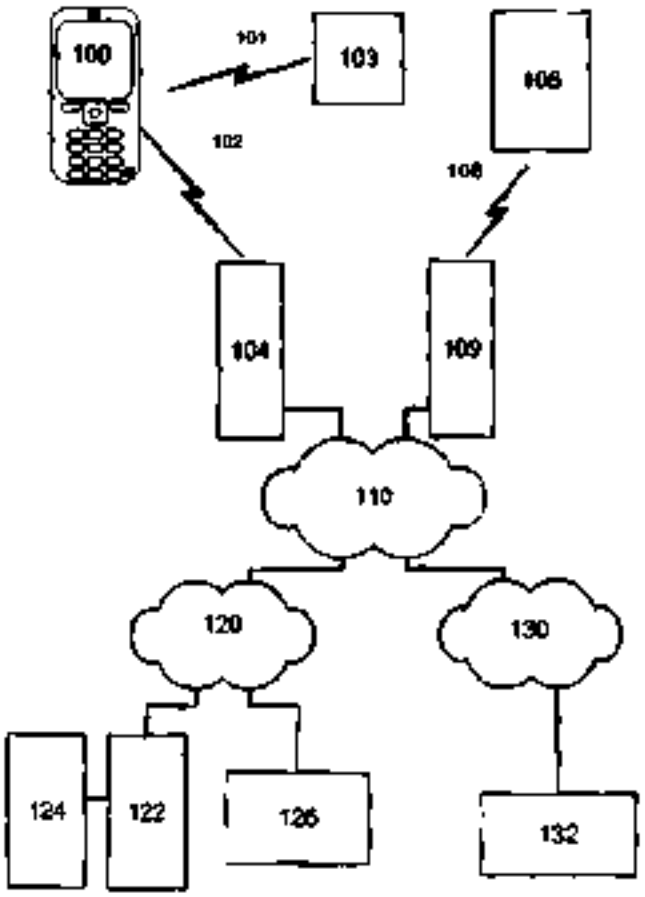


Fig 1

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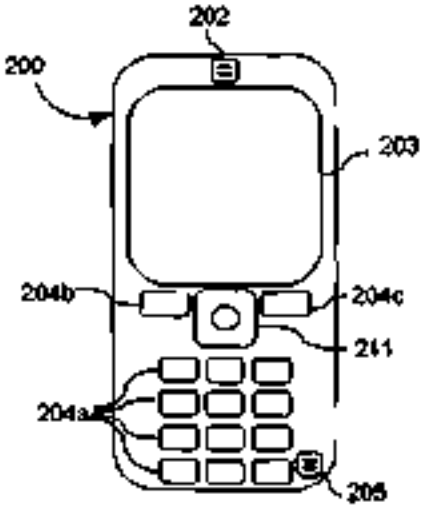


Fig 2

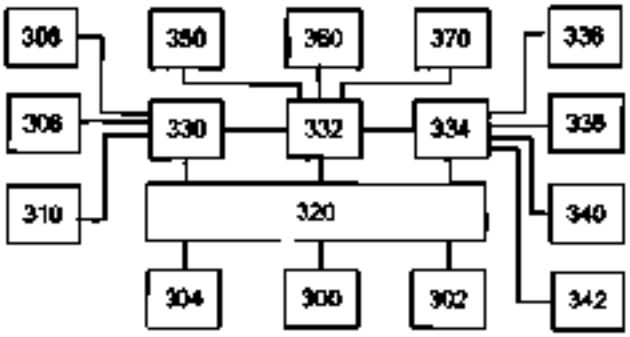


Fig 3

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3/6

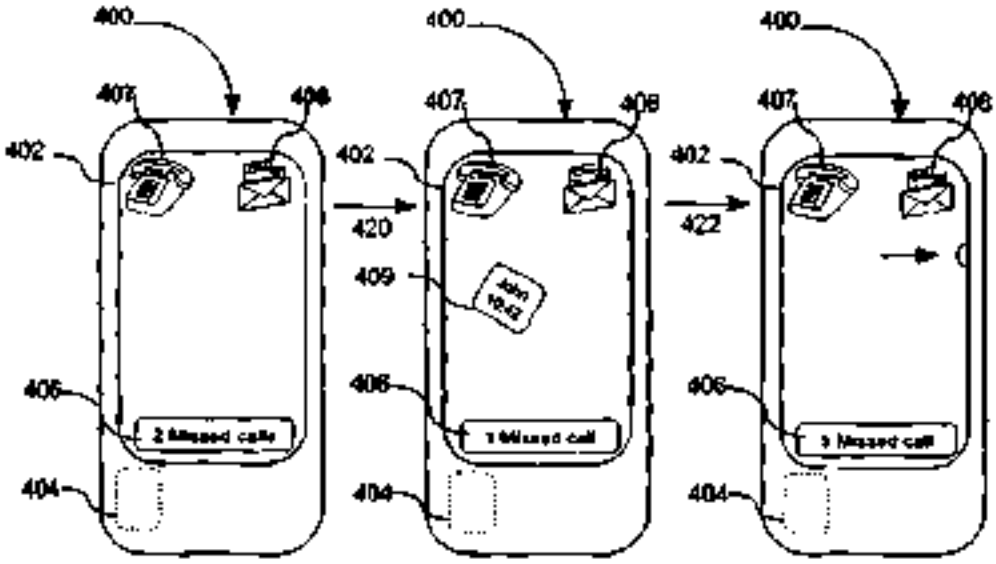


Fig 4a Fig 4b Fig 4c

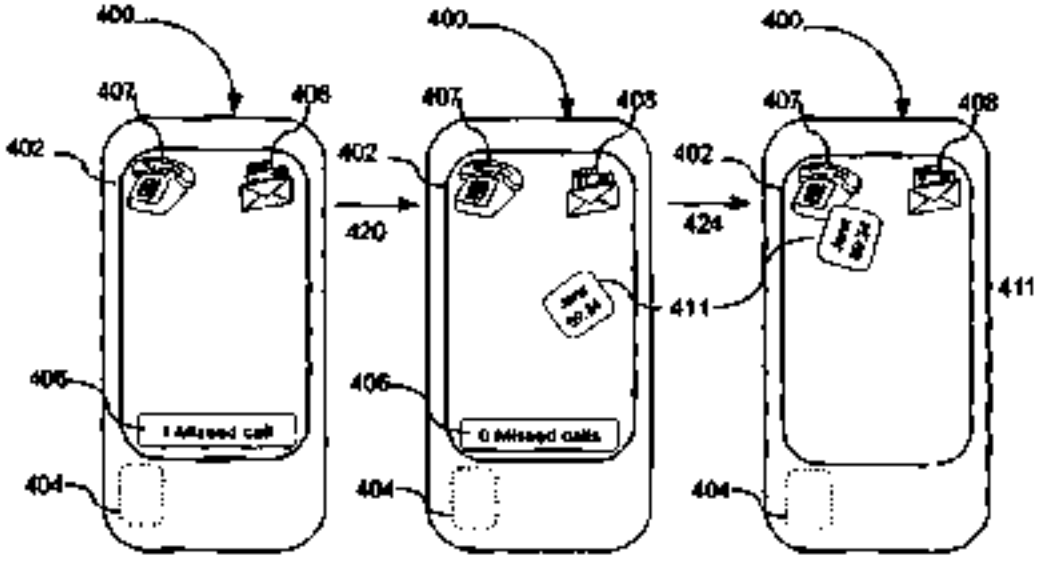


Fig 4d Fig 4e Fig 4f

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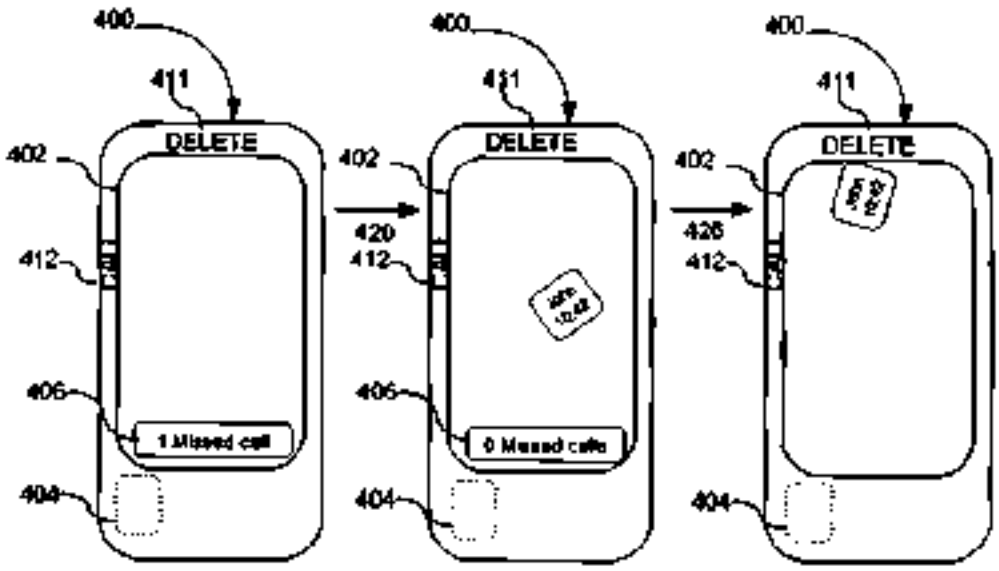


Fig 4g Fig 4h Fig 4i

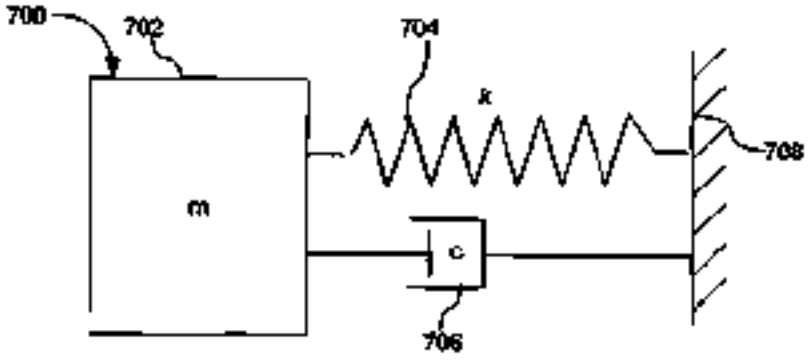


Fig 7a

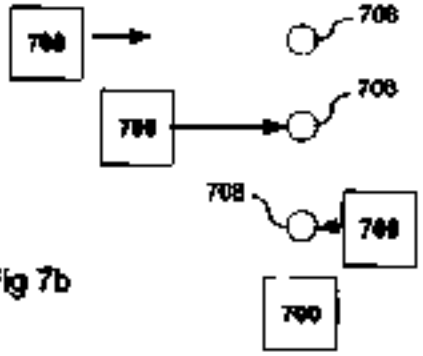


Fig 7b

FITBIT 1002
Fitbit v. Immersion

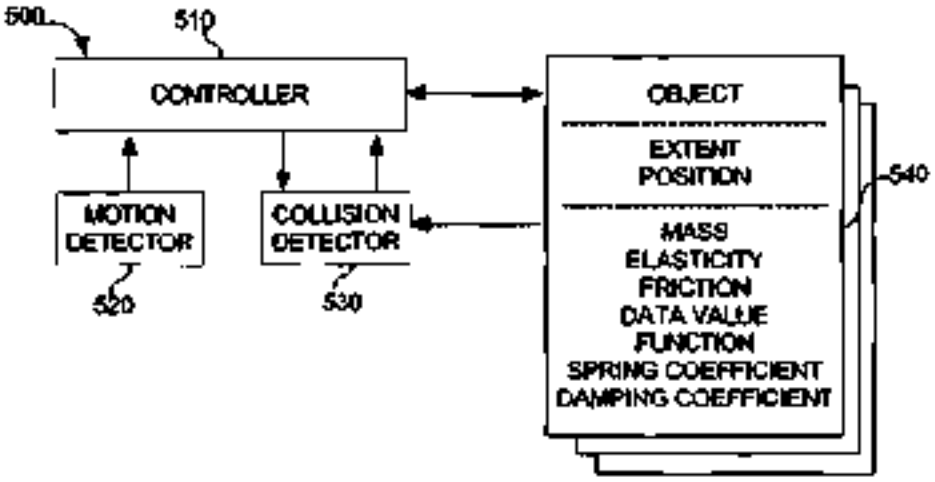


Fig 5a

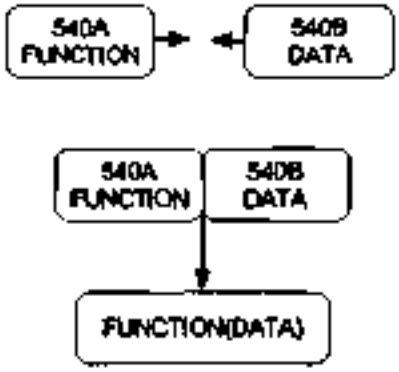


Fig 5b

FITBIT 1002
Fitbit v. Immersion

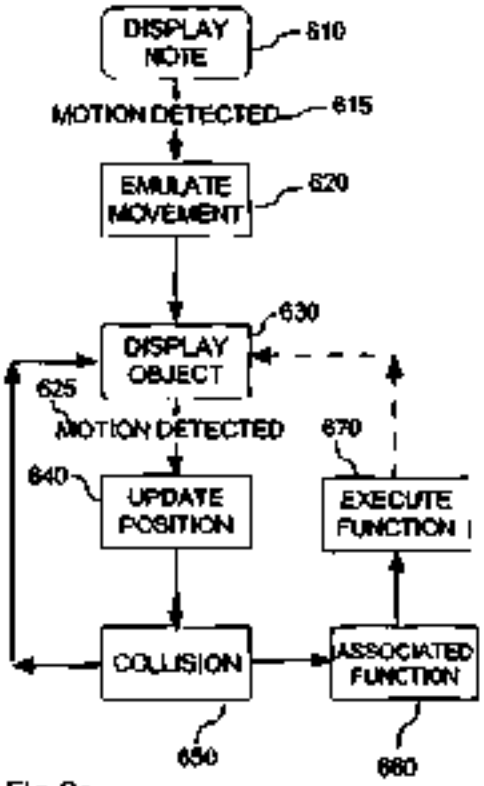


Fig 6a

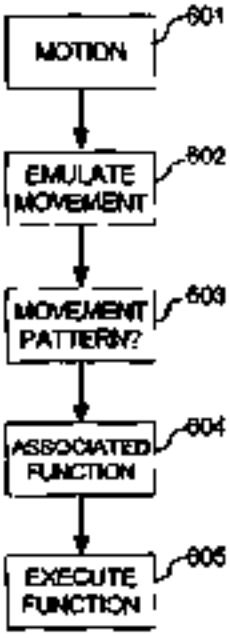


Fig 6b

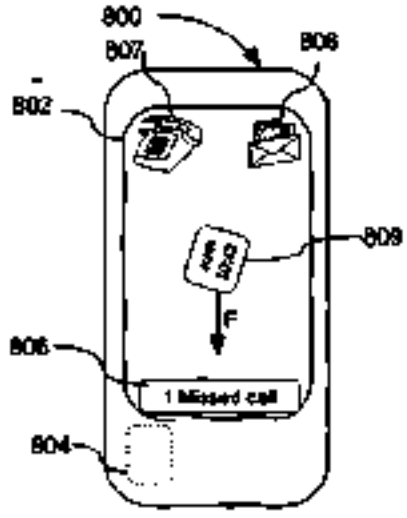


Fig 8

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2008/006662

INV. G06F3/048

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data, INSPEC, COMPENDEX, IBM-TDB

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2007/176974 A1 (MASUYAMA TAKO [JP] ET AL) 2 August 2007 (2007-08-02) abstract paragraphs [0012] - [0015], [0111], [0193] - [0196]	1-31

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
11 February 2009	19/02/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax (+31-70) 340-3016	Wiedmeyer, Vera

Form PCT/ISA/210 (second sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2008/008562

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2007178974 A1	02-08-2007	NONE	

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Fitbit v. Immersion

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Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	6366633
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David M. Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Amber Johnson
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	30-OCT-2009
Filing Date:	14-JUL-2009
Time Stamp:	16:46:07
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	Transmittal.pdf	37205	no	1

Warnings:	
Information:	

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Fitbit v. Immersion

2	Transmittal Letter	Certification.pdf	194656	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Filed (SB/08)	IDS.pdf	93914	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	NPL Documents	ISR.pdf	428048	no	15
Warnings:					
Information:					
5	NPL Documents	WILLIAMS.pdf	227913	no	4
Warnings:					
Information:					
6	Foreign Reference	WO2004044728.pdf	1400475	no	80
Warnings:					
Information:					
7	Foreign Reference	WO2004075165.pdf	1204776	no	54
Warnings:					
Information:					
8	Foreign Reference	WO2008132546.pdf	544184	no	24
Warnings:					
Information:					
9	Foreign Reference	WO2009074185.pdf	1080651	no	54
Warnings:					
Information:					
Total Files Size (in bytes):			5214415		

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This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	David Birnbaum et al.
Application No.	:	12/502,702
Filed	:	July 14, 2009
For	:	Systems and Methods for Transmitting Haptic Messages
Examiner	:	Unassigned
Art Unit	:	2472
Confirmation No.	:	6699

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are copies of the following documents for filing in the above-identified application:

Information Disclosure Statement Letter;

Form PTO/SB/08 listing 6 References; and

6 Non US Patent References.

The Commissioner if hereby authorized to charge any deficiencies to Deposit Account Number 16-1435.

Respectfully submitted,

Date: 10/30/2009

By: _____
Michael Morlock (Reg. No. 62,245)

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web, on 10/30/09

_____
Amber Johnson

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: **David Birnbaum**	Conf No.: **6699**
Serial No. **12/502,702**	Art Unit: **2472**
Filed: **July 14, 2009**	Examiner: **Unassigned**
For: **Systems and Methods for Transmitting Haptic Messages**	
Attorney Ref. **IMM351**	

INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08A(s), attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08A are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08A are in the English language and therefore, do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

c. ☒ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FITBIT 1002
Fitbit v. Immersion

FEES

IV. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ concurrently with the filing of a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☒ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☐ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

or

b. ☐ See the statement below. No fee is required.

FITBIT 1002
Fitbit v. Immersion

VI. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS; or

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VII. PAYMENT OF FEES (check one box)

☐ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 16-1435 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☒ No fee is required.

FITBIT 1002
Fitbit v. Immersion

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 16-1435.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 16-1435 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 10/30/2009 By: _____

Michael Morlock
Reg. No. 62,245
Kilpatrick Stockton LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400

Attachment(s):
- ☒ PTO/SB/08A
- ☒ Documents
- ☐ Fee

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	David Birnbaum et al.
Application No.	:	12/502,702
Filed	:	July 14, 2009
For	:	Systems and Methods for Transmitting Haptic Messages
Examiner	:	Unassigned
Art Unit	:	2472
Confirmation No.	:	6699

Mail Stop Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are copies of the following documents for filing in the above-identified application:

1. Transmittal;
2. Petition for Extension of Time (2 months);
3. Response to Notice to File Missing Parts of Nonprovisional Application;
4. Declaration;
5. Eighteen (18) Sheets of Replacement Drawings; and
6. EFS-Web payment in the amount of $620.00 ($130.00 – Surcharge; $490.00 – Extension of Time)

The Commissioner is hereby authorized to charge any deficiencies to Deposit Account Number 16-1435.

Respectfully submitted,

Date: 11/9/2009

By: _____
Michael Morlock (Reg. No. 62,245)

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with the United States Patent Office via EFS-Web, on November 9, 2009.

_____
Laura J. Smith

FITBIT 1002
Fitbit v. Immersion

PTO/SB/22 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) FY 2009 *(Fees pursuant to the Consolidated Appropriations Act, 2008 (H.R. 4986))*	Docket Number (Optional) IMM351 (51851/378586)
Application Number 12/502,702	Filed July 14, 2009
For Systems and Methods For Transmitting Haptic Messages	
Art Unit 2416	Examiner To Be Assigned

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below)

	Fee	Small Entity Fee	
☐ One month (37 CFR 1.17(a)(1))	$130	$65	$
☑ Two months (37 CFR 1.17(a)(2))	$490	$245	$ 490.00
☐ Three months (37 CFR 1.17(a)(3))	$1110	$555	$
☐ Four months (37 CFR 1.17(a)(4))	$1730	$865	$
☐ Five months (37 CFR 1.17(a)(5))	$2350	$1175	$

☐ Applicant claims small entity status. See 37 CFR 1.27.

☐ A check in the amount of the fee is enclosed.

☑ Payment by credit card. Form PTO-2038 is attached.

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☑ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 16-1435.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

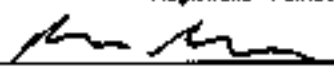
I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96).

☑ attorney or agent of record. Registration Number 62,245

☐ attorney or agent under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____



Signature

11/4/2009

Date

Michael Morlock

Typed or printed name

336/607-7300

Telephone Number

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: **Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2

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Document Description: Oath or declaration filed

PTO/SB/01 (04-09)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)

☐ Declaration Submitted With Initial Filing OR ☒ Declaration Submitted After Initial Filing (surcharge (37 CFR 1.16(f)) required)

Attorney Docket Number	IMM351 (51851/378566)
First Named Inventor	David M. Birnbaum
COMPLETE IF KNOWN	
Application Number	12/502,702
Filing Date	July 14, 2009
Art Unit	2416
Examiner Name	To Be Assigned

I hereby declare that: (1) Each inventor's residence, mailing address, and citizenship are as stated below next to their name; and (2) I believe the inventor(s) named below to be the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention titled:

Systems And Methods For Transmitting Haptic Messages

(Title of the Invention)

the application of which

☐ is attached hereto

OR

☒ was filed on (MM/DD/YYYY) 07/14/2009 as United States Application Number or PCT International Application Number 12/502,702 and was amended on (MM/DD/YYYY) _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified application, including the claims, as amended by any amendment specifically referred to above

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the filing date of the prior application and the national or PCT international filing date of the continuation-in-part application.

Authorization To Permit Access To Application by Participating Offices

☐ If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the above-identified patent application is filed access to the above-identified patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the above-identified patent application is filed to have access to the above-identified patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the above-identified patent application with respect to: 1) the above-identified patent application-as-filed; 2) any foreign application to which the above-identified patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the above-identified patent application; and 3) any U.S. application-as-filed from which benefit is sought in the above-identified patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing the Authorization to Permit Access to Application by Participating Offices.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 21 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FITBIT 1002
Fitbit v. Immersion

PTO/SB/01 (04-09)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION — Utility or Design Patent Application

Claims of Foreign Priority Benefits

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached? YES	NO
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐
			☐	☐	☐

☐ Additional foreign application number(s) are listed on a supplemental priority data sheet PTO/SB/02B attached hereto.

FITBIT 1002
Fitbit v. Immersion

PTO/SB/01 (04-09)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION — Utility or Design Patent Application

Direct all correspondence for: ☒ The address associated with Customer Number: 34300 OR ☐ Correspondence address below

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Address

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Country | Telephone | Email

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available. Petitioner/applicant is advised that documents which form the record of a patent application (such as the PTO/SB/01) are placed into the Privacy Act system of records DEPARTMENT OF COMMERCE, COMMERCE-PAT-7, System name: *Patent Application Files*. Documents not retained in an application file (such as the PTO-2038) are placed into the Privacy Act system of COMMERCE/PAT-TM-10, System name: *Deposit Accounts and Electronic Funds Transfer Profiles*.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

NAME OF SOLE OR FIRST INVENTOR: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle [if any]): David

Family Name or Surname: Birnbaum

Inventor's Signature:  Date: 10/09/09

Residence: City: Oakland | State: CA | Country: US | Citizenship: US

Mailing Address: 311 Oak Street #327

City: Oakland | State: CA | Zip: 94607 | Country: US

☒ Additional inventors or a legal representative are being named on the 2 supplemental sheet(s) PTO/SB/02A or 02LR attached hereto

FITBIT 1002
Fitbit v. Immersion

PTO/SB/02A (09-07)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION

ADDITIONAL INVENTOR(S)
Supplemental Sheet

Name of Additional Joint Inventor, if any: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))	Family Name or Surname
Chris	Ulrich

Inventor's Signature _____ Date 10/11/09

Residence: City	State	Country	Citizenship
Ventura	CA	US	CA

227 Palomares Avenue
Mailing Address

City	State	Zip	Country
Ventura	CA	93003	US

Name of Additional Joint Inventor, if any: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))	Family Name or Surname
Peter	Rutsil

Inventor's Signature _____ Date _____

Residence: City	State	Country	Citizenship
Berkeley	CA	US	US

2901 Garber Street
Mailing Address

City	State	Zip	Country
Berkeley	CA	94705	US

Name of Additional Joint Inventor, if any: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))	Family Name or Surname
Phong David	Ngo

Inventor's Signature _____ Date _____

Residence: City	State	Country	Citizenship
San Francisco	CA	US	US

88 Rosemont Street
Mailing Address

City	State	Zip	Country
San Francisco	CA	94110	US

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 21 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

FITBIT 1002
Fitbit v. Immersion

PTO/SB/02A (07-07)
Approved for use through 06/30/2010. OMB 0651-0032
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DECLARATION

ADDITIONAL INVENTOR(S)
Supplemental Sheet

Name of Additional Joint Inventor, if any: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))	Family Name or Surname
Chris	Ulrich

Inventor's Signature _____ Date _____

Residence: City	State	Country	Citizenship
Ventura	CA	US	CA

227 Peninsula Avenue
Mailing Address

City	State	Zip	Country
Ventura	CA	93003	US

Name of Additional Joint Inventor, if any: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))	Family Name or Surname
Peter	Rubin

Inventor's Signature Peter Rubin Date _____

Residence: City	State	Country	Citizenship
Berkeley	CA	US	US

2901 Garber Street
Mailing Address

City	State	Zip	Country
Berkeley	CA	94705	US

Name of Additional Joint Inventor, if any: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))	Family Name or Surname
Phong David	Ngo

Inventor's Signature Phong David Ngo Date _____

Residence: City	State	Country	Citizenship
San Francisco	CA	US	US

68 Rosenkranz Street
Mailing Address

City	State	Zip	Country
San Francisco	CA	94110	US

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 21 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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FITBIT 1002
Fitbit v. Immersion

PTO/SB/02A (07-07)
Approved for use through 06/30/2010. OMB 0651-0032
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION

ADDITIONAL INVENTOR(S)
Supplemental Sheet

Name of Additional Joint Inventor, if any: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))	Family Name or Surname
Leo	Kopelman

Inventor's Signature: Leo Kopelman — Date:

Residence: City	State	Country	Citizenship
San Francisco	CA	US	CA

630 Naquilla Street

Mailing Address

City	State	Zip	Country
San Francisco	CA	94110	US

Name of Additional Joint Inventor, if any: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))	Family Name or Surname

Inventor's Signature — Date:

Residence: City	State	Country	Citizenship

Mailing Address

City	State	Zip	Country

Name of Additional Joint Inventor, if any: ☐ A petition has been filed for this unsigned inventor

Given Name (first and middle (if any))	Family Name or Surname

Inventor's Signature — Date:

Residence: City	State	Country	Citizenship
68 Rosewood Street			

Mailing Address

City	State	Zip	Country

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 21 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing this form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	David Birnbaum *et al.*
Ser. No.	:	12/502,702
Filing Date	:	July 14, 2009
For	:	**Systems and Methods for Transmitting Haptic Messages**

Mail Stop: Missing Parts
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

RESPONSE TO NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

A Notice to File Missing Parts for the above referenced Patent Application was mailed on July 29, 2009. The Notice requires an Oath or Declaration in compliance with 37 CFR 1.63. The Notice further requires Replacement Drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d). The Notice specifies that the originally submitted drawings are rejected because portions of Figures 2, 5a-8b, 11a-12b, 14, and 16a-17 are missing and/or blurry. Finally, the Notice requires Applicants submit a $130 surcharge for late submission of the Oath or Declaration.

In response, Applicants submit herewith replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d), a signed Declaration, and the $ 130 surcharge.

Respectfully submitted,

Date: 11/9/2009

Michael Morlock
Registration No. 62,245

Kilpatrick Stockton LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300

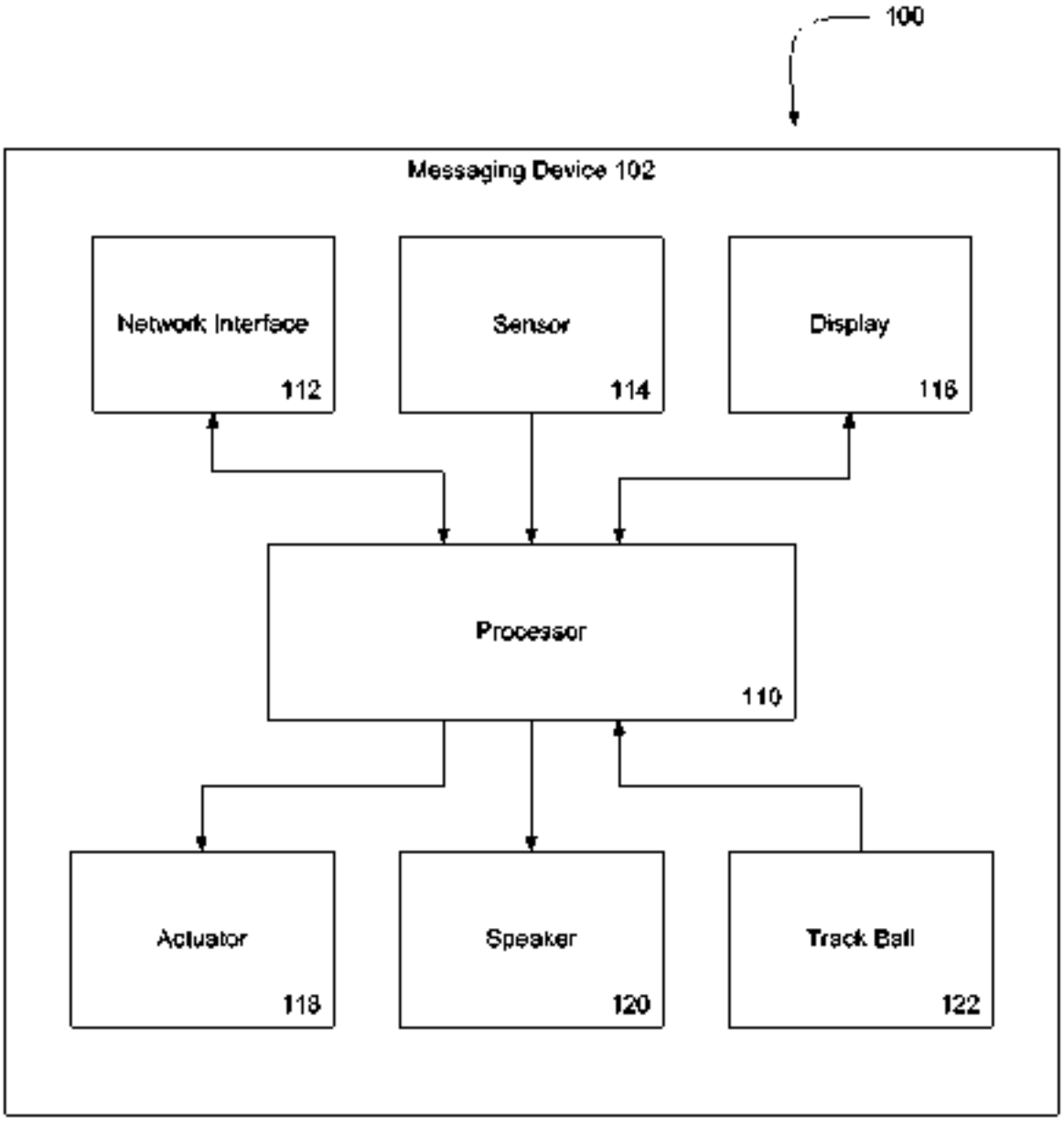


Figure 1

FITBIT 1002
Fitbit v. Immersion

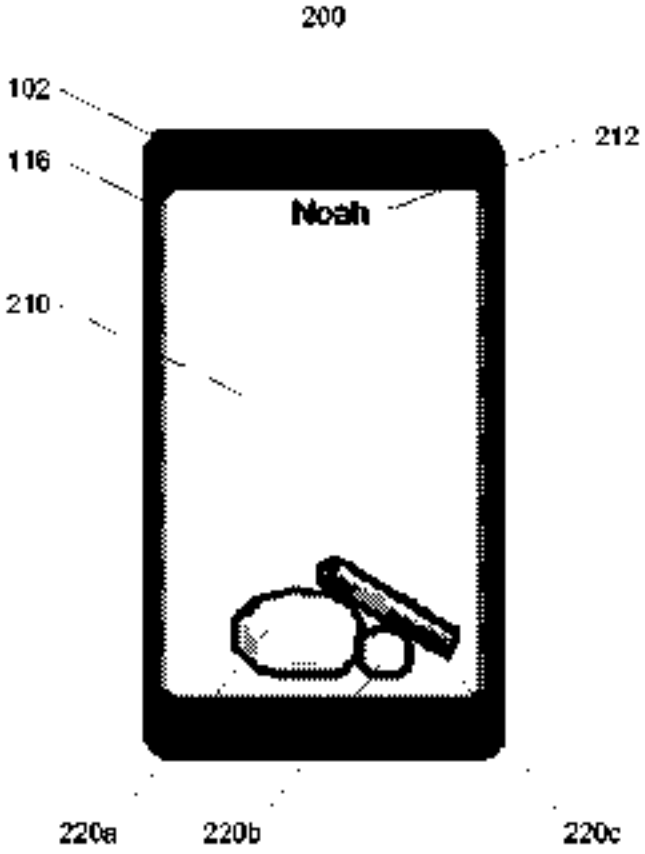


Figure 2

FITBIT 1002
Fitbit v. Immersion

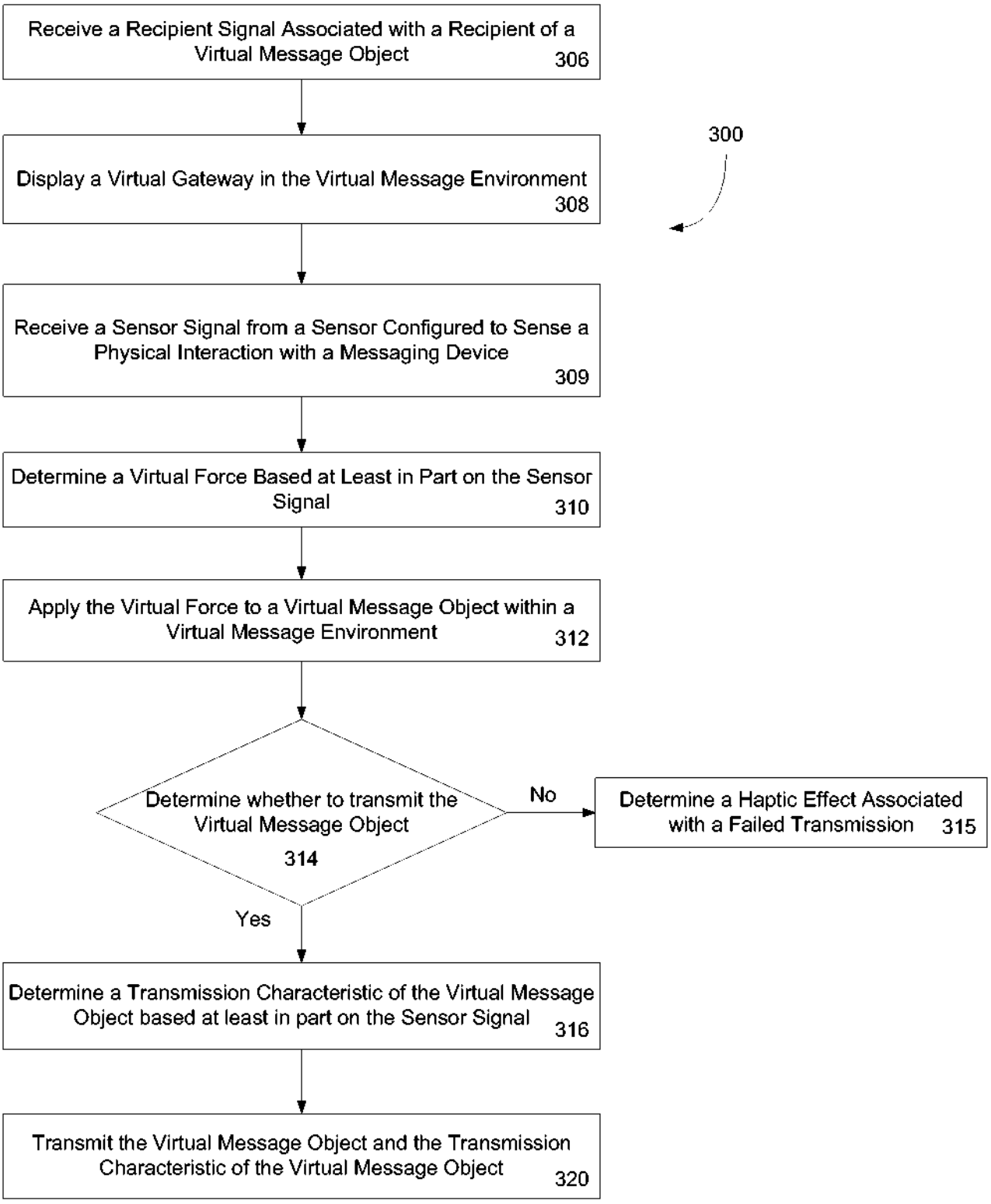


Figure 3

FITBIT 1002
Fitbit v. Immersion

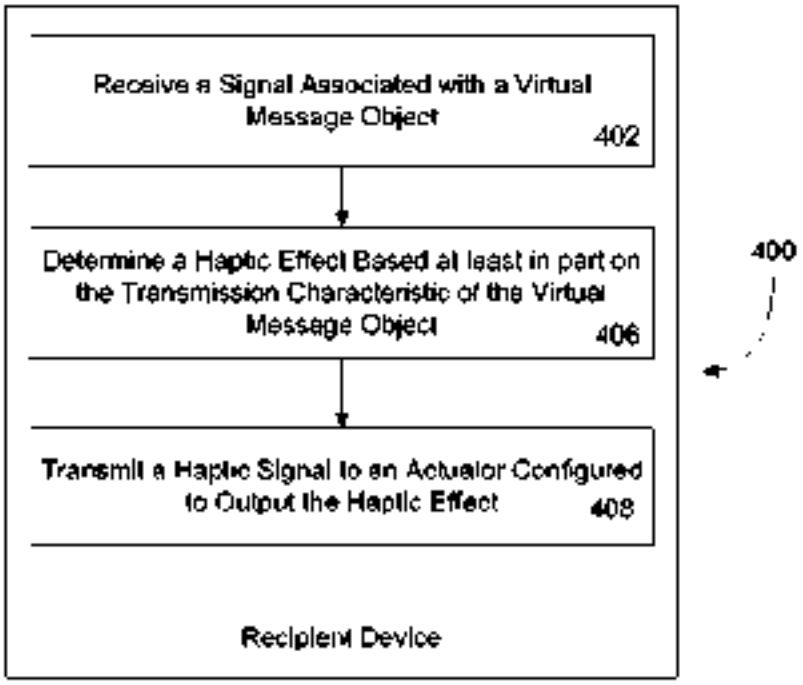


Figure 4

FITBIT 1002
Fitbit v. Immersion

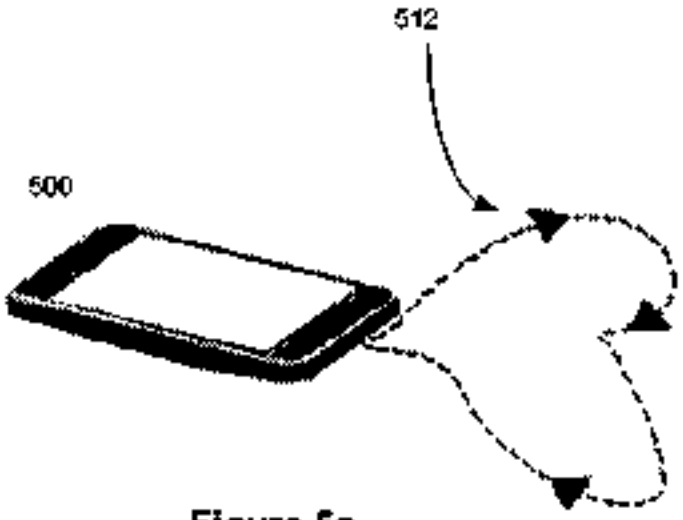


Figure 5a

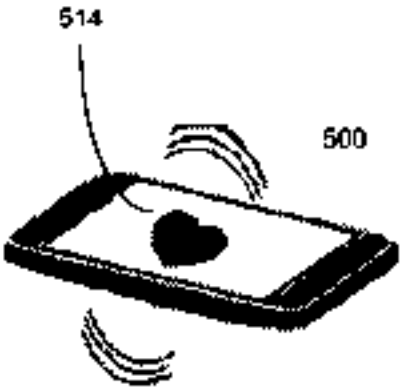


Figure 5b

FITBIT 1002
Fitbit v. Immersion

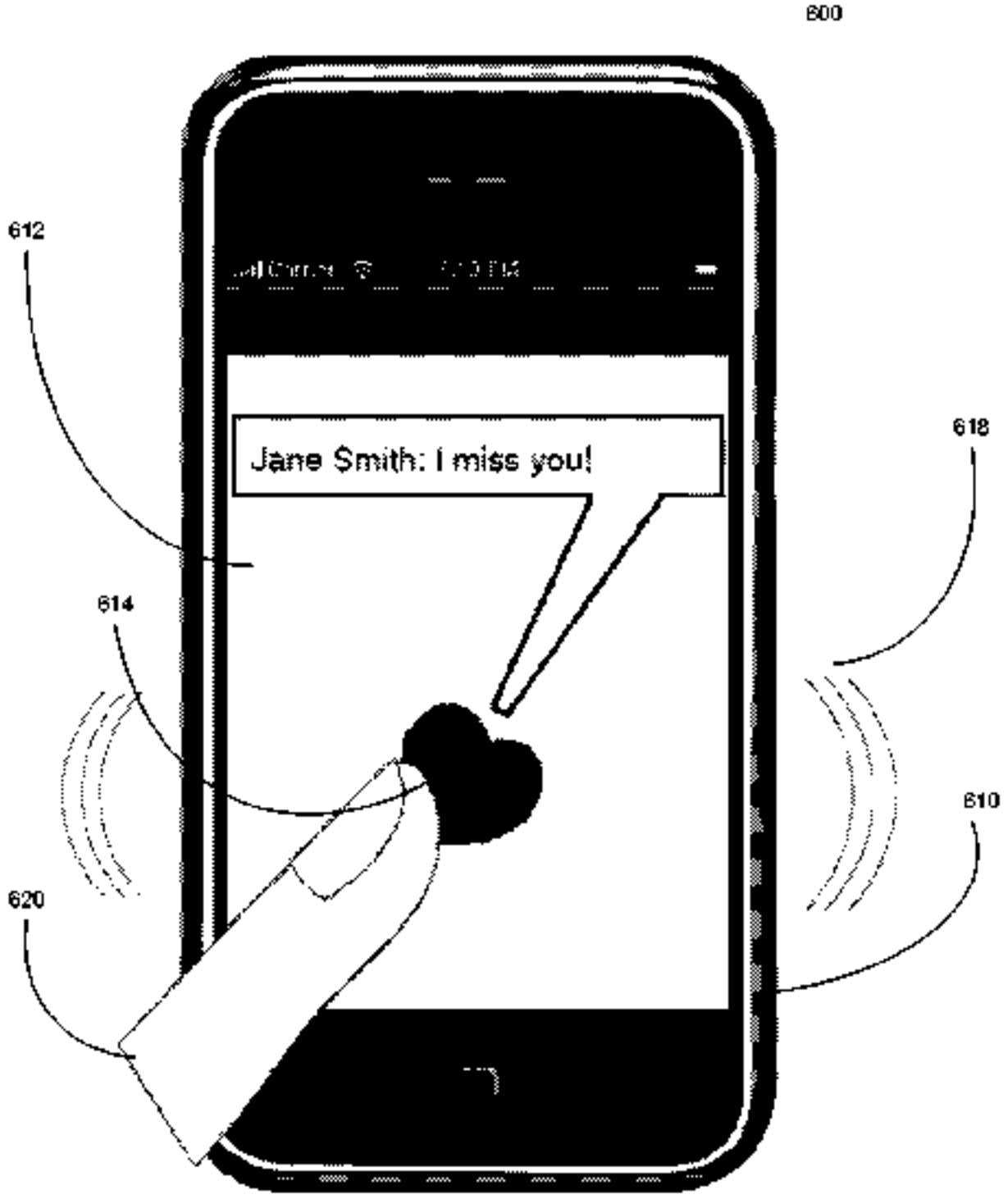


Figure 6

FITBIT 1002
Fitbit v. Immersion

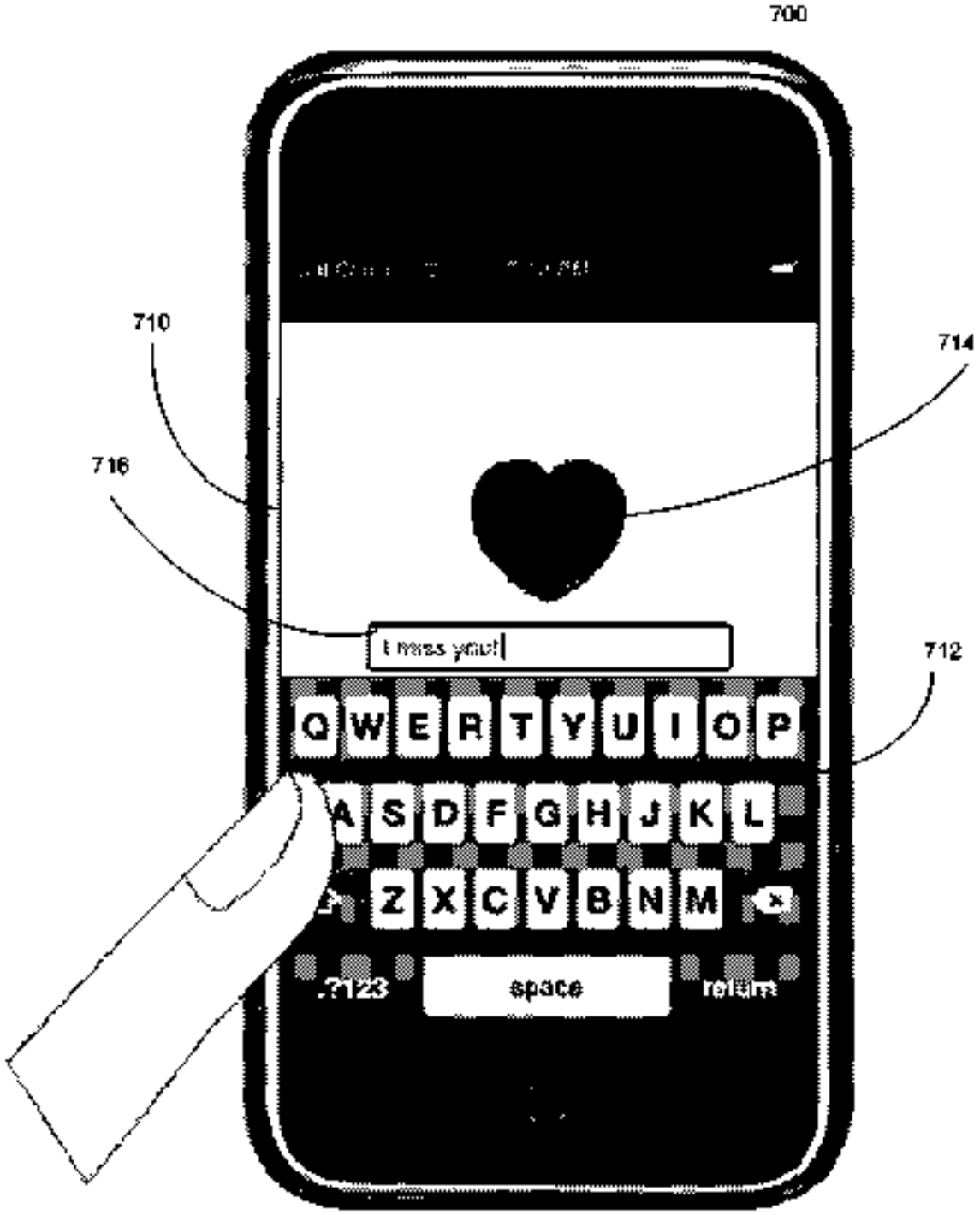


Figure 7

FITBIT 1002
Fitbit v. Immersion

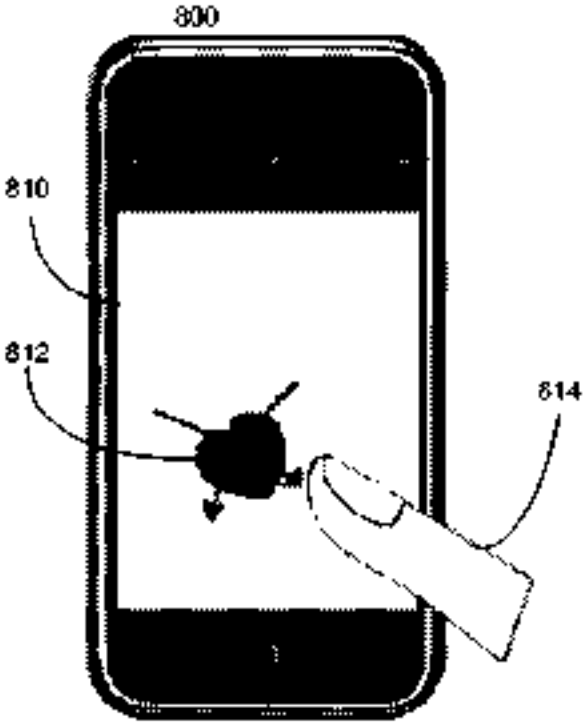


Figure 8a

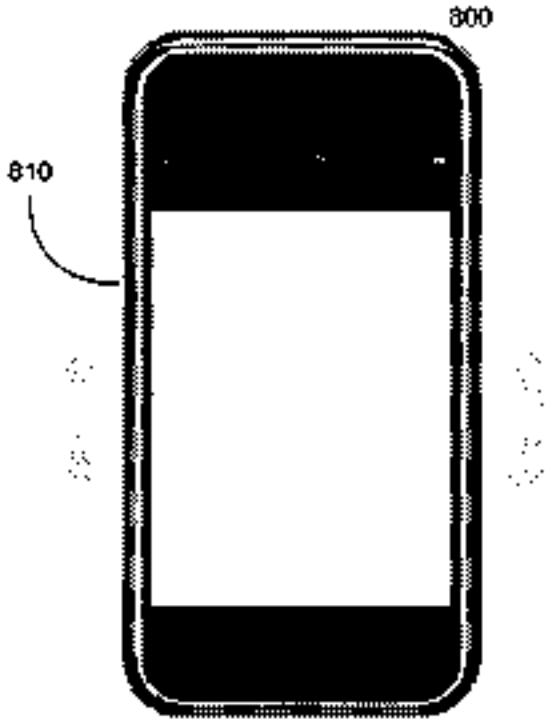


Figure 8b

FITBIT 1002
Fitbit v. Immersion

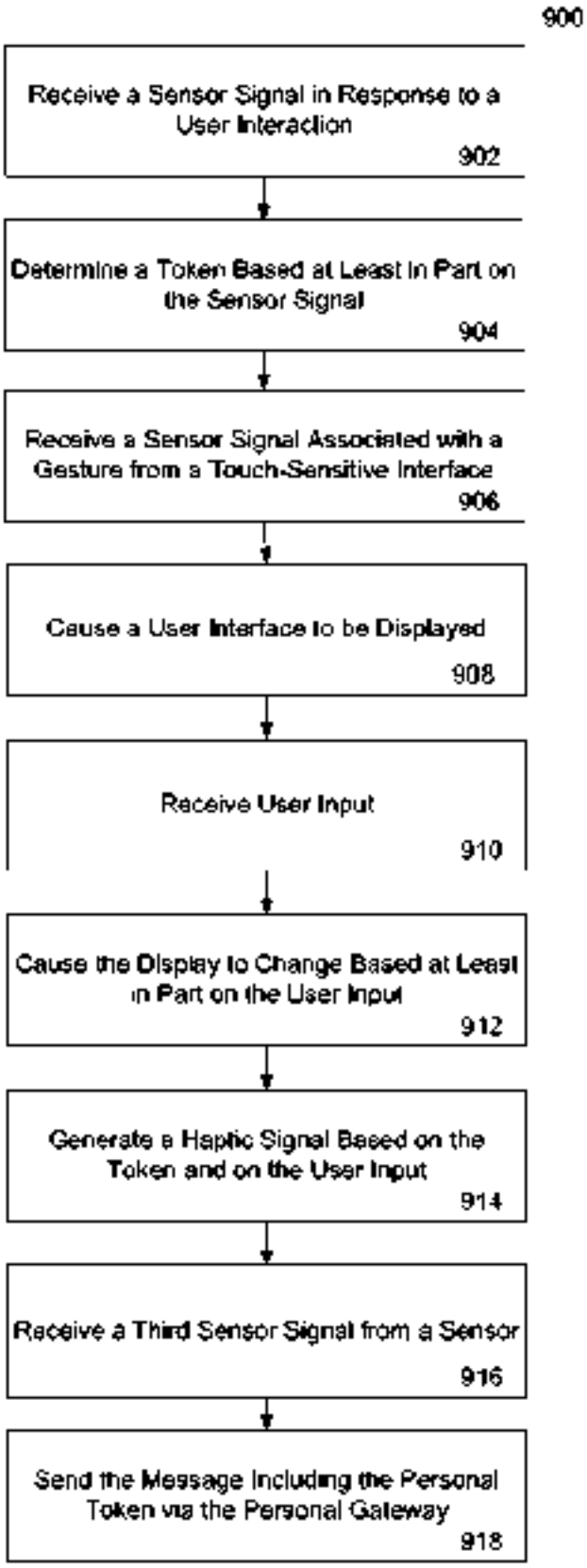


Figure 9

FITBIT 1002
Fitbit v. Immersion

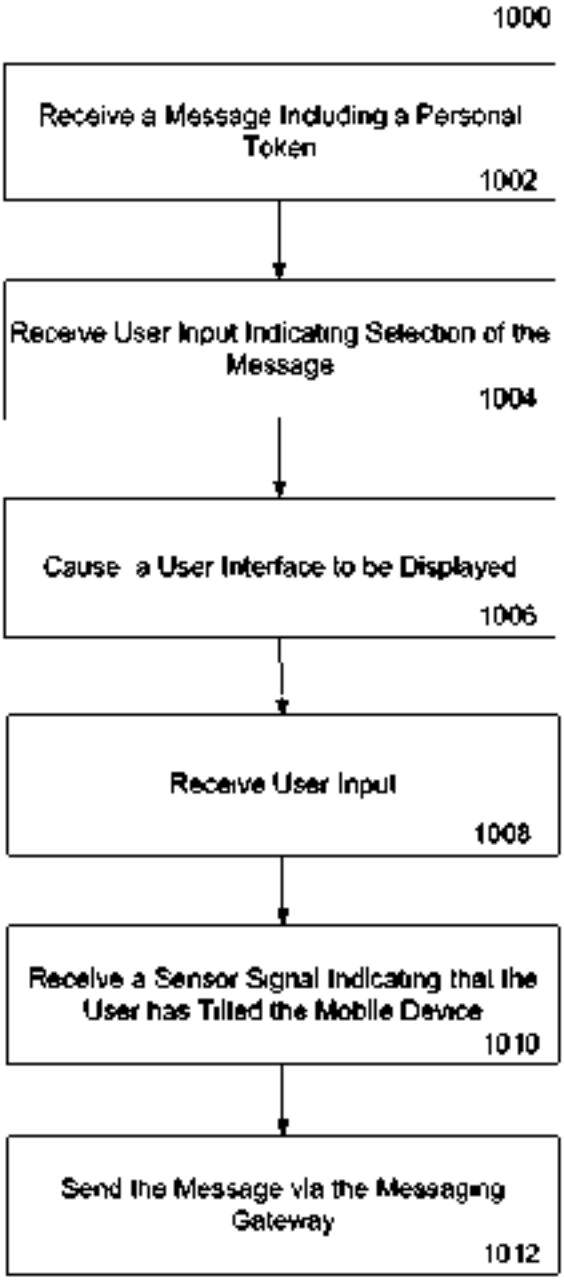


Figure 10

FITBIT 1002
Fitbit v. Immersion

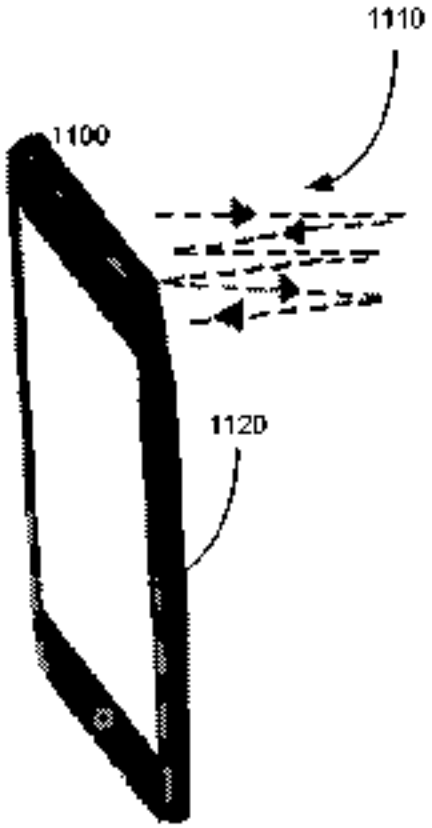


Figure 11a

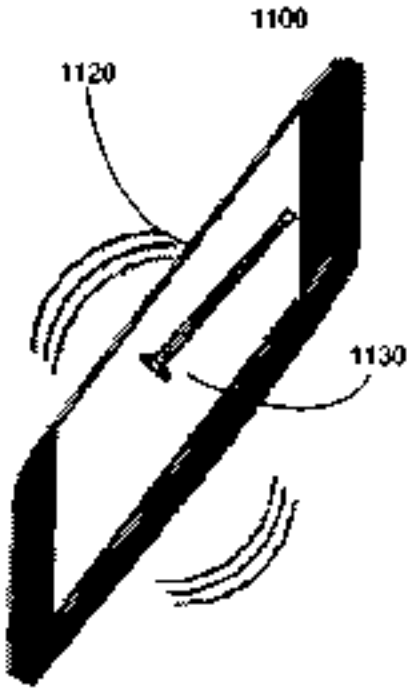


Figure 11b

FITBIT 1002
Fitbit v. Immersion

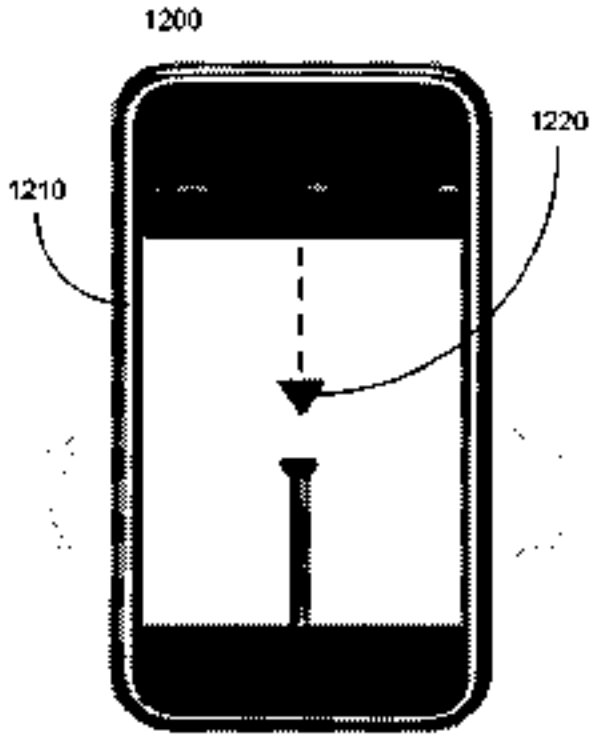


Figure 12a

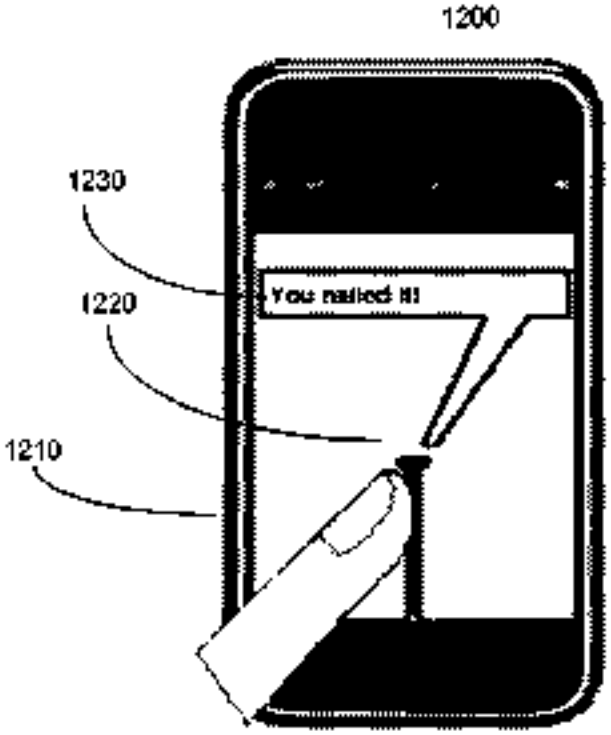


Figure 12b

FITBIT 1002
Fitbit v. Immersion

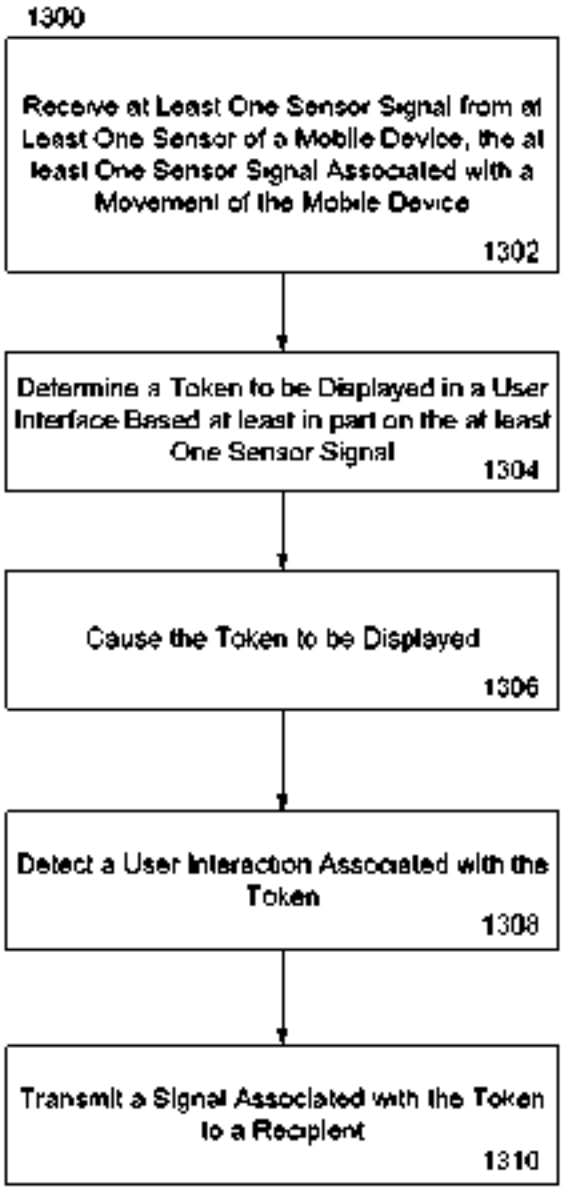


Figure 13

FITBIT 1002
Fitbit v. Immersion

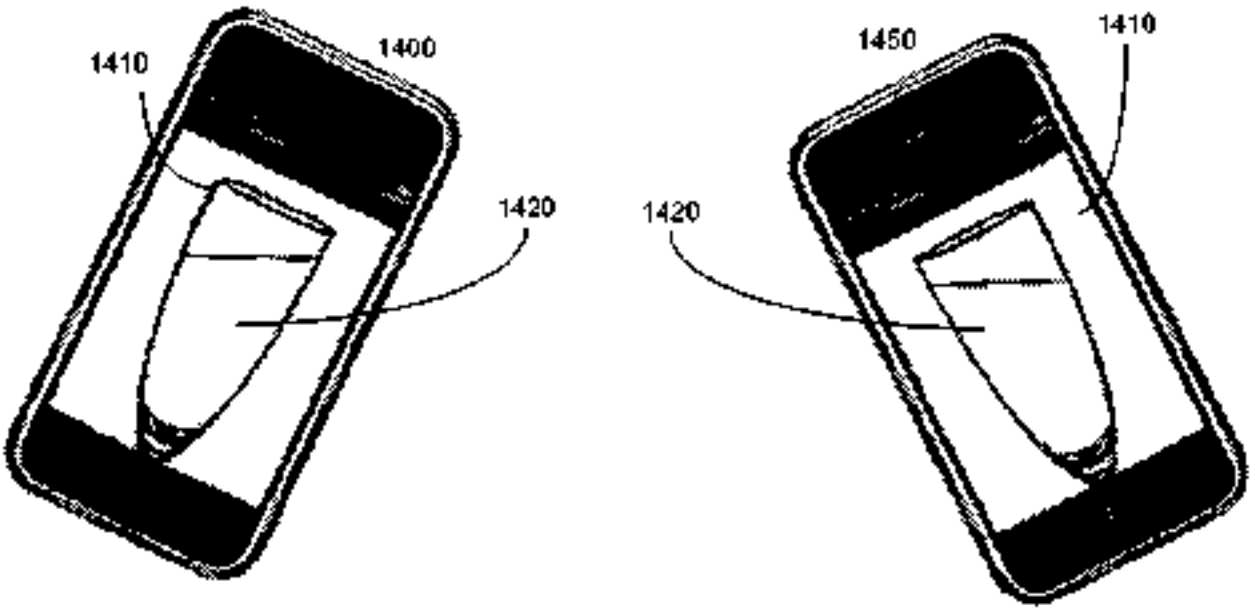


Figure 14

FITBIT 1002
Fitbit v. Immersion

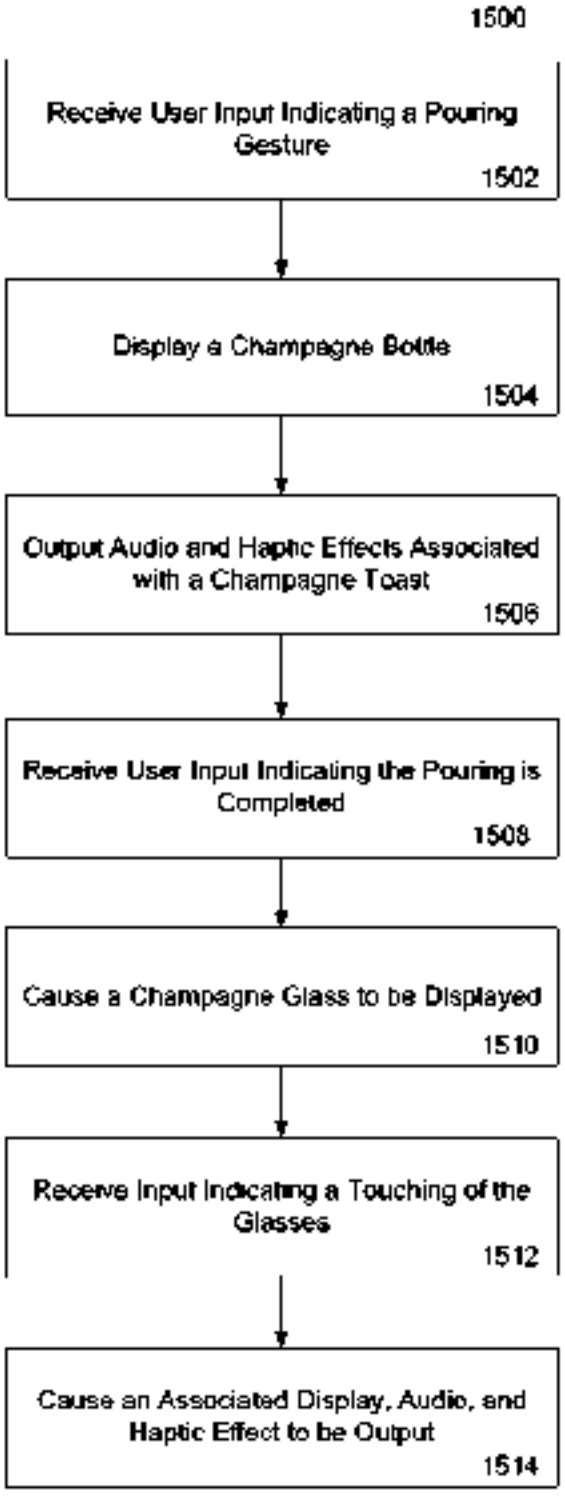


Figure 15

FITBIT 1002
Fitbit v. Immersion

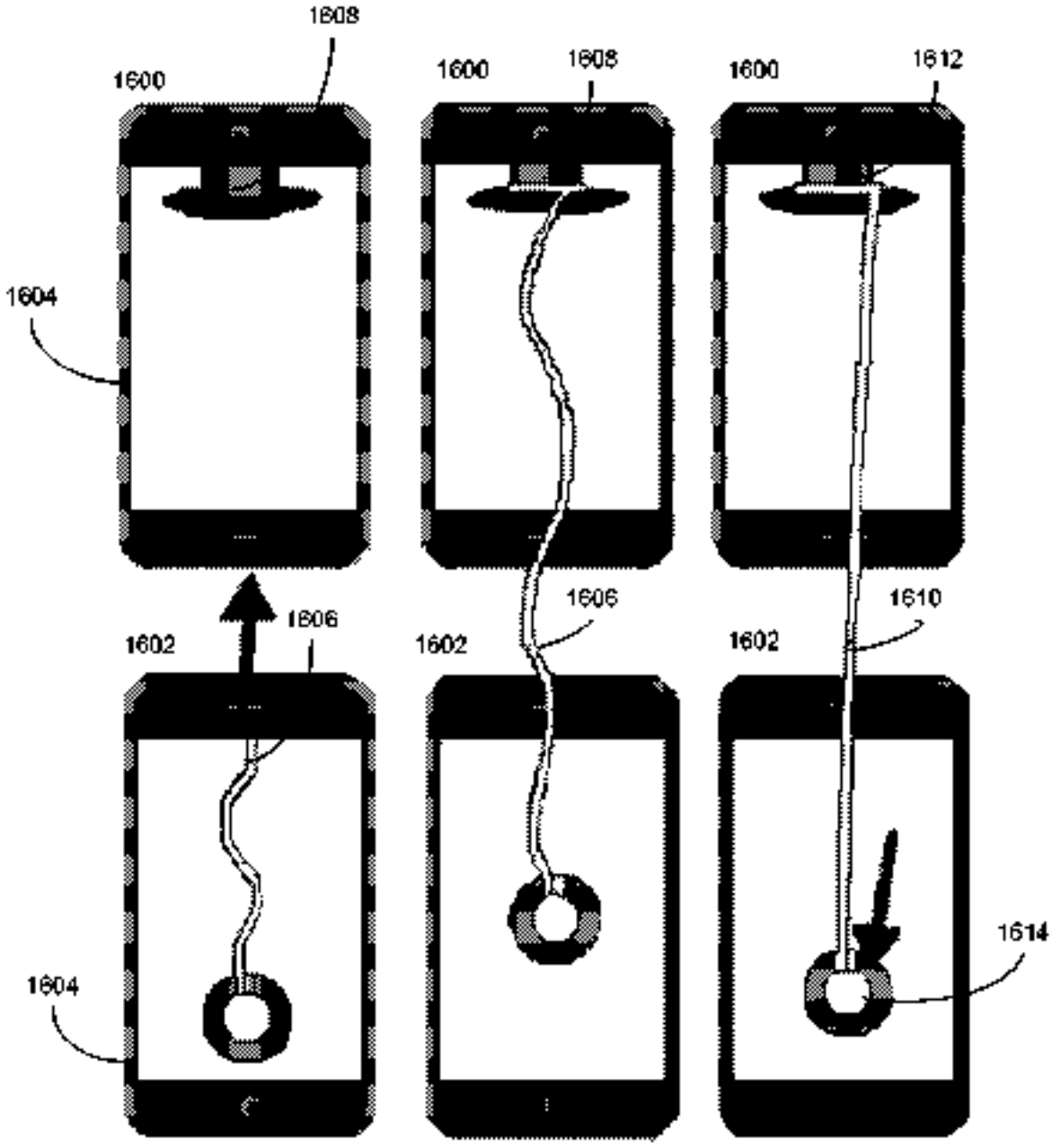


Figure 16A Figure 16B Figure 16C

FITBIT 1002
Fitbit v. Immersion

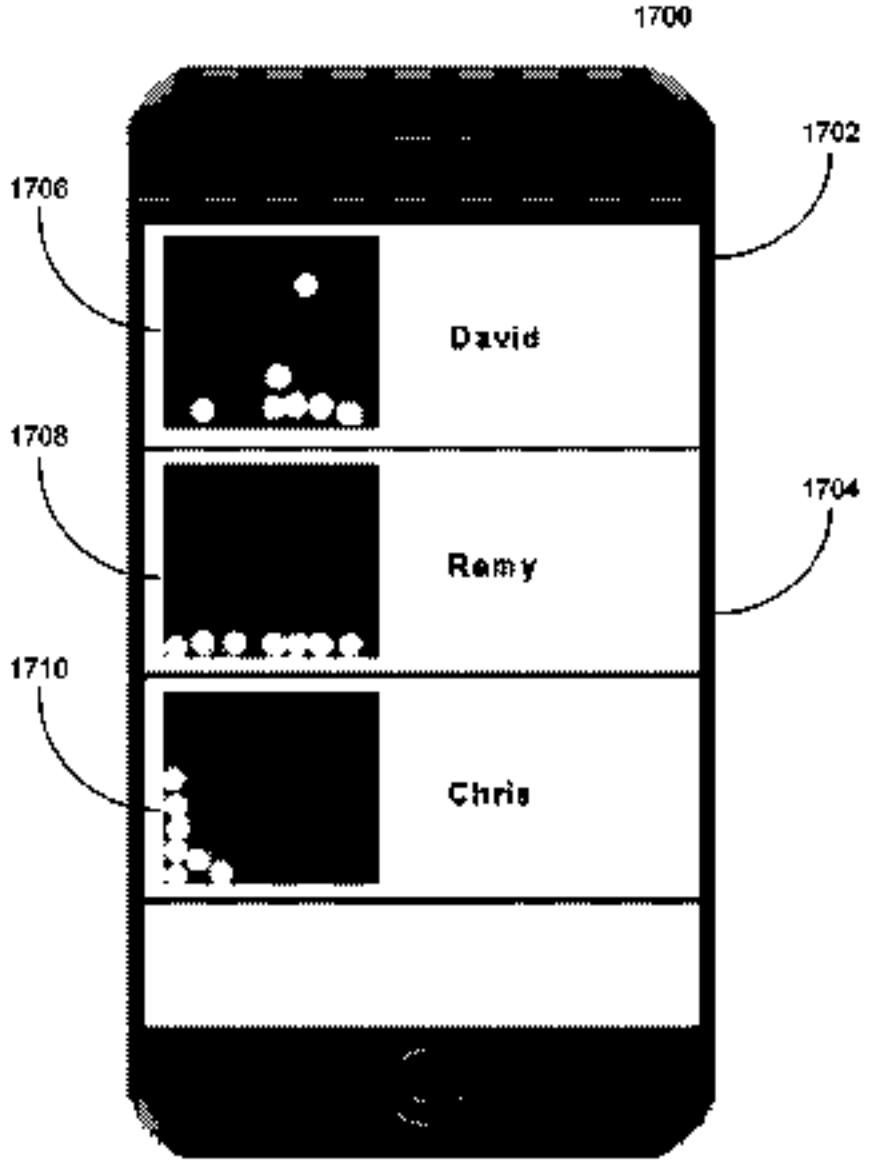


Figure 17

FITBIT 1002
Fitbit v. Immersion

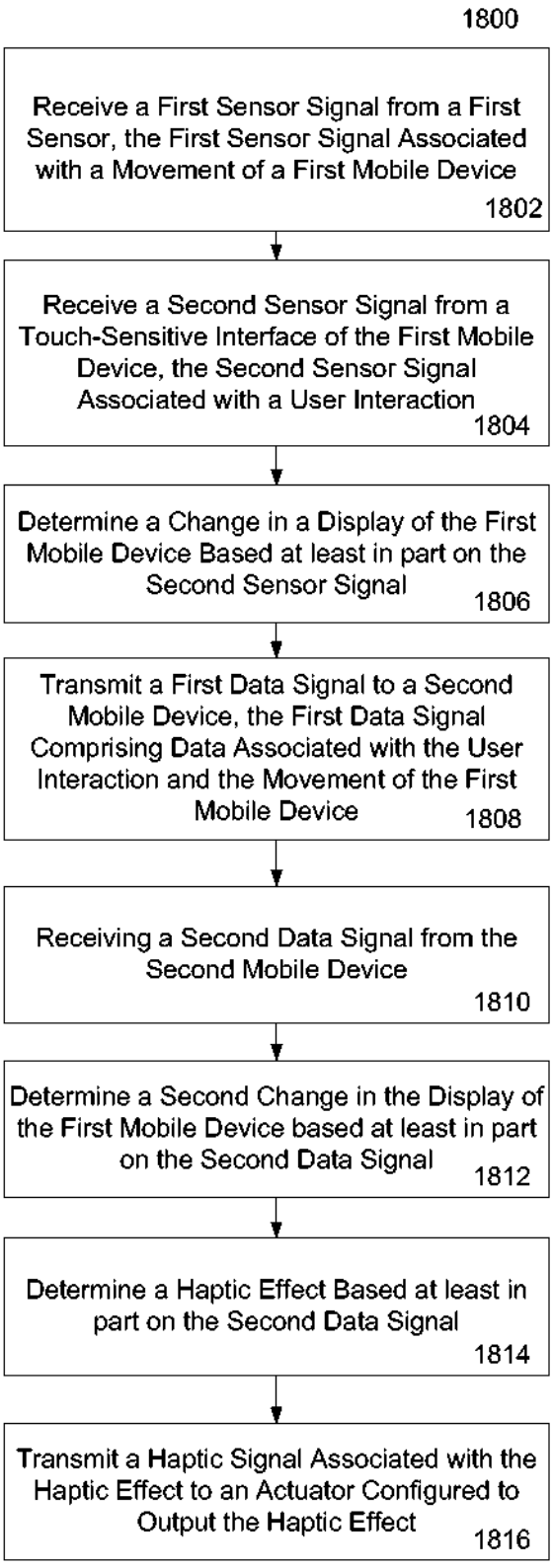


Figure 18

FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David M. Birnbaum
Filer:	Michael T. Morlock/Laura Smith
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Late filing fee for oath or declaration	1051	1	130	130
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 2 months with $0 paid	1252	1	490	490
Miscellaneous:				
			Total in USD ($)	**620**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	6415690
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David M. Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Laura Smith
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	09-NOV-2009
Filing Date:	14-JUL-2009
Time Stamp:	13:51:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$620
RAM confirmation Number	112
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

EXHIBIT 1002
Fitbit v. Immersion

1	Miscellaneous Incoming Letter	TransmittalI378586.pdf	40670	no	1
Warnings:					
Information:					
2	Extension of Time	ExtensionofTime378586.pdf	74222	no	1
Warnings:					
Information:					
3	Oath or Declaration filed	Declaration378586.pdf	441887	no	6
Warnings:					
Information:					
4	Miscellaneous Incoming Letter	Response378586.pdf	33959	no	1
Warnings:					
Information:					
5	Drawings-only black and white line drawings	IMM351Figures.pdf	311603	no	18
Warnings:					
Information:					
6	Fee Worksheet (PTO-875)	fee-info.pdf	32200	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	939441		

FITBIT 1002
Fitbit v. Immersion

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New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

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Application Number: 12502702 Document Date: 11/9/2009

The presence of this form in the IFW record indicates that the following document type was received in electronic format on the date identified above. This content is stored in the SCORE database.

- Drawings – Other than Black and White Line Drawings

Since this was an electronic submission, there is no physical artifact folder, no artifact folder is recorded in PALM, and no paper documents or physical media exist. The TIFF images in the IFW record were created from the original documents that are stored in SCORE.

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- Examiners may access SCORE content via the eDAN interface.
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Form Revision Date: February 8, 2006

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	David M. Birnbaum et al.
Application No.	:	12/502,702
Filed	:	July 14, 2009
For	:	Systems And Methods For Transmitting Haptic Messages
Examiner	:	Unassigned
Art Unit	:	2416
Conf. No.	:	6699

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Enclosed herewith for filing in the above-identified application are the following documents:

1. Transmittal;
2. Power of Attorney; and
3. Statement Under 37 CFR 3.73(b)

The Commissioner is hereby authorized to charge any additional fees required by this action, or credit any overpayment, to Deposit Account No. 16-1435.

Respectfully submitted,

Date: 11/16/2009

By: _____
Michael Morlock (Reg. No. 62,245)

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with the United States Patent and Trademark Office via EFS-Web on November 16, 2009.

_____
Laura J. Smith

FITBIT 1002
Fitbit v. Immersion

PTO/SB/80 (04-05)
Approved for use through 4/30/2005. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(b).

I hereby appoint:

☑ Practitioners associated with the Customer Number: 34300

OR

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(b) to:

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name			
Address			
City		State	Zip
Country			
Telephone		Email	

Assignee Name and Address:

Immersion Corporation
801 Fox Lane
San Jose, California 95131

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	March 13, 2007
Name	Catherine Mercer	Telephone	408-350-8619
Title	Senior IP Counsel		

This collection of information is required by 37 CFR 3.73, 1.36 and 1.34. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FITBIT 1002
Fitbit v. Immersion

PTO/SB/96 (07-09)
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U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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STATEMENT UNDER 37 CFR 3.73(b)

Applicant/Patent Owner: Immersion Corporation

Application No./Patent No.: 12/502,702 Filed/Issue Date: July 14, 2009

Titled: Systems And Methods For Transmitting Haptic Messages

Immersion Corporation, a Corporation

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest in;

2. ☐ an assignee of less than the entire right, title, and interest in (The extent (by percentage) of its ownership interest is _____ %); or

3. ☐ the assignee of an undivided interest in the entirety of (a complete assignment from one of the joint inventors was made) the patent application/patent identified above, by virtue of either:

A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 023487, Frame 0768, or for which a copy therefore is attached.

OR

B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at

Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(b)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (*i.e.*, a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/M/ 11/16/2009

Signature Date

Michael Morlock Attorney, 62,245

Printed or Typed Name Title

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	6459321
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Laura Smith
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	16-NOV-2009
Filing Date:	14-JUL-2009
Time Stamp:	14:36:04
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	Transmittal378586.pdf	32993	no	1

Warnings:	
Information:	

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Fitbit v. Immersion

2	Power of Attorney	PowerofAttorney378586.pdf	80799 3f347003d095732dc3d8db898ece4c2a60ed8cd7	no	1
Warnings:					
Information:					
3	Assignee showing of ownership per 37 CFR 3.73(b).	Statement378586.pdf	78370 cc19f85cbed58285a4f0596882630de81f677aff	no	1
Warnings:					
Information:					
		Total Files Size (in bytes):	192162		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET NO	TOT CLAIMS	IND CLAIMS
12/502,702	07/14/2009	2472	1792	IMM351 (51851/378386)	31	3

CONFIRMATION NO. 6609

UPDATED FILING RECEIPT

94900
PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

Date Mailed: 11/17/2009

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Applicant(s)

David Birnbaum, Oakland, CA;
Chris Ullrich, Ventura, CA;
Peter Rubin, Berkeley, CA;
Phong David Ngo, San Francisco, CA;
Lao kopelow, San Francisco, CA;

Assignment For Published Patent Application

Immersion Corporation, San Jose, CA

Power of Attorney: None

Domestic Priority data as claimed by applicant

This appln claims benefit of 61/080,979 07/15/2008
and claims benefit of 61/080,981 07/15/2008
and claims benefit of 61/080,985 07/15/2008
and claims benefit of 61/080,987 07/15/2008
and claims benefit of 61/148,312 01/29/2009
and claims benefit of 61/181,280 05/26/2009

Foreign Applications

If Required, Foreign Filing License Granted: 07/23/2009

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 12/502,702**

Projected Publication Date: 02/25/2010

Non-Publication Request: No

FITBIT 1002
Fitbit v. Immersion

Early Publication Request: No
Title

Systems And Methods For Transmitting Haptic Messages

Preliminary Class

370

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4158).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where

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Fitbit v. Immersion

the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

FITBIT 1002
Fitbit v. Immersion

PTO/SB/08a (01-09)
Approved for use through 03/31/2009. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	Birnbaum et al.
Art Unit	2472
Examiner Name	Unassigned
Attorney Docket Number	IMM331

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.*	Document Number: Number - Kind Code[1] (if known)	Publication Date: MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	US-2001/0035854 A1	11-01-2001	Rosenberg et al.	
	2	US-2002/0177471 A1	11-28-2002	Kaaresoja et al.	
	3	US-2003/0063128 A1	04-03-2003	Salmimaa et al.	
	4	US-2006/0181510 A1	08-17-2006	Faith	
	5	US-2006/0061545 A1	03-23-2006	Hughes et al.	
	6	US-2007/0066283 A1	03-22-2007	Haar et al.	
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[2] - Number[3] - Kind Code[4] (if known)	Publication Date: MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[5]
	7	EP 0 899 650	03-03-1999	Xerox Corp		
	8	EP 1 401 185	03-24-2004	Samsung Electronics Co. Ltd.		
	9	EP 1 731 983	12-13-2006	Sony Corp.		
	10	GB 2 416 962	02-08-2006	Vodafone PLC		
	11	WO 2005/103863	11-03-2005	Fujitsu Limited		

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 2 of 2

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	Birnbaum et al.
Art Unit	2472
Examiner Name	Unassigned
Attorney Docket Number	IMM351

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	12	BIET, M. et al., Discrimination of Virtual Square Gratings by Dynamic Touch on Friction Based Tactile Displays, Haptic Interfaces for Virtual Environment and Teleoperator Systems, 2008, Symposium, IEEE, Piscataway, NJ, XP 031399918, pp. 41-48, March 2008	
	13	DEWITT, A., Designing Sonification of User Data in Affective Interaction, Master of Science Thesis Stockholm, Sweden, XP 002551469, at http://w3.nada.kth.se/utbildning/grukth/exjobb/rapportlistor/2007/rapporter07/de_witt_anna_07142. as available via the Internet and printed 10-20-2009.	
	14	KAARESOJA, T. et al., Snap-Crackle-Pop: Tactile Feedback for Mobile Touch Screens, Proceedings of the Eurohaptics 2006, XP 002551485, at http://ac.univ-evry.fr/paurohaptics/upload/fr/papers/fr0, as available via the Internet and printed 10-20-09.	
	15	OAKLEY, I. et al., Contact IM: Exploring Asynchronous Touch over Distance, Palpable Machines Research Group, Media Lab Europe, XP 007910100, at http://people.cs.vt.edu/twang06/touch%20review%20organization/Oak002, as available via the Internet and printed 10-20-2009	
	16	ROVERS, A. et al., HIM: A Framework for Haptic Instant Messaging, Chi 2004 (Chi Conference Proceedings, Human Factors in Computing Systems), XP 002484573, Vienna Austria, April 2004, p. 1313-1316	
	17	SEKIGUCHI, Y. et al., Haptic Interface using Estimation of Box Contents Metaphor, Proceedings of ICAT 2003, Tokyo, Japan, XP 002551457, at http://www.vrsj.org/ic-at/papers/2003/00047_00000, as available via the Internet and printed 10-20-2009.	
	18	Patent Cooperation Treaty, International Search Report, International Application No. PCT/US2009/050587, mailed October 29, 2009	
	19	Patent Cooperation Treaty, International Search Report, International Application No. PCT/US2009/050574, mailed October 28, 2009.	
	20	Patent Cooperation Treaty, International Search Report, International Application No. PCT/US2009/050584, mailed October 28, 2009	
	21	Patent Cooperation Treaty, Invitation to Pay Additional Fees, Application No. PCT/US2009/050569, mailed November 5, 2009	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1] Applicant's unique citation designation number (optional). [2] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: **David Birnbaum**	)	
	)	Conf No.: **6699**
Serial No. **12/502,702**	)	
	)	Art Unit: **2472**
Filed: **July 14, 2009**	)	
	)	Examiner: **Unassigned**
For: **Systems and Methods for Transmitting Haptic Messages**	)	
	)	
Attorney Ref: **IMM351**	)	

INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08A(s), attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08A are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08A are in the English language and therefore, do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

c. ☒ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FITBIT 1002
Fitbit v. Immersion

FEES

IV. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ concurrently with the filing of a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☒ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☐ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

or

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Respectfully submitted,

Date: 11/20/2009

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Attachment(s):

- ☒ PTO/SB/08A
- ☒ Documents
- ☐ Fee

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(54) A computer user interface using a manipulatory grammar

(57) A method for inputting information to a device connected to a deformable piece includes the steps of manipulating the deformable piece to provide a first morpheme input to the device. The first morpheme input normally triggers a first default action by the device such as controlling a display, modifying a data structure, or communicating with another electronic device. When a user asynchronously manipulates the deformable piece to provide a second morpheme input to the device the second morpheme input converts the normally triggered first default action to a second action generally not equivalent to the first default action. This mode of interaction allows formation of morphemic sentences to control a graspable device.

The method is implemented by a device (10) supporting a manipulatable user interface, the device comprising:

a feedback module (30) for presenting information related to a data structure,

a processor (24) for controlling the feedback module (30) and the data structure, and

a deformable piece (20) including multiple subregions. The deformable piece is attached in a vicinity to the feedback module (30), with the deformable piece contacting at least one sensor (22) that monitors positional changes within multiple subregions of the deformable piece (20). The at least one sensor (22) is connected to the processor (24).

EP 0 899 650 A2

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FITBIT 1002
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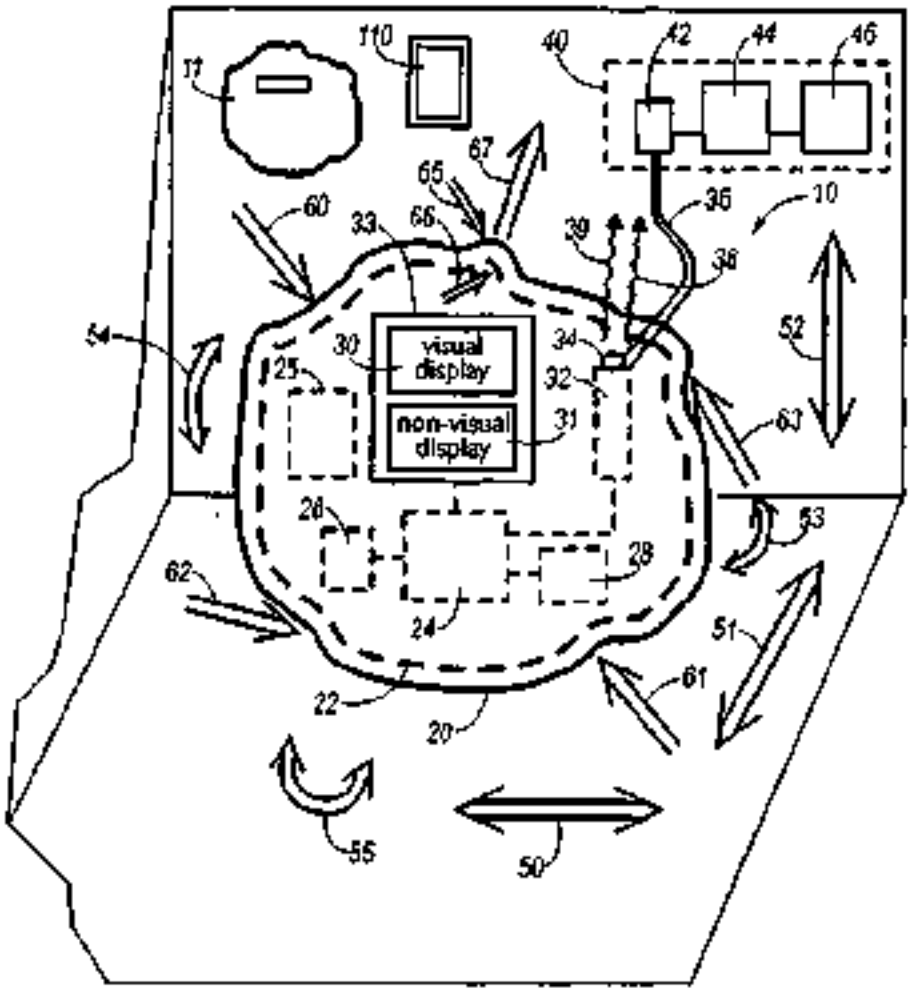


Fig. 1

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Description

[0001] Reliably, quickly, and intuitively transmitting complex commands to small portable computers can be difficult. Small computer devices do not generally have sufficient computer processing power to respond reliably to voice or handwritten (pen based) commands. Keyboards are often absent or too small for accurate finger input, and conventional buttons are too large or support too limited a command instruction set. User interface techniques that rely on bulky external modules (full size infrared linked keyboards, tethered data gloves, or camera based gestural recognition equipment, for example) are expensive, often not readily available outside selected areas, and probably too awkward for widespread use in conjunction with consumer level portable computing devices.

[0002] User interface designers for portable computers have attempted to compensate for some of these problems by constructing devices that rely on various spatial positions, or environmental cues that manually or automatically allow for activation of various modes in the device. For example, some laptop computers use the action of opening/closing the lid to initiate automatic boot up/power down of the computer without requiring any additional signal input (e.g. such as depressing a "start" button or typing "l_o_g_o_n" on a keyboard) from a user. Alternatively, the use of small portable computers that automatically switch control modes depending on position, orientation, or room location have been investigated. Buttonless manual control of a portable computer through deliberate user actions such as tilting the portable computer have also been described.

[0003] However, all these solutions for interfacing with small portable computers have generally been limited in scope and functionality. What is needed is a user interface system suitable for even very small portable computers (having volumetric dimensions on the order of a one cubic centimeter) that is powerful, can be intuitively operated by an ordinary user with little training, and is still readily capable of modification or extension by the user. The present invention meets these requirements by providing a manipulatory user interface that responds to a user twisting, folding, bending, squeezing, shaking, tilting, spinning, lifting, or otherwise physically manipulating the computer.

[0004] In the manipulatory user interface system of the present invention, the most basic level of manipulation is known as a "sensseme". A sensseme is defined as a single indivisible type of physical manipulation. A partial list of categories of senssemes include material transformations such as squeezing, twisting, stretching; local spatial transformations such as translation, rotation or bending, and environmental transformations based on temperature, light level, or vibration. For example, a small portable computer may support a deformable piece having multiple embedded sensors that detect folding, twisting, or bending of the deformable piece by a user. This computer can also contain a number of accelerometers that sense relative spatial information, gyroscopic, radio or infrared positional sensors for determining absolute position; and various thermal or pressure sensors that respectively detect temperature and light level changes. Intentional or unintentional modifications detected by one or more of these sensor systems can provide the basis for a powerful user interface scheme.

[0005] As will be appreciated, each sensseme category contains many individually distinguishable members. For example, consider the category of senssemes known as a "pinch", a structural transformation generally completed by a user squeezing the deformable piece between a forefinger and thumb. A pinch can be modified by varying its speed (quick or slow pinch), magnitude/intensity (light or hard pinch), portion of deformable piece pinched (top, bottom, or center of deformable piece pinched), or even portion of body used to pinch (right handed pinch or left handed pinch), with each modification being distinguishable as a sensseme capable of being mapped onto a computer control command.

[0006] Although the wide variety of easily distinguishable senssemes would alone provide a powerful user interface to a computer, the present invention further extends the flexibility of the sensseme based user interface by supporting computer control based on a "morpheme" input. The morpheme is a temporally synchronous (or overlapping asynchronous) tuple of one or more senssemes. Note that a morpheme can (and often will) contain more than one sensseme. The senssemes combined into a morpheme can come either from the same category (the user pinches with a right hand while tapping with a left hand finger), or different categories (the user pinches the deformable piece with a right hand while modifying the spatial position of the portable computer by tilting it forward).

[0007] Any morpheme can in turn be extended by participation in a "sentence". A sentence is defined as a sequence of one or more temporally disjoint morphemes. The sentence level allows definition of a physical manipulatory grammar by appropriate choice of morpheme sequence, and corollary rules governing, for example, use of active (verb like) morphemes, naming (noun) morphemes, or connectives. Other possible grammar constructs used in sentences may include those based on "Home" systems. Home systems are general-purpose gestural languages, whose grammar and syntax are not borrowed in any way from a host language. Examples of these languages are gestural languages developed by deaf children of hearing parents who have not been exposed to American Sign Language (ASL) and the "plains talk" of North American Indians, which was used as a trade language.

[0008] Accordingly, a first aspect of the present invention provides a method for inputting information to a computer connected to a deformable piece that can be manipulated, and optionally to various position sensors (both relative and absolute), pressure sensors, thermal

FITBIT 1002
Fitbit v. Immersion

sensors, or even light sensors. The method comprises the steps of manipulating the deformable piece to provide a first morpheme input to the computer, with the first morpheme input normally triggering a first default action by the computer. The deformable piece may also be manipulated to provide a second morpheme input to the computer, with the second morpheme input converting the normally triggered first default action to a second action. The first and second morphemes (and any subsequent morphemes) together form a sentence that can be interpreted as a command to implement a computer controlled action, whether it be to unlock an electronically controlled door, display a graphical image on a computer display or begin logging on to a computer network. Advantageously, such a user interface system is well suited for interaction with small computer devices, and may even be cross-cultural to a limited extent, with ability to squeeze or pinch being universal human attributes.

[0009] According to a second aspect of the present invention there is provided a device supporting a manipulatable user interface, the device comprising

a feedback module for presenting information related to a data structure,
a processor for controlling the feedback module and the data structure, and
a deformable piece including multiple subregions, the deformable piece attached in a vicinity to the feedback module, with the deformable piece contacting at least one sensor that monitors positional changes within multiple subregions of the deformable piece, the at least one sensor being connected to the processor.

[0010] According to a third aspect of the present invention there is provided a device supporting a manipulatable user interface, the device comprising

a processor and memory, and
a deformable piece including multiple subregions, the deformable piece attached in a vicinity to the processor and memory, with the deformable piece contacting a sensor mesh that monitors positional changes within multiple subregions of the deformable piece, the sensor mesh being connected to the processor.

[0011] According to a fourth aspect of the present invention there is provided a device supporting a manipulatable user interface, the device comprising

a feedback module for presenting information related to a data structure,
a processor for controlling the feedback module and the data structure, and
a detector for determining handedness of a user, the detector being connected to the processor for modifying the displayed data structure based on handedness of a user.

[0012] According to a fifth aspect of the present invention there is provided a method for inputting information to a device connected to a deformable piece, the method comprising the steps of

spatially rotating device to provide a first morpheme input to the device, the first morpheme input normally triggering a first default action by the device, and
asynchronously manipulating the deformable piece to provide a second morpheme input to the device, with the second morpheme input converting the normally triggered first default action to a second action.

[0013] According to a sixth aspect of the present invention there is provided a plurality of tileable devices for transferring data, comprising

a first device having a processor and a first wireless communication module for transferring data,
a second device having a processor and a second wireless communication module for transferring data,
a third device having a processor and a third wireless communication module for transferring data,
wherein the first device is connected in substantially simultaneous wireless communication with the second device and the third device to pass data based on spatial positions of the respective first device, second device and third device.

[0014] The present invention is particularly useful for portable computers that can be held in the palm of a hand. If the portable computer is partially or completely surrounded with a deformable material having embedded or contact pressure/deformation sensors, a user is able to gesture with or manipulate the whole computer in order to achieve some desired result. Material deformation can be implemented at various scales. For instance, a computer and connected deformation sensors mounted inside a flexible tube could respond to right angle bending of the tube, or even complex knotting or looping of the tube. In practice however, only minute surface deformations are required, being just sufficient to provide tactile feedback to pressing, pinching, or bending type manipulations. In either case, however, the measurement of location and pressure applied to a surface is sufficient to characterize the mode of interaction (distinguishing a pinch from a prod).

[0015] One particularly preferred embodiment of a handheld portable computer that responds to a physical manipulatory grammar in accordance with the present invention includes a computer, a feedback module to provide visual, auditory, or tactile feedback to a user (e.

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g., processor connected LCD display, audio speaker, or tactile display to present Braille or other conventional touch interface), and co-mounted graspable, deformable piece partially or completely surrounding the feedback module. In addition, various thermal or pressure sensors are mounted to detect handedness of a user, with the grasping hand generally being the non-dominant hand for the user. Depending on the handedness of the user (which can be considered as a morpheme), the displayed data structure is modified. For example, text displayed on an LCD display screen may be automatically shifted rightward on the screen to allow pen based annotation on the left side of the screen, thereby aiding left handed users.

[0016] Physically manipulatable user interfaces additionally provide an opportunity for multiple devices to interact in a user friendly manner. For example, a mobile display system having multiple displays with touch sensitive deformable pieces surrounding the display can be used to organize documents based on relative position of contact of each display. For example, if two displays initially showing separate data structures (e.g. two different pages from two different electronic books) are brought together in side by side touching contact, the displayed/reveal information can alter (e.g. by displaying adjacent pages of a single electronic book). As will be appreciated, one can also use multiple computers connected to physically manipulatable control elements to construct complex commands for organizing data structures.

[0017] The method of the present invention may further comprise the step of spatially manipulating the deformable piece as at least one of the first and second morpheme inputs to the device.

[0018] At least one of the first and second morpheme inputs to the device may require spatially translating the device: panning the device; pushing the device relative to a user; pulling the device relative to a user; moving the device within a room; and/or moving the device between widely separated sites.

[0019] At least one of the first and second morpheme inputs to the device may be based on detected light variations; detected thermal variations; detected electromagnetic variations; detected vibration variations; and/or detected acoustic variations. Information can be input to the device of the present invention by:

a) shaking the deformable piece to provide a morpheme input to the device and triggering a first default action by the device in response to shaking the deformable piece;

b) flicking the deformable piece to provide a morpheme input to the device, and triggering a first default action by the device in response to flicking the deformable piece;

c) facing the deformable piece to provide a morpheme input to the device, and triggering a first default action by the device in response to facing the deformable piece;

d) tilting the deformable piece to provide a morpheme input to the device and triggering a first default action by the device in response to tilting the deformable piece;

e) orienting the deformable piece to give to an external environmental object to provide a morpheme input to the device, and triggering a first default action by the device in response to orienting the deformable piece relative to an external environmental object; and/or

f) whacking the deformable piece to provide a morpheme input to the device and triggering a first default action by the device in response to whacking the deformable piece.

[0020] Embodiments of the present invention will now be described by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a schematic diagram of an approximately spherical hand holdable portable computer having a deformable surface, a status display, and a pressure sensor array for detecting surface deformations;

Figure 2 is a graphical diagram illustrating various physical manipulation morphemes, with axes respectively illustrating complexity of sememe tuples required to form a morpheme, and plasticity of a device required to support the physical manipulation;

Figures 3-16 schematically illustrate various preferred classes of physical manipulation morphemes;

Figure 17 is a graphical diagram illustrating various spatial morphemes, with a first axis illustrating complexity of sememe tuples required to form a morpheme, and a second axis illustrating the degree of positional information needed to support the physical manipulation (moving along a continuum from relative local measurement along a single specified dimension to absolute global measurement with six degrees of freedom determined);

Figures 18-26 schematically illustrate various preferred spatial manipulation morphemes;

Figure 27 is a graphical illustration showing increasing degrees of sensor system complexity that can be used to detect various categories of environmental stimuli, including light effects, thermal effects, the electromagnetic environment, and the vibratory/acoustic environment;

Figure 28 is a graphical diagram illustrating various physical manipulation morphemes for multiple interacting devices, with axes respectively illustrating the complexity of sememe tuples required to form a morpheme, and increasing level of physical contact;

Figures 29-34 schematically illustrate various preferred manipulation morphemes for multiple inter-

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Fitbit v. Immersion

acting devices;

Figures 35 and 36 are schematic diagrams illustrating "squeeze" and "tilt" morphemes applicable to a portable computer;

Figure 37 is a schematic diagram illustrating tilt and squeeze morphemes used to control view of large two-dimensional data sets with a relatively small display of a portable computer;

Figure 38 is a schematic illustration representing a portable computer having a display ready to receive annotations from a right handed user;

Figure 39 is a schematic illustration representing a portable computer having a display ready to receive annotations from a left handed user;

Figure 40 is an electronic schematic illustrating components of the pressure and tilt sensitive modules of a portable computer such as illustrated in Figures 35-39;

Figures 41 and 42 are schematic illustrations of a scanner/printer/copier using a paper shaped display interface to support morphemic input;

Figures 43-45 are schematic illustrations of flexible displays capable of supporting morphemic input;

Figure 46 illustrates optical sensors and patterns suitable for use in conjunction with flexible displays such as illustrated in Figures 43-45;

Figure 47 illustrates radio transponders suitable for use in conjunction with flexible displays such as illustrated in Figures 43-45; and

Figure 49 illustrates addressing of multiple flexible displays.

[0021] Figure 1 illustrates an embodiment of the present invention suitable for supporting a morphemic user interface grammar. Support of the grammar can require detection of a user's physical manipulation of a device, detection of relative or absolute spatial location of the device, detection of various environmental factors acting on the device, and even detection and interaction with multiple devices or external computer networks. As illustrated, a device 10 has a deformable surface 20 with an underlying deformation sensor mesh 22 for detecting surface deformation across or within multiple subregions of the deformable surface 20. The deformation sensor mesh 22 is connected to an internally contained processor 24 having associated memory system 26. For detecting various positional or environmental variables, a sensing system 28 is also provided. The illustrated device further includes a feedback module 30, which may include an externally visible status display 30 or a non-visual feedback module 31 (typically delivering auditory or tactile feedback). In the illustrated device, a communications system 32 for reception or transmission of information to other electronic or computing devices is also provided. All these components can be powered by a power supply 25, which is usually an internally mounted rechargeable battery of conventional construction.

[0022] Although the device 10 is illustrated as having an approximately spheroidal and unitary mass, various other shapes are contemplated to be within the scope of the present invention. For example the overall shape may be similar to various rectangular prisms, or can be ellipsoida., toroidal, planar, or even be malleable enough to support a wide range of user defined irregular shapes. In addition, multiple cooperating shape elements are contemplated using conventional designs that permit interlocking of multiple shape elements (e.g. using a ball and socket, a lock and key, or slidable or rotatable interlocked components).

[0023] Whatever the shape of device 10, for operation of the present invention the device 10 is completely or partially enveloped by the deformable surface 20. The present invention supports use of a great variety of designs and materials for the deformable surface 20, depending on the required plasticity, durability, longevity, and of course, cost constraints. For example, contemplated designs for deformable surface 20 include, but are not limited to:

a closed or open celled polymeric foam material having a wall thickness of millimeters to centimeters, with thinner walled embodiments being supported (e.g. by adhesive attachment) by an internal hard shell (constructed from polymeric or metallic materials), and those thicker walled embodiments directly supporting (by, e.g. brackets or supports) internal components such as processor 24. Suitable foams may include those composed in whole or in part of widely available synthetic rubbers such as polychloroprene (neoprene), polystyrenes, rubber or nitrile rubber latex foams, polysiloxanes, block polymers including styrene-butadiene or styrene isoprene, or any other conventional material having good elasticity and deformability;

a thin single layer polymeric surface loosely wrapped around a internal hard shell (the hard shell being constructed from polymeric or metallic materials). For example a nylon or cotton weave, single layer polyethylene, synthetic rubber (with little or no foam cells present), or natural polymeric materials such as leather wrapped around a polystyrene casing can be used;

a composite layered surface having a durable polymeric outer layer supported by an inner foam layer; or even

a polymeric bilayer having an intermediate fluid or gel layer of a viscous or thixotropic material that can be used to support extreme deformations. The intermediate layer can be relatively thick (one the order of centimeters), or in certain embodiments can have a thickness measured on micron to millimeter scales. Such extremely thin layers would allow complex twisting, folding, curling, or crumpling actions, and have been described in conjunction with U.S. Patent 5,389,845, assigned to Xerox Corp., the disclosure of which is herein specifically incor-

FITBIT 1002
Fitbit v. Immersion

porated by reference

[0024] The deformation sensor mesh 22 can be embedded within, or positioned to contact, the deformable surface 20. The deformation sensor mesh 22 can include an array of individual compressional or torsional strain sensors, or alternatively, embedded or attached positional sensors. For certain applications, continuous sensors (e.g. bilayer sheets of capacitance sensors) may be employed. One particularly useful continuous sensor type uses multiple capacitance or resistance strips, with deformation pressure resulting in a positionally localizable analog signal proportional to the applied deformation pressure. Various sensor types can be used, including simple capacitance sensors, resistive strain sensors, analog or digital pressure switches, inductive sensors, or even fluid flow sensors. Depending on the sensor type employed, sensor data can be directly fed to the processor 24 in digital form, or be transformed to digital format by an general purpose analog-digital converter that typically provides a 4 or 8 bit range (although as few as one or as many as 32 bits may be required by various applications). An analog to digital converter may be internal to the processor 24 or provided as an external module. As will be appreciated, the sensor mesh 22 is intended to include combinations of sensors and sensor types, which can be used over the whole or part of the deformable surface 20.

[0026] A positional or environmental sensor system 28 can also be supported by device 10. Various sensor modes can be supported, including absolute or relative positional information as determined by gyroscopic sensors, accelerometers, or acoustic or infrared ranging techniques. Environmental sensors, including conventional light, image, thermal, electromagnetic, vibratory, or acoustic sensors can also be present. Depending on the desired application, even costly environmental or positional sensors such as those incorporating differential GPS positioning, image analysis or recognition, acoustic or voice identification, or differential thermal sensors can be used as morphemic input. Such morphemic input, taken in conjunction with morphemic input as detected by sensor mesh 22, can enhance precision and flexibility of a user's control of device 10.

[0025] As illustrated, both sensor system 28 and sensor mesh 22 are connected to the processor 24 and associated memory 26. The processor 24 and memory 26 are typically mounted within the deformable surface 20 by either direct attachment to the deformable surface 20 or by attachment to a hard bearing positioned when the deformable surface 20. Conventional CISC or RISC processors can be used in the illustrated embodiment, with low power processors such as the Signetics 87c752 or 87c751, Motorola 68HC11 or 68332, or ARM 710 being preferred. If convenient, coprocessors such as analog to digital converters or digital signal processors can be used alone or in conjunction with a main processor. Conventional flash, static, or dynamic RAM can used in the present invention, although for certain applications higher cost embedded DRAM may also be used. In some storage intensive applications, memory 26 can include additional harddisk storage either located within the device 10 or available through an external connection. As will be appreciated, for many applications use of optional external communications can at least partially supplant use of internal processors and memory (except for that necessary to support required sensor or communication buffering and signalling).

[0027] The present invention optionally supports communications with an external computer system 40 using its internal communications system 32 and associated transceiver 34. The external computer system 40 also includes a transceiver 42, a personal computer or workstation 44, and is connected to a local or wide area network computer system 46. The transceivers 34 and 42 can support various communication protocols and designs, including use of a serial wire/fiber line 36 (using, for example, the RS-232C interface protocols), use of infrared signals 38 adhering to widely utilized IRDA communication standards, or use of radiofrequency signal 37 (which can be, for example, a cellular telephone, 900MHz radio, or digital PCS telephonic communications). Alternative communication standards or even alternative communication carriers such as those based on optical or acoustic techniques, can of course be employed.

[0028] As will be appreciated, in addition to direct communication with external computer system 40, the device 10 can be directly or indirectly maintained in continuous or intermittent communication with a number of suitably equipped electronic devices, including a tablet computer 110, or even a physically manipulatable portable computer 11 similar in design and function to device 10. Communication can be direct to a target device, or through an intermediary intermediate such as computer system 40. Other possible communication targets include automation control systems, security authorization units, personal digital assistants, notebook computers, or any other suitably equipped electronic system.

[0029] Results of communications with external devices, presentation of device stored information, or device status updates can all be provided to a user through processor 24 controlled update of feedback module 32. Feedback to a user can be primarily visual, such as can occur in conjunction with visual display 30. Generally, the display 30 can be a conventional passive or active matrix liquid crystal display, although use of more sophisticated (and expensive) displays based on various electrooptical or micromechanical technologies can of course be used. In addition, for certain devices a non-imaging display such as may be formed by a small number of status lights (e.g. red or green LEDs), or localized or distributed chromatic changes (in conjunction with a deformable surface 22 constructed with suitable electrochromic material) may be all that is necessary for visual feedback to the user.

FITBIT 1002
Fitbit v. Immersion

[0030] In some embodiments of the invention, visual output through display 30 may be augmented (or even replaced) with a non-visual display 31. The non-visual display 31 can include tactile displays based on internal actuators, auditory feedback, or even displays based on conformal changes in device appearance. For example, one possible feedback display is based on internal audio-only speakers rendering a range of sounds from simple "beeps" to well formed speech, depending on available processor speed and functionality) for providing user feedback. As will be appreciated, non-visual display 31 and its associated actuators or electronics can support alternative feedback modes, including, for example, force feedback to a user through internal actuators, tactile based feedback (e.g with multiple surface protections for presentation of Braille or other conventional tactile feedback interface), modifications to the surface texture of the device, or any other conventional mechanism for supplying information to a user.

[0031] To better appreciate operation of the present invention, some selected modes of physical manipulation of device 10 are schematically presented in Figure 1. As seen in Figure 1, device 10 can be translationally moved in three spatial dimensions, as illustrated with reference to orthogonal force arrows 60, 61, and 62. In addition to translational motion, the device 10 can be rotationally moved in any or all three spatial dimensions, as represented by arrows 63, 64, and 65. By use of sensor system 28 (alone or in combination with communication system 32) the relative or absolute position and orientation in three dimensions can be determined.

[0032] In addition to determining spatial position and orientation through use of sensors 28, the device 10 can optionally use sensor mesh 22 to measure and localize transient or continuing force application, with force vectors and related timing information being determined and interpreted. A few possible force actions (deformation modes) are schematically illustrated in Figure 1, with arrows 60 and 61 illustrating depression of surface 20 (with the combination representing a squeeze), arrows 62 and 63 illustrating sliding or rubbing deformation (with the combination representing a twist), and the combination of sliding arrows 65 and 66, and outward pull 67 together representing a pinch and outward pull. The strength of the applied force can be measured (e.g. a hard or soft squeeze is differentiated), as spatial expanse found (e.g. to differentiate between poking with a fingertip or a thumb pad), and timing determined (e.g. to differentiate between a quick or a slow depression of the surface). The deformation so caused may be either permanent or transitory.

[0033] As will be appreciated by those skilled in the art, each of the foregoing force actions represented by arrows can be considered a sensseme. Some temporally distinguishable sensemes (or combinations of sensemes such as the foregoing discussed push/pull combination) further represent morphemes used as a basis for a morphemic grammar in accordance with the present invention. All of the following described morphemes can be modified by numerous variations in applied pressure, force linked appendages used, body parts or extraneous intermediary objects used to apply force. In addition, timing of various objects (whether quick, slow, or alternately quick and slow) can modify interpretation of a morpheme. For example, if "squeeze" is taken as a typical morpheme, one can appreciate various squeeze operations such as quick squeeze, slow squeeze, hard squeeze, soft squeeze, narrow squeeze, wide squeeze, squeeze between hands, squeeze between one hand and a user's chest or head, squeeze between one hand and a table or wall, a squeeze made between two pens or two books, or even a squeeze between a user's tongue and the roof of the mouth. For purposes of the present invention, all such squeeze morphemes would be considered members of the "squeeze" class, with individual variables acting as possible modifiers or selected cases, just as a "house cat" might be considered a particular member of the class of "felines", which more generally embraces lions, tigers, and bobcats.

[0034] To aid in understanding the diversity of contemplated physical manipulation morphemes, Figure 2 illustrates selected morphemes arranged by increasing plasticity of the device required to enable morpheme utilization, and by increasing complexity of available sensseme tuples required to form or interpret a morpheme applied to a particular class of device. Beginning with the least plastic device and the simplest sensseme set used to compose a morpheme, a definition of a possible physical manipulation and typical function invoked by that manipulation of a device similar (but of course possibly more complex) to that described in conjunction with Figure 1 is presented.

DEPRESS

[0035] Definition: Indenting one or more subregions of the device through the application of pressure.

[0036] Example: As seen in Figure 3, consider a device 122 having a display 129. The device 122 supports a graphical illustration software application which allows users to position geometric shapes or user defined graphical objects. The device can have four pads 124 placed around it, one on each side. By deforming a particular side, the user indicates a desire to "nudge" the currently selected geometric shape 125 away from that side to a new position 126.

SQUEEZE

[0037] Definition: To deform one or more subregions of a device through the application of vectors of force, some components of which are directed towards each other, which compress the morphological structure of the device. This is a special case of depression.

[0038] Example: As illustrated in Figure 4, consider a

FITBIT 1002
Fitbit v. Immersion

device 132 which can display one or more documents in either iconic (closed) or textual display (open) modes. By selecting an open document 135, and then squeezing a deformable edge 134 of the device 132, the user indicates a desire to make the document "smaller", in this case to iconize it as icon 135.

FOLD

[0039] Definition: To deform a second subregion by bending the first subregion such that it partially or completely overlaps the second subregion. Further deformations can be applied to that new morphological structure on other subregions.

[0040] Example: As illustrated in Figure 5, consider a device 142 which can display documents. Suppose this device 142 has been augmented such that a deformable horizontal "flap" 144 near a top edge of the device 142 can be folded to partially obscure a display 143. When the user makes this folding gesture, the user indicates a desire to password-protect ("hide") the currently displayed document.

CURL

[0041] Definition: Deforming one or more subregions of the device by spatially configuring subregions relative to each other in a cylindrical or circular morphological structure.

[0042] Example: As illustrated in Figure 6, consider a device 150 which can display documents in various languages (English, French, etc.). When the user takes such a device 150, curls in a direction indicated by arrow 157 into a tube, and then uncurls it, this "abra-cadabra" gesture tells the device 150 to display the current document in a different language.

STRETCH

[0043] Definition: Deforming one or more subregions of a device through the application of vectors of forces, some components of which are directed away from each other, the vectors being applied at opposite ends of the device. Example: As illustrated in Figure 7, consider a device 160 with a graphical software application which allows users to manipulate geometric shapes. By stretching the device 160, the user indicates a desire to "resize" or "rescale" the currently displayed shape 165 to a larger size 168, the amount of resizing being a function of the amount of deformation. Note that SQUEEZING can indicate resizing the currently displayed to a smaller size.

PINCH

[0044] Definition: Manipulating one or more subregions by applying vectors of forces, aligned directly towards each other, on opposite sides of the affected subregion(s). This is typically but not exclusively accomplished using two-finger tactile force. PINCH is a special case of SQUEEZE.

[0045] Example: As illustrated in Figure 8, consider a device 170 which can copy documents. By performing a "pinching" action 175, the user indicates that they wish the next set of copies to be stapled form.

DOGEAR

[0046] Definition: Deforming a second subregion by folding a first subregion at a logical corner or edge of the second subregion, indicating a marker or location point (e.g. a bookmark) to be later referenced. DOGEAR is a special case of FOLD.

[0047] Example: As illustrated in Figure 9, consider a device 180 which displays a subset of the pages from a multi-page document. By "dogearing" the upper right corner 185 of device 180, the user indicates that they wish a bookmark associated with the currently displayed page or pages.

TWIST

[0048] Definition: Deforming one or more subregions of the device through the application of two opposing rotational forces offset from each other by a non-zero difference about some central axis.

[0049] Example: As illustrated in Figure 10, consider a device 190 which, over time, becomes degraded in some aspect of its performance (its disk becomes fragmented, its memory needs garbage-collection, etc.). By performing a "TWIST" gesture 195, the user indicates that they wish the device to "wring itself out", performing, for example, garbage collection.

RELIEF-MAP

[0050] Definition: Deforming one or more subregions of the device by raising and or lowering them by either spatial transformation or the addition/removal of material.

[0051] Example: As illustrated in Figure 11, consider a device 200 which can display documents in either one- or two- page format. When the user "scrunches" the device by making a vertical indentation about the center axis of the device while it displays a single page 205, the device 200 interprets the morpheme to request display of documents in a two-page format as pages 207 and 208.

RIP

[0052] Definition: Deforming one or more subregions of the device by introducing a spatial discontinuity, by applying vectors of force to partially or totally disconnect these subregions from the device.

[0053] Example: As illustrated in Figure 12, consider a device 210 which can copy some or all of its informa-

FITBIT 1002
Fitbit v. Immersion

tion. When the user performs the "ripping" gesture 215 removing one or more subregions, the device 210 copies its currently selected data set onto those subregions 216 and 217.

PERFORATE

[0054] Definition: Deforming one or more subregions of the device by means of introducing a change in the spatial connectivity of the subregions such that a hole is introduced (either temporarily or permanently) in the device.

[0055] Example: As illustrated in Figure 13, consider a device 220 which is used to route messages between various parts of a device network, and which displays this functionality to the user by means of lines 222 representing message pathways. When the user perforates the device 220 with a finger or object 224 to introduce a hole in one of these pathways 222, the system stops routing messages along that pathway.

SIMILARITY

[0056] Definition: Deformation of one or more subregions of a device previously configured to represent some other predefined object. Typically the device acts in a manner consistent with the behavior of the real-world object when it is manipulated in this manner.

[0057] Example: As illustrated in Figure 14, consider a device 230 which contains text-to-speech and audio input capability, and which presents itself to the user in an anatomically accurate shape of a human head. When the user opens lips 232 on the human head, internal sensors detect opening of the lips and activate text-to-speech capability.

3D MAP

[0058] Definition: The morphing of a device that can be molded around an external object to permit a sensor mesh to determine simultaneously size and shape of the external object. The range of possible external objects is large but is limited by the size of the device's solid inner-housing and the volume of the moldable material in the outer housing. In this system the device has the ability to accurately sense the amount of material from its inner surface to the outer edge of the moldable material (example: via ultrasonic sounding, similar to sonar in water) thus determining an accurate electronic model for the shape of the molded enclosure.

[0059] Example: As illustrated in Figure 15, by pressing a device attached moldable material 244 around the surface of an external object (e.g. a cog 242) a device 240 can automatically generate a CAD model of that object and store it in its memory.

MIMICRY

[0060] Definition: Deforming one or more subregions of the device such that the resultant morphological structure resembles a known real-world object and through the association of subregions, the device acts in a manner consistent with the object it resembles.

[0061] Example: As illustrated in Figure 16 consider a device 250 containing a computer which contains text-to-speech and audio input capability, and which presents itself to the user as a mishapen blob having the consistency and plasticity of moldable putty or clay. When the user performs the "MIMICRY" action by molding part of the device 250 to resemble an ear, the audio input capability is activated.

[0062] In addition to morphemes based on physical manipulation various morphemes based on varying degrees of relative or absolute spatial positioning are contemplated to be useful in practice of the present invention. To aiden understanding the diversity of contemplated spatial morphemes, Figure 17 illustrates selected spatial morphemes arranged by increasing knowledge of spatial position required to enable morpheme utilization, and by increasing complexity of available sensemme tuples required to form or interpret a morpheme applied to a particular class of device. Beginning with a device having only rudimentary relative positioning functionality for supporting simple spatial sensemmes, and ending with a device absolutely positionable to within centimeters anywhere on Earth, a definition of a possible spatial manipulation and typical function invoked by that manipulation of a device similar (but of course possibly more complex) to that described in conjunction with Figure 1 is presented.

TRANSLATE (relative to device)

[0063] Definition: The linear movement of a device's center of mass from one position in space to another.

[0064] Example: Used to substitute for mouse-controlled graphical "sliders" in conventional graphical user interfaces. When it is only physically possible to display a small amount of list, large listings can still be searched by "scrolling" a display window in response to the TRANSLATE morpheme.

SHAKE

[0065] Definition: Spatially translating all subregions of a device by repeated movement in opposing directions, such that the net translation is negligible.

[0066] Example: As illustrated in Figure 19 consider a device 260 which is used as a calculating device. When the user performs the "SHAKE" gesture, the device 260 clears its accumulator.

388

FITBIT 1002
Fitbit v. Immersion

REVOLVE

[0067] Definition: Rotating all subregions of a device by rotating the subregions about a point internal to the device about any arbitrary plane.

[0068] Example: As illustrated in Figure 19 consider a device 270 which displays a merged slice of volumetric data, such as medical data from a series of CAT scans. By rotating the device about a center point 272 internal to the device 270 to a new position 274, the plane specifying the merged slice is changed accordingly.

TILT

[0069] Definition: Rotating one or more subregions of a device by rotating the subregions such that one or more components of the rotary force are in the direction of gravity and the amount of rotation is between about -180 degrees and +180 degrees.

[0070] Example: Consider a device which displays frames from an animation sequence on the side facing the user. As the device is tilted away, the speed of the animation increases - as it is tilted towards the user the speed of the animation decreases, analogous to operation of a gas pedal.

FLICK

[0071] Definition: A forwards TILT immediately followed by an opposing backwards TILT.

[0072] Example: As illustrated in Figure 20, consider a device 280 which can transmit some subset of its data to another device. When the user performs the "FLICK" gesture by quickly tilting in the direction of arrow 282, followed by a reverse tilt along arrow 282, the device 280 performs this transmission, towards the device (not shown) pointed to by the tip of the gesture.

SPIN

[0073] Definition: Rotating one or more subregions of the device by rotating the subregions about a point, internal to the device, such that the plane of rotation is one of the device's surface planes. SPIN can be considered a special case of REVOLVE.

[0074] Example: As illustrated in Figure 21, consider a device 290 which can display a frame of video 295 from a video sequence. The user performs the "SPIN" gesture in a counter-clockwise direction, the device displays earlier frames in the sequence, when the gesture is performed in a clockwise direction (arrow 292), the device 290 displays a later frame 296 in the sequence (represented by film strip 294).

ORIENT

[0075] Definition: Rotating one or more subregions of the device by rotating the subregions about the center of the device, such that the plane of rotation is one of the device's surface planes, and the amount of the rotation is a multiple of 90 degrees (i.e. to rotate the device between cardinal compass points). Orient can be considered a special case of SPIN which in turn is a special case of REVOLVE.

[0076] Example: As illustrated in Figure 22, consider a device 300 which can display a document in either 1-page, 2-page, or 4-page format ("1-up", "2-up", or "4-up"). When the user performs the orient gesture in a clockwise direction (arrow 302), the device 300 increases the number of document pages it is displaying from one page 305 to two pages 306 and 307. Further orient gestures would increase the number of displayed pages. When performed in a counter-clockwise direction, the device 300 decreases the number of pages it is displaying.

FACE

[0077] Definition: Manipulating one or more subregions of the device such that a first set of subregions is no longer bottom-most and a second distinct set of subregions now assumes the first subregions former position.

[0078] Example: As illustrated in Figure 23, consider a device 310 which displays documents and which allows users to edit such documents. Consider further the case in which the device presents itself to the user in the form of a cube, in which 6 different documents are displayed on the 6 different faces. When the user performs the "FACE" gesture by making a particular face top-most, the document which is now on the top-most face becomes editable by the user, while the document which is no longer top-most is no longer editable.

LIFT

[0079] Definition: The movement of a device's center of mass in a direction opposite to the current gravitational force acting on the device.

[0080] Example: Commanding the device to display the computer's file system at a position one level higher in the hierarchy.

PAN

[0081] Definition: The application of a TRANSLATION to a device such that it is moved parallel to the front of the user's body, at a substantially constant height.

[0082] Example: Viewing a spread-sheet on a device with a display so small only one cell can be shown. By PANning the device, the contents of the current row can be shown in sequence depending on the rate or amount of PAN. However, if the device were orbited away from its current orientation during the PAN, a new row would be chosen. The selection of the row could be dependent

FITBIT 1002
Fitbit v. Immersion

on the deviation from the original orientation

PUSH-PULL

[0083] Definition. Manipulating one or more subregions of the device by spatially translating them such that they are moved along a line of projection from the center of the device to the vertical axis of the user's body.

[0084] Example: Consider a device with audio output capability. As the device is "pushed" further away from the body, its audio output level increases. When it's "pulled" towards the body, its level decreases.

WHACK

[0085] Definition. The application of an acceleretive or de-acceleretive force to one or more subregions of a device such that said subregions contact or are contacted by an external object, causing an equal and opposite countering force.

[0086] Example: As illustrated in Figure 24, consider a device 320 which can perform long and unpredictable database searches. When the user performs the WHACK gesture (e.g. upon a table 322), the current search is aborted.

ORIENT (relative to environment)

[0087] Definition: Manipulating two subregions of the device such that the line drawn between the centers of those two subregions alters its orientation with respect to the surrounding environment.

[0088] Example: Displaying a CAD drawing of a machine-part in 3D on the display of a mobile device. As the orientation of the device changes, so too does the viewing angle and position of the rendered image.

ORBIT

[0089] Definition: Rotating one or more subregions by rotating the subregions and/or the center of mass of the device about some point, external to the physical boundaries of the device, about any arbitrary axis.

[0090] Example: As illustrated in Figure 25, consider a device 330 which can search a network database, such as the World Wide Web, for information. When the user performs the "orbit" gesture, such a search is initiated. The radius 332 of the rotation 334 specifies the breadth of the search - wider circles specify a wider search. The speed of the gesture specifies the time limit imposed on the search - the quicker the gesture, the more cursory the search.

ORBIT RELATIVE TO USER

[0091] Definition: Rotating one or more subregions by rotating the subregions and/or the center of mass of the device about some point exterior to the physical boundaries of the device, where said point is proximal to a body feature of the user. This is a special case of ORBIT.

[0092] Example. As illustrated in Figure 26, consider a device 340 which can perform audio output. By performing the ORBIT gesture (in direction indicated by arrow 344) about the user's ear 345, the audio output is activated.

MOVEMENT IN ROOM

[0093] Definition: The local detection of a device's 3D position relative to reference points found within an enclosing room. Differences in the measured position are used to trigger actions.

[0094] Example. A virtual filing system that allows you to save and restore files based on the devices current position in the room. To save a file you might think carefully about the contents of the file and then walk to the position in the room that might be most easily associated with it. When retrieving the file you would use the same thought processes and go back to the position you had associated with the file. On doing so the files associated with that position would be displayed and you would then be able to select the file you were looking for. The system is useful because the human mind is very good at remembering information that is spatially organized rather than in some abstract information data structure.

MOVEMENT BETWEEN WIDELY SEPARATED SITES

[0095] Definition: Manipulating one or subregions of the device such that the detected absolute spatial position of those subregions is changed.

[0096] Example: Consider a device which can display information from a database of client information. When the device is moved to a different client site, the device automatically updates its display to display information for the nearest client site.

[0097] In addition to morphemes based on physical manipulation or spatial positioning, various morphemes based on sensed environmental conditions are contemplated to be useful in practice of the present invention. To aid in understanding the diversity of contemplated environmental morphemes, Figure 27 illustrates selected environmental morphemes loosely arranged in order of increasing sensor complexity needed to sense commonly sensed environmental categories. For each of the proffered categories, some selected sensing systems supportable by a device such as that described in conjunction with Figure 1 are presented.

LIGHT

[0098] Definition. Manipulating one or more subregions of the device such that the amount of light falling upon those subregions changes.

[0099] Example: Consider a device used in a lecture

FITBIT 1002
Fitbit v. Immersion

hall to take notes. When the room lights are turned on the light sensors detect this and turn down the backlight to conserve energy. When the room lights are turned off (e.g. during a slide show) the light sensors detect this and turn up the backlight to increase viewability.

[0100] Light sensors can range from thresholded binary light detectors, to light pattern detectors, to full imaging systems. Advanced techniques can include image analysis and recognition to identify objects or persons.

HEAT

[0101] Definition: Manipulating one or more subregions of the device such that the amount of heat applied to those subregions changes.

[0102] Example: Consider a portable computer which has a stylus for entering text. By looking at the heat profile along the back surface of the computer, the computer can detect whether it is being held with the left hand, the right hand, both hands, or neither hand, and update its interface accordingly.

[0103] Thermal (heat) sensors can range from simple temperature sensors to sophisticated differential thermal mappers and thermal imagers.

ELECTROMAGNETIC

[0104] Definition: Manipulating one or more subregions of the device such that the electromagnetic spectrum applied to those subregions changes.

[0105] Example: By analyzing the radio spectrum the device can derive estimates as to its absolute spatial position, and use that to alter its functionality.

[0106] Electromagnetic detection can include magnetic compasses, radio detection, or GPS signal detection. More advanced techniques can include electromagnetic spectrum analysis and interpretation such as roughly determining location based on available radio signals.

VIBRATE

[0107] Definition: Manipulating one or more subregions of the device by vibration.

[0108] Example: Consider a device which displays textual information. When the user takes the device on the bus, the ambient vibration level sensed by the device changes, and the device increases the size of the displayed text to help the user compensate.

[0109] This class of environmental morphemes can include detection of intermittent contacts, low frequency rumblings, or acoustic level detection. More advanced techniques requiring greater processor power include maximum frequency identification, spectral analysis of acoustic frequencies (enabling the device to distinguish background environmental noises from speech, for example), or even speech based identification of persons in the vicinity of a device.

[0110] In addition to morphemes based on physical manipulation, spatial position, or sensed environmental factors, various morphemes based on cooperation between multiple interacting devices are contemplated to be useful in practice of the present invention. To aid in understanding the diversity of contemplated spatial morphemes, Figure 28 illustrates multidevice morphemes arranged by an increasing level of possible physical contact, and by increasing complexity of available sensome tuples required to form or interpret a morpheme applied to a particular class of device. Beginning with a device having only rudimentary edge delineation functionality for supporting simple spatial sensemes, and ending with complex deformable or embeddable devices that can be wrapped about each other, a definition of a possible multidevice manipulation and typical function invoked by that multidevice manipulation of devices similar (but of course possibly more complex) to that described in conjunction with Figure 1 is presented:

TOUCH

[0111] Definition: To move one or more subregions of a device such that they enter physical contact with a subregion of a second device, in any alignment and to any extent. Or, to take two devices so aligned and remove that alignment.

[0112] Example: Consider two portable computers 350 and 351, the first of which contains a database and the second of which contains an IRDA port. When the user touches the first computer 350 to the second computer 351, the database is transmitted via the second computer's port.

MATCH

[0113] Definition: To move one or more subregions of a device such that they enter physical contact with one or more subregions of a second device, with the subregion(s) of the first device and the subregion(s) of the second device being aligned along one or more edges. Or, to take two devices so aligned and remove that alignment.

[0114] Example: As illustrated in Figure 30, consider, multiple devices 360, 361, and 362, which contain different versions of the same basic database. When the user MATCHes the first device 360 to the second device 361, followed by matching the third device 362 to the matched first and second devices, their databases are reconciled (synchronized).

STACK

[0115] Definition: To move one or more subregions of a device such that they enter physical contact with a subregion of a second device, such that the first device is now located above, but physically adjacent to, the sec-

FITBIT 1002
Fitbit v. Immersion

and device. Or, to take two devices so aligned and remove (i.e. unstack) that alignment.

[0116] Example: As illustrated in Figure 31, consider a set of devices 370, 371 and 372, each of which is displaying a frame of video from a longer video sequence. When the devices are stacked, the ordering of the stacking specifies an order for the video editing, and a single composite video is now produced.

TILE

[0117] Definition: To move one or more subregions of a device such that they physically contact with a subregion of a second device, such that the first device and second device now form a single seamless spatial unit or to take two devices so aligned and remove that alignment. TILE is a special case of MATCH.

[0118] Example: As illustrated in Figure 32, consider a set of devices 380, 381, 382, 383, each of which can independently display a portion of a large photograph. When the devices are tiled, each device displays the portion of the photograph appropriate to its current relative position in the tiled grid.

RELATIVELY ALIGN

[0119] Definition: To move one or more subregions of a device such that they engage in a particular spatial relation to one or more other devices, where said devices are not touching.

[0120] Example: As illustrated in Figure 33, consider a set of devices 390, 391, 392, and 393 which are displaying a multi-page document. Whichever device is presently placed at the far left (device 390) displays the table of contents, whichever one is presently placed at the far right (device 393) displays the index, and the others display pages according to their respective locations. As different devices can have different display capabilities, moving them about can alter the document display. For example, if any one of the devices has a color display, when it is moved from second position to third position then (a) the device which was in third position, displaying page #2, now displays page # 1, and (b) the color display, which was displaying page #1, now displays page #2 in color.

WRAPPING/EMBEDDING

[0121] Definition: Manipulating one or more subregions of a device such that those subregions spatially occlude or are spatially occluded by some portion of the second device.

[0122] Example: As illustrated in Figure 34, consider a first device 400 which contains the infrastructure to support the filtering of email. Consider a second set of devices 401 and 402 which implement particular email filters. When the user physically embeds device 401 (or 402) into the first device 400, by which the first device 400 now wraps the second device 401 (or 402), the particular email filter supported by the second device is activated.

[0123] As those skilled in the art will appreciate, combinations of any of the foregoing described morphemes based on physical manipulation, spatial position, environmental conditions, or multiple interacting devices can be extended by participation in a morphemic "sentence". A sentence is defined as a sequence of one or more temporally disjoint morphemes. Typically, between about 1/10th of a second and 2-3 seconds suffices to distinguish morphemes within a sentence. Of course, in some circumstances and indefinite time period may elapse. The sentence level allows definition of a physical manipulatory grammar by appropriate choice of a morpheme sequence, and corollary rules governing, for example, use of active (verb like) morphemes, naming (noun) morphemes, or connectors. Just as the position and relation of words in a sentence define the sentence's meaning (e.g. "horse chestnut" is not the same as "chestnut horse"), similarly the position and relation of morphemes in a manipulatory sentence define the sentence's meaning. For example, in a communication mode a FLICK followed by a WHACK could mean "transfer data and erase the local copy", while a WHACK followed by a FLICK means "power on the device and transfer data". In other settings a FLICK or a WHACK could mean something entirely different. To better understand construction of morphemic sentences, the following examples are discussed:

DATA TRANSFER SENTENCE

[0124] Consider a device which can transmit some or all of its information to another device. Furthermore this transmission can be done either unencrypted or encrypted (to increase security). Furthermore this transmission of a text+graphics document can either include the graphics or omit them (to save time). Suppose that the user wishes to perform the command "Transmit the information in document A, encrypted, omitting graphics, to machine B". Then a gestural sequence (morphemic sentence) to support this could be:

DEPRESS - the user presses on a displayed representation of A, indicating that A is to be selected for an upcoming operation

FLICK - the user flicks the device in the direction of device B, indicating that the operation is a transmission to B

FOLD - the user folds the top quarter of the device over the lower three-quarters, indicating that the transmission is to be encrypted.

TWIST - the user twists the device about its central axis, indicating that the data is to be "wrung out", i.e. the graphics are to be omitted

SQUEEZE - the user squeezes the device, indicating that they are confirming that the operation is to

FITBIT 1002
Fitbit v. Immersion

proceed.

[0125] Note that none of these gestures, in isolation, perform an act - the "ensemble" of temporally separated morphemes must be interpreted in order to form the complete action

DRAWING MODIFICATION SENTENCE

[0126] Consider a device which displays geometric shapes for user manipulation. Furthermore, one of the manipulations supported is to resize (or rescale) a shape. Furthermore, suppose that this resizing can be done either aliased (jaggy) or anti-aliased (edges are smoothed). Suppose that the user wishes to perform the command "Resize shape A by 120% about the X axis only, using anti-aliasing". Then a morphemic sentence to support this could be:

DEPRESS - the user presses on a displayed representation of A, indicating that A is to be selected for an upcoming operation
STRETCH - the user stretches some portion of the device, indicating that the operation is to be a resize. When the user starts stretching, a portion of the status display displays "100". The user continues to stretch until the status display reads "120"
RELIEF-MAP - the user "scores" the display by making a horizontal line of depression, indicating that the operation is to take place only about the horizontal (X) axis.
DEPRESS - a circular thumb stroke is made in a different area of the device, indicating that anti-aliasing (smoothing the edges) is to be performed

DATABASE PRESENTATION SENTENCE

[0127] Consider a device which contains various personal information databases, such as a list of phone numbers, a list of addresses, and a calendar. Suppose that the user wishes the most appropriate of these databases displayed. Then a gesture sequence to support this could be

SPATIAL LOCATION - the user carries the device such that it is spatially proximate to either the telephone, the address book, or the refrigerator (where the family calendar is displayed), whichever is appropriate
DEPRESS - the user touches the device to activate the operation. The device now displays the personal information appropriate to that location

DATABASE RETRIEVAL SENTENCE

[0128] To extend the foregoing example of a database presentation sentence, consider two computers which contain calendar databases. If the user wishes to synchronize the calendars, a suitable gestural sequence to support this could be

SQUEEZE - the user squeezes the device to activates its gestural recognition capabilities
ORBIT - the user orbits the device about the surface of the other device 3 times, indicating a desire to only match data for the next 3 weeks
MATCH - the user matches the edge of the device to the edge of the calendar, indicating a desire to "match" contents between the two devices

PRINTER/COPIER CONTROL SENTENCE

[0129] Consider a device which can produce paper copies of documents. Suppose that the user wishes to tell such a device to produce a stapled, two sided copy of document A, enlarged to the next greater size. Then a gesture sequence to support this could be

DEPRESS - the user presses on a displayed representation of A, indicating that A is to be selected for an upcoming operation
RIP - the user introduces a spatial discontinuity into a portion of the device, indicating that the upcoming operation is to be a copy ("carrying away" some of the data).
PINCH - the user pinches the upper left corner of the device, indicating that the copies are to be stapled
SQUEEZE - the user presses on the front and back of the device, indicating that the copy is to be two-sided
STRETCH - the user stretches the device, indicating that the copy is to be an enlargement to the next greater size
FACE - the device typically has its paper emitter on the bottom, preventing users from making copies accidentally. By facing the device such that the emitter is on the side, the copying operation is initiated

LIGHT BASED CONTROL SENTENCE

[0130] Consider a device which can display documents. Suppose the user is using the document while seated on a train, and wishes the document to display itself with a backlight when the train enters a tunnel, and wishes the document to display itself in a larger font when the train rumbles over rough tracks. Then a gestural sequence to support this could be

SQUEEZE - the user squeezes on the device, indicating that a loss of light is to be compensated for by a backlight
LIGHT - as the train enters a tunnel the LIGHT gesture is made, and the device turns on the backlight.
WHACK - the user briskly raps the device against

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Fitbit v. Immersion

the palm of their hand, indicating that their desired preference for adjusting hard-to-read documents is to increase the font size.

VIBRATE - as the train goes over a bridge, the vibratory gesture is sensed. Because of the position of the VIBRATE morpheme (after the preceding WHACK gesture) in the morphemic sentence, the device now increases the font size on the displayed text.

LIGHT - the user puts the device into his suitcase making the LIGHT gesture. In this context (with no SQUEEZE before it), the LIGHT gesture causes the device to power-off its display.

To better appreciate utility and construction of devices in accordance with the present invention, several examples of devices are now described.

PORTABLE COMPUTER WITH SQUEEZE AND TILT CONTROL

[0131] A handheld portable computer 500 (e.g. a 3Com® PalmPilot®) capable of being tilted with deformable, pressure sensitive edging 504 is schematically illustrated in Figures 35 and 36. The computer 500 supports a name and address software application, providing a user viewable name-address entry field on display 503. In this embodiment, a user can squeeze the deformable, pressure sensitive edging 504 (squeeze arrows 507) of the computer 500. In response the name and address software application causes the display 503 to animate by slowly incrementing (scrolling) through the name list from "A" towards "Z" entries. When the user squeezes edging 504 again, the software application stops the scrolling animation. Scrolling functionality is further enhanced by the use of a tilt sensor, which allows the computer's behavior to mimic conventional rotatable address books. If the computer 500 is tilted away from the 45 degree angle at which someone might typically hold it, the scrolling rate is increased. In this application, the closer the computer 500 was tilted towards the user (as indicated by arrow 506 of Fig. 36), the faster the scroll rate toward "Z". However, if a user tilted the computer 500 back past the neutral 45 degree position (as indicated by arrow 508 in Figure 36), the animation would move backwards with a velocity related to the magnitude of tilt. In this way it was possible for a user to search for items in a long list in a very natural way, while only using one hand.

[0132] In an alternative mode schematically illustrated in Figure 37, scrolling speed can be completely controlled by pressure. The greater the squeeze pressure (arrows 537), the faster the list scrolls. Release of the applied pressure causes the scrolling to halt. In this alternative user interface strategy, application tilt (as indicated by orthogonal tilt arrows 530 and 532) could be used to change the direction of the scrolling through the list, allowing a user to search portions of a large two-dimensional data set (schematically illustrated as a data plane 520) that is not entirely visible either horizontally or vertically on display 503. By simply tilting the display 503 of computer 500 as if it were a window through which the data plane 520 can be viewed, any particular portion of the data plane (for example, data subset 524) can be viewed. As will appreciated, in both the foregoing modes the speed of scrolling, the specific neutral tilt angle, and required pressures to initiate scrolling changes can be adjusted to fit a particular user.

PORTABLE COMPUTER WITH HANDEDNESS DETECTION

[0133] Pressure sensors have been added to augment a conventional keyboard 561 enabled user interface to a hand holdable Windows® CE class computer 550 (i.e. a Cassiopeia® Casseiopeia®) schematically illustrated in Figures 38 and 39. In this embodiment, user handedness was determined by using pressure sensors positioned on a right back-edge and a left back-edge of computer 550. User studies have found that the difference in pressure between the right and left side gave a direct indication of handedness of a user. As respectively illustrated in Figures 38 and 39, handedness was used to justify formatted text 554 to the left (Fig. 38) or right (Fig. 39), thereby allowing more space 555 on display 550 for an electronic annotation pen to be used to mark-up the text.

[0134] For both the embodiment of the invention illustrated by Figures 35-37 and the foregoing embodiment illustrated in Figures 38 and 39, material deformation of a spongy, elastic, or otherwise deformable material must be measured. Although various techniques can be used to measure material deformation, including those based on imaging or fluid volumetric changes, one particularly useful technique is based on the use of pressure transducers. Commercially available sensors measure pressure (indicative of material deformation) by converting a pressure change to a change in electrical characteristics. For example, inexpensive sensors that change resistance in response to pressure can be obtained in a variety of shapes and sizes, including paper thin sensors, and easily bendable sensor strips. Sensors of this kind can be customized to any particular shape or form that a gestural UI might require. The change in resistance is usually linearly related to pressure, with the sensor generally being placed in a potential divider network to model the pressure as a change in potential. For a practical circuit the resulting signal needs to be amplified, buffered and translated such that the change in value from minimum pressure to maximum pressure spans a useful range. The modified signal can now be fed into an analog to digital converter (ADC) to produce a digital representation of pressure. An 8-bit ADC can typically be used for most applications, however if greater sensitivity to pressure changes is required, a higher resolution ADC (e.g. 16-bit ADC) can be used. As will be appreciated, the ADC could be memory

FITBIT 1002
Fitbit v. Immersion

mapped into the processor's address space as a peripheral, or alternatively supplied as a retrofitted pressure interface to existing computers capable of benefiting from this system. Since an RS232 connection is an interface that is almost universally available on portable computers, one strategy is to have the parallel output of the ADC converted into a serial RS232 frame using a serializer such as a UART and then level-shift and buffer the signal as specified by the RS232 standard. At the computer end of the serial interface, another level-shifter and UART, the output of which is readable by the processor, performs the serial-to-parallel conversion.

[0135] As described with reference to Figure 40, in realizing a working system a microcontroller 564 (a Signetics 87c752) with an ADC built in to combine many of the I/O tasks in a single chip can be used in combination with level shifter 566 (a MAX3223). This approach has the advantage that intelligent processing of the input signal is possible with software. The measurement was provided by a tilt sensor 567 connected to a buffer/amp 562 to supply an analog signal to microcontroller 564. The pressure measurement can also be encoded with a protocol across the serial link. This particular microcontroller 564 has five ADC inputs, but by making use of eight digital control lines, it is possible to use only one ADC input and one buffer amplifier 561, to measure up to eight pressure points with pressure sensors 565. This is achieved by using the control lines to select only one sensor at a time and take a reading for each using a single input to the ADC. After eight sensors have been selected, eight readings are acquired in memory. The design is practical because the microcontroller can take measurements and make analog to digital conversions at a rate far higher than is needed to communicate with a host computer 569.

[0136] For scrolling or handedness based software applications, 16 levels were determined to be adequate for representing a pressure measurement. In order to have a high data throughput to the host computer 569, each measurement was encoded in one byte of an RS232 frame such that the four lowest bits were the pressure representation and the highest four bits were the sensor ID. Each frame of the RS232 data was therefore completely self contained. Of course any protocol that limits itself to a specific number of devices in its address space will eventually have the problem that someday applications might be designed that need to reference far more devices than are supported. The solution used in the protocol is to reserve the sensor ID number 15 as a special value that can extend the semantics of the encoding to include an arbitrary number of bytes representing a sensor or value. For the described software applications, the commonly used RS232 frame format (1 start, 8 data, no parity, 1 stop bit at a baud rate of 9600) was chosen.

[0137] In operation, the host computer 569 determined handedness by utilizing information about the current pressure exerted on two subregions - one on the back of the device, occupying roughly the left half, and the other also on the back of the device, occupying the right half. The current pressure values were converted from analog to digital form, such that a digital value of 0 (zero) represents no pressure, and a digital value of, for example, 15 represents maximum pressure. The detection circuitry then proceeds:

```
if (left_sensor is high AND right_sensor is high) then
    conclude that the user is gripping the device
with both hands
else if (left_sensor is high AND right_sensor is low)
then
    conclude that the user is gripping the device
with the left hand

only

else if (left_sensor is low AND right_sensor is high)
then
    conclude that the user is gripping the device
with the right hand

only

else if (left_sensor is low AND right_sensor is low)
then
    conclude that the user is gripping the device
with neither hand
```

Also, to optimize communication, pressure values are only sent when they change. In order to account for jitter and error in the pressure sensors, a sensor is only considered 'high' if its value is higher than some minimum threshold (e.g. '2' on the 0 to 15 range).

SCANNER/PRINTER/COPIER SUPPORTING EDGE DEFORMABLE DISPLAY

[0138] A scanner/printer/copier device 570 is schematically illustrated in Figure 41. As seen in Figure 41 (and in more detail in Figure 42) the device 570 supports a display 574 having a deformable edge 572, with the combination roughly shaped like a piece of paper. In operation, a user can place a written document in the device 570 for scanning. An electronic version of the scanned document is displayed (i.e. as text 575 in Figure 42) on the display 574. By outwardly pulling the deformable edge 572 as indicated by arrow 577, a user can instruct the device 570 to resize the document before printing or copying. Pinching opposing sides of the deformable edge 572 (arrows 578) can further instruct the device 570 to print double sided copies. As will be appreciated, various other morphemes can be used to provide a simple interface for interacting with device 570.

FITBIT 1002
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TILEABLE AND STACKABLE PORTABLE DISPLAYS

[0139] Multiple autonomous display tiles having an onboard display controller and at least one surface consisting substantially of a conventional display are particularly useful for the practice of various aspects of the present invention. Such tiles can be interconnected in response to various morphemes such as TOUCH, FLICK, RELATIVELY ALIGN, or WHACK, or even can be operated without substantial user mediated morphemic input in certain situations.

[0140] Advantageously, tile positioning can be used as an interface specifier in and of itself. For example, each display tile can contain a video segment in independent memory. Shuffling or reorganizing the tiles can allow users to physically manipulate the sequence of video segments to effect a physically manipulatable video editing system. Using the card analogy, tiles can be used to re-sequence documents, pages within a document, audio annotations, voice mail, or other temporal media contained within the tiles. The resultant sequence can then be played as a whole by using the tiled structure as a unit.

[0141] For purposes of the present invention, display tile array configurations can be categorized as follows:

[0142] Close-packed display tile array 600 (Figure 43) in which tiles 602 are arranged to span a surface 610 in closely abutting, but not overlapping relationship, such that the continuous display area is maximized (i.e. seamlessly). As will be appreciated, the tiles could themselves form a freestanding continuous surface, or they could be disposed on a table or other suitable support. Each of the tiles 602 supports a display 604 sized to substantially cover a front surface of each tile 602. In certain embodiments, a back surface of each tile 602 can also support a display. Advantageously, this would allow for creation of free standing displays with images visible on the front and back. The surface 610 can be a plane, a sphere, or any arbitrary shape that permits tiling.

[0143] Loose-packed display tile array 620 (each tile 622 having a display 624 as seen in Figure 44) in which tiles 622 are slotted into a lattice pattern (indicated by dotted lines 625). Each tile can be considered to be situated in a regular bounded lattice slot (namely, the lattice slot that contains a defined center of each of the tiles) within the lattice where the dimensions of the bounded slot are no more than a few times the maximum dimension of the tile, and there is no more than one tile in any slot. Within the lattice regions any of the tiles can be positioned arbitrarily and still retain the same interrelationship with the group. It is still possible for tiles to touch one another at the boundaries of two or more lattice slots, however, that is not a requirement.

[0144] Free-formed display tiles 630 (each tile 632 having a display 634 as seen in Figure 45) are similar to loose-packed display tiles 620 where the size and shape of the lattice slots may vary freely (e.g. the dimension of a lattice slot may be many times the maximum dimension of any of the participating tiles). The only constraint on the arrangement is that there must be no ambiguous relationships about the relative connectivity of the each of the tiles 632. That is to say, a tile that is to display the next piece of information to one side of another tile must be unique and not be confused with the task of another tile in the tiling lattice.

[0145] 3D display tiles (packable display tiles) are created by extending the three foregoing display tile categories. However for close packed tiling of display tiles, packed devices in the center of a 3D structure would not be available as the user interface. This may not matter as the surface of the 3D shape will expose a area that will have unique affordances for some classes of application. For instance, cubic tiles packed into the shape of a large cube can display, using the six faces of the larger cube, the various projections that could be rendered by viewing a 3D CAD drawing from each degree of freedom.

[0146] As will be appreciated, display tiles need not be rectilinear but can be hexagonal, circular, or of arbitrary shape and size. The size of tiles need not be constant for all tiles within a larger structure. Tiles need not be aligned but may require proximity to indicate adjoining points or edges.

[0147] Tiles need not be in physical contact to define they are joined in a group activity but instead that may be a programmed function. The connectivity can also be discovered through a radio network from a coordinating server or from a distributed algorithm that draws in as many computers as necessary for a task, using the wireless network to negotiate the resources it needs. The tiled computers may also be connected by wired networking systems, although in cases where the topology might need to rapidly change, this is not as desirable as a wireless system. An example of a wired networking system of this type is a system that uses the Internet to include many computers in a single task, one in which each computer knows its relative position even though they may be separated by rooms or in the extreme cases buildings, cities or countries. However, in general the most useful case of display tiling is when the tiles are proximate enough that they can all be viewed by one person to create a display medium whereby the viewing experience is an enhancement over using a single display. Accordingly, tiles can operate as either a single larger contiguous structure or they can retain individual properties and independent functions or a combination of both, (e.g. jumbo-tron like function, 12x12 small displays as used in a TV studio, or picture in-picture features found in commercial TVs or editing suites).

[0148] Depending on the type of packing, various schemes can be used to allow for permanent, intermittent, or even one-time communication between display tiles. For example, close packed tiling can make use of wired connectivity between computers or could use a variety of wireless or optical communication technolo-

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gies. In the case of wired connectivity, edge mounted conventional plug and socket connectors may be used to create a rigid tiled array. Plug and socket systems lend themselves to parallel connections for bulk and high-speed data transfer. They also provide a convenient method of power distribution which can allow for one of the tiles providing a power source that supports the rest of the array. A plug and socket connection between tiled computers 692 in a tiled computer array 690 (with both data and power transfer shown) is schematically illustrated by lines 695 in Figure 49.

[0149] The exact design and locations of electrical connectors depends on the intended use, and subsequently, the shape of tile components. For applications where large seams between displays are acceptable, simple rigid connectors could be attached to the center of each edge providing connectivity to all the surrounding tiles. Other applications might require a more complex design. For example, applications which require high-quality information display on a seamless array surface (i.e. tiled blueprints), might employ spring-loaded contacts on the four edge connectors. The spring mechanism allows all array connections to be made below the display surface, while tiles can still be inserted and removed from the interior of the array. Removal of tiles could be triggered by some host signal which activates a release of the spring and pops the tile out of the array.

[0150] Serial connectivity can also be used in a close packed arrangement such as that illustrated in Figure 43. It has the advantage that fewer connections have to be made and in practice it might be more reliable. However the net bandwidth between tiles will be less than a parallel system. Serial communication lends itself to optical and wireless systems thus removing the need for any physical connections. For optical technologies alignment of the transmitter and receiver is still important although the clever use of light pipes and lens capture techniques can introduce more flexibility. Wireless systems can use many different bands of the EM spectrum (kHz, MHz, GHz), utilizing a variety of modulation techniques (amplitude modulated, frequency modulated, or those based on code division multiple access) and operate at a range of transmitter powers. There is no longer a need for direct alignment if the system is designed with suitable communication tolerances. The transmitter range plays a crucial part in the design. If there is only enough power in an emitted signal to be picked up within a few millimeters of a tile edge, then the signals will be isolated, the topology will be defined by the physical connectivity and the complexity of designing the system to avoid interference from neighboring signal sources will be minimized. However, an alternative design is to use more powerful radios. In this case all tiles will be able to contact all other tiles and inter-tile connectivity needs to be defined by another parameter. Signal strength can be used or, more deliberately, information that relates the ID of a tile to a spatial map (perhaps held in one master tile) describing the position of all tiles in the tile array. In this system it is also necessary to minimize inter-tile interference. For digital packet-data systems that operate at the same frequency carrier sense multiple access (CSMA-CD or CSMA-CA) systems are well known techniques to solve the problem. Other solutions involve tiles using different frequencies, with frequencies reused depending on the power of the transmitters. This is the technique used by traditional cellular telephones. Yet another approach is to use Code Division Multiple Access (CDMA) that relies on the overlaying of signals in the same region of the EM spectrum, a technique known as spread spectrum modulation.

[0151] For loose packed display tiles, the wireless techniques described above in connection with close packed tiling generally become essential to the implementation. However a special case of loose packing exists in which each edge of a tile does make contact with every other surrounding tile, except that it may only be a single point of contact and not at a accurately defined place. A wired version of this system can be built in which the entire edge of each tile is a serial connection including one of the two vertices that define the edge. Communication in each direction can be achieved by a variety of commercially available techniques, including use of a one-wire interface (plus a ground) for bi-directional communication between tiles and a master. Note that the ground connection for a tile arrangement can be derived by sharing a common ground connection through the surface the tiles are laid out on. For example, the surface could be made of a metal sheet. The system may be further enhanced by ensuring that the edge contact is made of a magnetic material and the vertices have a magnet embedded in the end. Such an arrangement ensures that there will be a good electrical contact between the transmitter and the receiver.

[0152] The receiver can also derive power from an electrically transmitted signal by bridge-rectifying it and storing the collected charge in a capacitor for use by its own electronics. Thus, power distribution can also be included in a one-wire interface. In this way flexible connectivity can be achieved to support the rapid and convenient rearrangement of tiles in which only the minimum amount of care needs to be taken in setting up connectivity.

[0153] Loosely packed tile displays such as illustrated in Figure 45 may require that the display surfaces use a best effort algorithm to present a tiled display with all the sections of the displayed image bearing the correct spatial arrangement to each other even though, in the case of rectangular tiles, they might not be registered vertically or horizontally and have an offset angle relative to each other. In order to implement the desired tile display algorithm, not only is the relative arrangement of tiles important but the exact offset (distance and angle) from each other is also important. There are several methods that are suitable for automatically deter-

FITBIT 1002
Fitbit v. Immersion

mining offsets between closely packed tiles. For example as illustrated with respect to Figure 46 (showing communicating tiles 652 and 654 with respective displays 651 and 653), optical encoding 650 along an edge can be used to identify tile orientation. It is possible to use a binary coded optical pattern along an edge which is regular and encodes the distance from a vertex at any point. A tile that abuts, or is relatively aligned, can read this pattern using optical sensors 656 and 658 and determine the display offset in the direction of the edge. Alternatively, as illustrated by Figure 47 (showing communicating tiles 672 and 674), it is possible to use radio based techniques that rely on signal strength triangulation. Each vertex 675 or 676 of a tile 672 can contain a wireless transmitter and a receiver. If these vertices transmit a short characteristic wireless signal at well known times, a nearby tile 674 can use the receivers situated at its own vertices 680, 681, 682, and 683 to triangulate the position of each transmitting vertex relative to them by measuring the relative delay by which the signal was received. After two of the vertices of the original transmitting tile 672 have signaled, the adjoining tile 674 can determine its exact position and orientation within their local region of a tile array. The transmitting and receiving tiles can now swap roles, with the result that both tiles will know their relative position. This process can be extended across the tile array.

[0154] Free format tiling differs from loose-packed tiling in that there are no proximity or regular format constraints. To demonstrate how a free format tiling system might work, the following example is described. Imagine a number of laptop computers each fitted with a Global Positioning System (GPS) and a radio modem. Each laptop can determine its position (with acceptable error) and communicate it to all the other laptops by contacting them through the radio modem. After some period of time the laptops will all know their relative location and absolute location. If any computer changes its location, it can update the local neighbors to ensure there is enough understanding in the array to consider the computers are in a known tiling configuration even though they are not close to each other and in fact they may be in different geographic regions. An application that might use this free format tiling system is one that wishes to ensure information is being correctly sent in a uniform and dispersed fashion across a very large area. For example, the information that each laptop computer receives could be instructions to release an amount of a pesticide used to control an insect that does damage to commercial crops. If the pesticide is released in too high a concentration in any locality it may be hazardous to human health. The tiled approach allows the computers to roam (e.g. in the back of a truck), displaying information as to the type and concentration of pesticide that is to be released given their current relative proximity.

[0155] Various conventional algorithms can be used to support distribution of information between autonomous tiled displays. These algorithms assume a system by which there is a master controller generating data to be displayed. There is also a large array of tiled computers that the system will use to display visual data and/or process information. Each computer in the tiled array contains a unique ID. It is the job of the master to split the data into pieces that each computer can display and for this information to be packaged along with the ID of the target computer. The algorithms below describe how the information travels from the master to a destination display tile:

Daisy chain routing

[0156] Display tiles are arranged to have a logical connectivity with each other so that each one only transmits information to the next in a predefined line. The computers are said to be daisy chained to each. Any information sent to the start of the chain contains an ID and the first computer in the chain compares it to its own ID. If it matches, it acts on the data. If not, it sends the data on to the next computer in the chain until it finds its destination.

N-ary routing

[0157] In N-ary routing the path to the destination is contained in the ID of the device. A simple routing example is schematically illustrated with reference to the direction arrows 695 in Figure 48 which shows quaternary routing in physically connected bleasle displays. In quaternary routing an array is conceptually arranged as a quaternary tree with each node having an input and three outputs. In this system each pair of bits of the ID contains a routing command. A 0 indicates send the packet to the first output, a 1 indicates the second output, a 2 indicates the third output, and 3 indicates no further transmission. There is also a count that gets decremented by each node to tell successive nodes the bit number that is currently being considered and when the packet has reached its destination. In this way packets are forwarded from node to node with a simple choice at each stage until they reach their target display. As will be appreciated, it is possible to design N-ary systems with more than three outputs (a power of two is usually convenient for implementation (e.g. 4, 8, 16 ...)).

Flooding

[0158] Flooding has no predefined routing structure. The computer that takes the first packet from the master checks to see if it has the correct ID. If not the packet is sent out on all links to which it has not yet sent or received that packet. The result is a flood of copies of the packet across the array eventually reaching its destination. The packets must also have a maximum hop count to ensure they eventually are removed from the system. The disadvantage of this approach is that many

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more tiles are burdened with the processing of unwanted data than in the previous two schemes, which may impact the overall efficiency of the system.

Hot Potato

[0159] The Hot Potato algorithm is similar to the Flooding algorithm, except a retransmitted packet is sent out on only one output that is either chosen randomly or is the least busy. The process stops when the packet reaches the correct tile. The time that a packet takes to reach its destination is not deterministic.

Claims

1. A device (10) supporting a manipulatable user interface, the device comprising:

   a feedback module (33) for presenting information related to a data structure
   a processor (24) for controlling the feedback module (33) and the data structure, and
   a deformable piece (20) including multiple subregions, the deformable piece attached in a vicinity to the feedback module, with the deformable piece contacting at least one sensor (22) that monitors positional changes within multiple subregions of the deformable piece (20) the at least one sensor (22) being connected to the processor (24).

2. A method for inputting information to a device connected to a deformable piece, the method comprising the steps of

   manipulating the deformable piece to provide a first morpheme input to the device, the first morpheme input normally triggering a first default action by the device,
   asynchronously manipulating the deformable piece to provide a second morpheme input to the device, with the second morpheme input converting the normally triggered first default action to a second action

3. A device supporting a manipulatable user interface, the device comprising

   a processor (24) and memory (26), and
   a deformable piece (20) including multiple subregions, the deformable piece (20) attached in a vicinity to the processor (24) and memory (26), with the deformable piece (20) consisting a sensor mesh (22) that monitors positional changes within multiple subregions of the deformable piece, the sensor mesh (22) being connected to the processor (24).

4. A device supporting a manipulatable user interface, the device comprising

   a feedback module (33) for presenting information related to a data structure,
   a processor (24) for controlling the feedback module (33) and the data structure, and
   a detector (20) for determining handedness of a user, the detector being connected to the processor (24) for modifying the displayed data structure based on handedness of a user.

5. A method for inputting information to a device connected to a deformable piece, the method comprising the steps of

   spatially rotating device to provide a first morpheme input to the device, the first morpheme input normally triggering a first default action by the device, and
   asynchronously manipulating the deformable piece to provide a second morpheme input to the device, with the second morpheme input converting the normally triggered first default action to a second action.

6. A plurality of tileable devices for transferring data, comprising

   a first device having a processor and a first wireless communication module for transferring data,
   a second device having a processor and a second wireless communication module for transferring data,
   a third device having a processor and a third wireless communication module for transferring data,
   wherein the first device is connected in substantially simultaneous wireless communication with the second device and the third device to pass data based on spatial positions of the respective first device, second device, and third device

FITBIT 1002
Fitbit v. Immersion

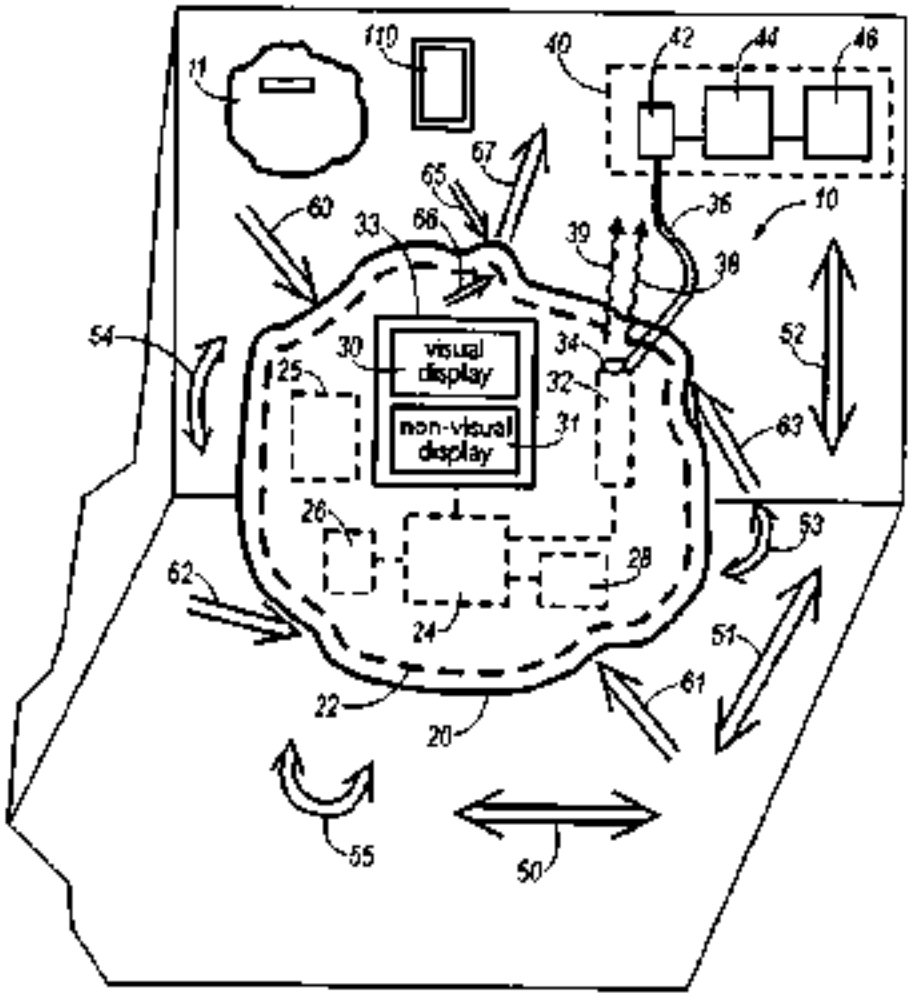


Fig. 1

FITBIT 1002
Fitbit v. Immersion

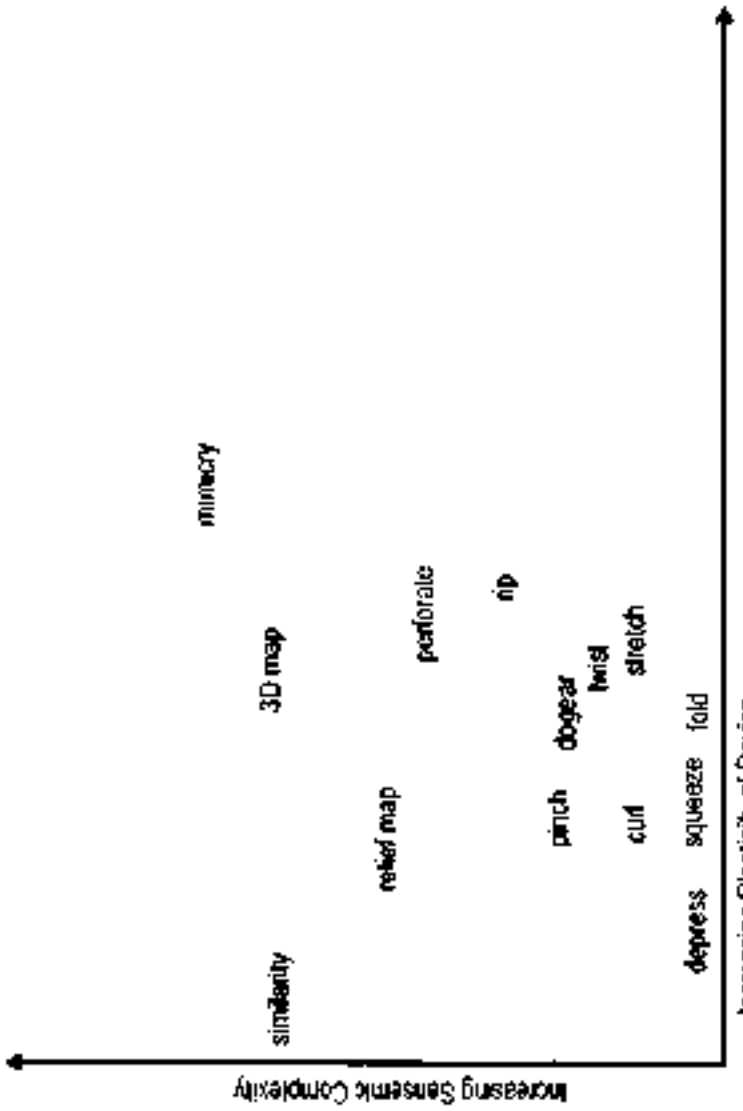


Fig. 2

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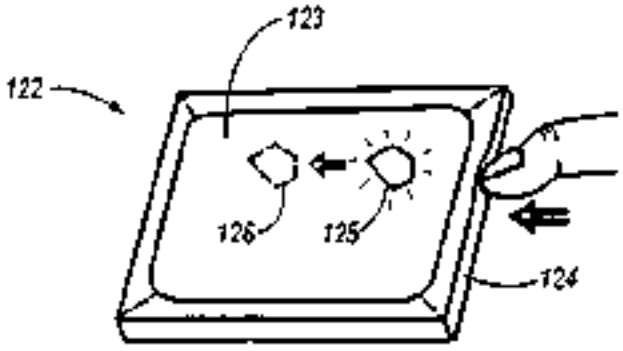


Fig. 3

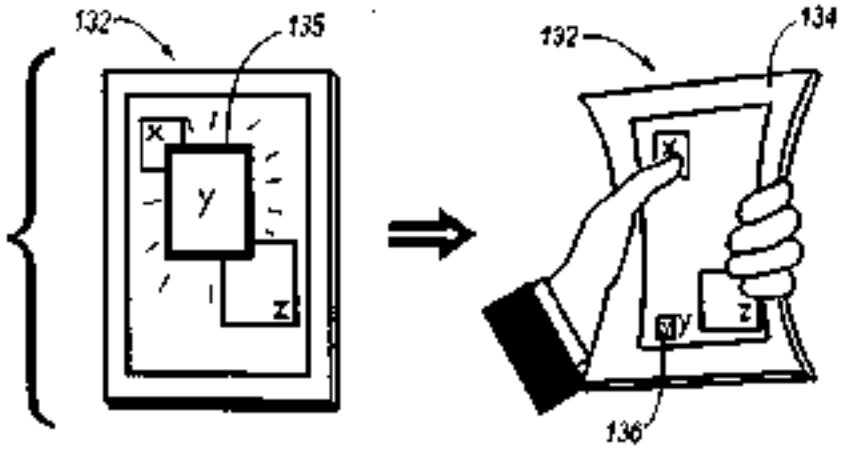


Fig. 4

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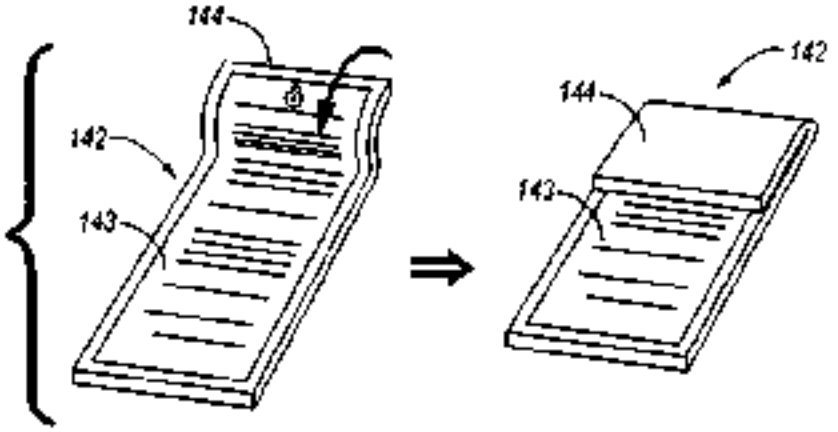


Fig. 5

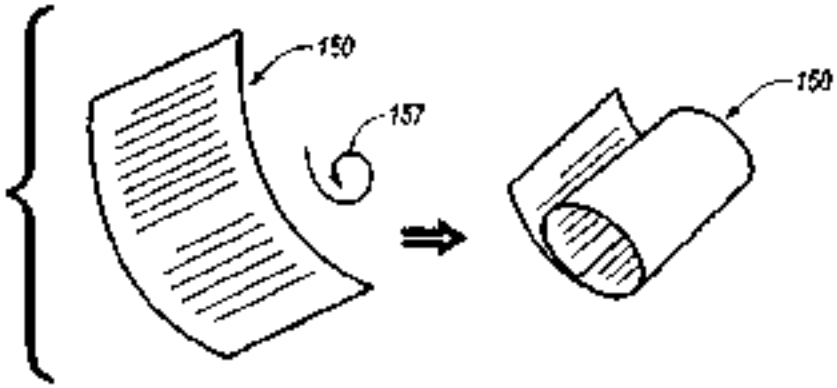


Fig. 6

FITBIT 1002
Fitbit v. Immersion

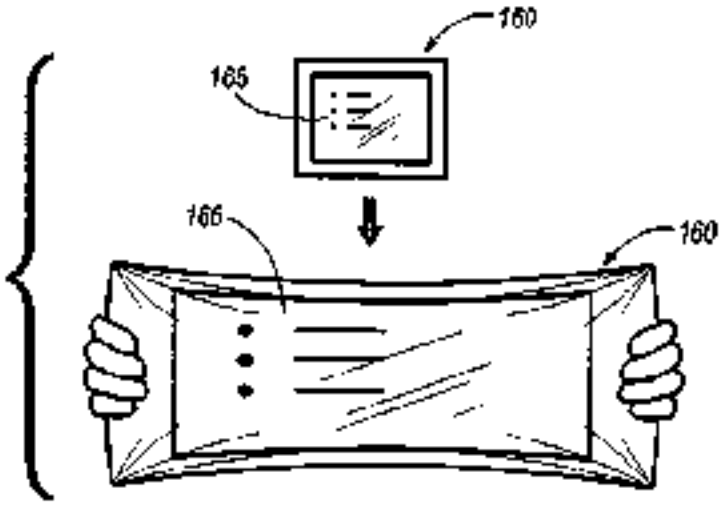


Fig. 7

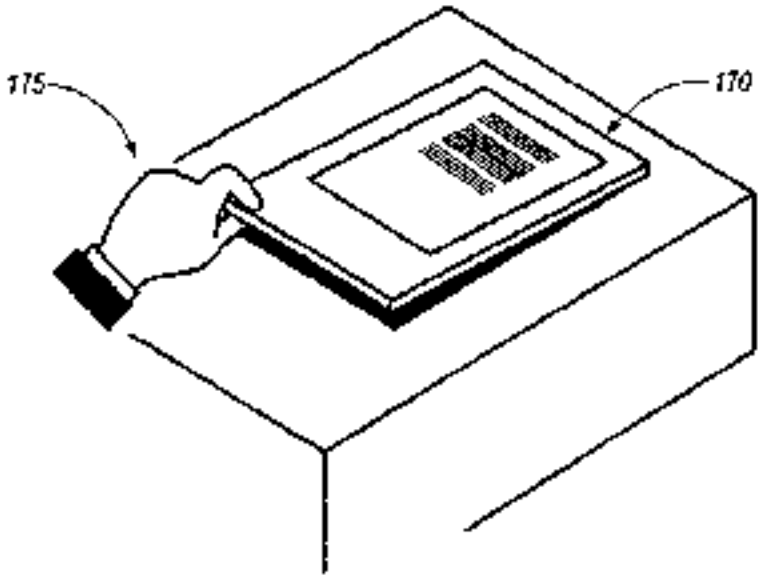


Fig. 8

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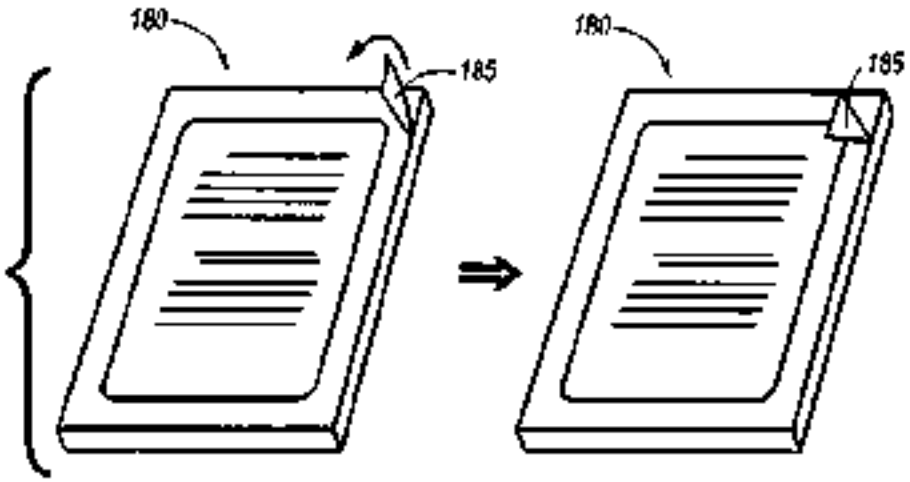


Fig. 9

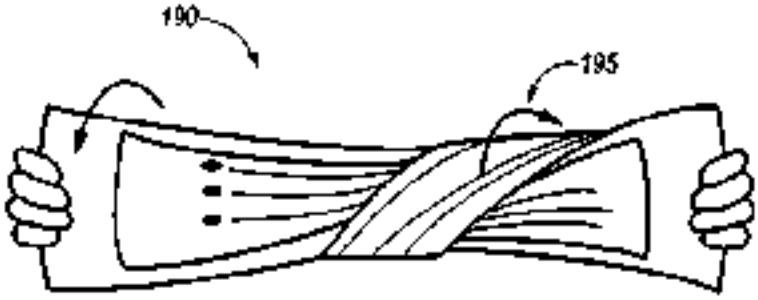


Fig. 10

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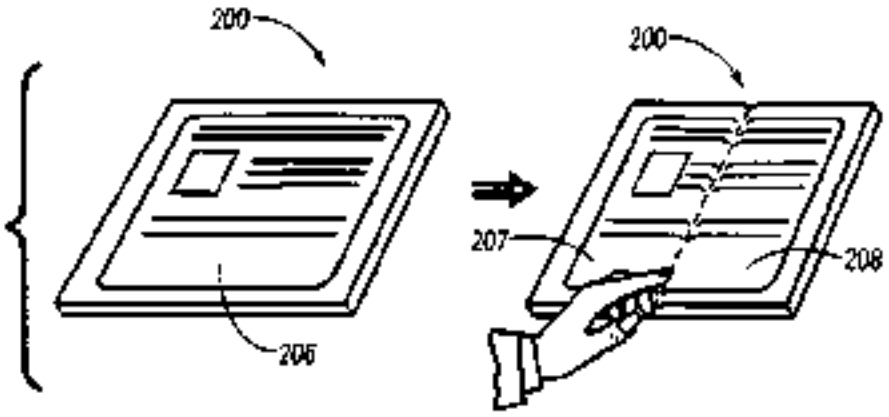


Fig. 11

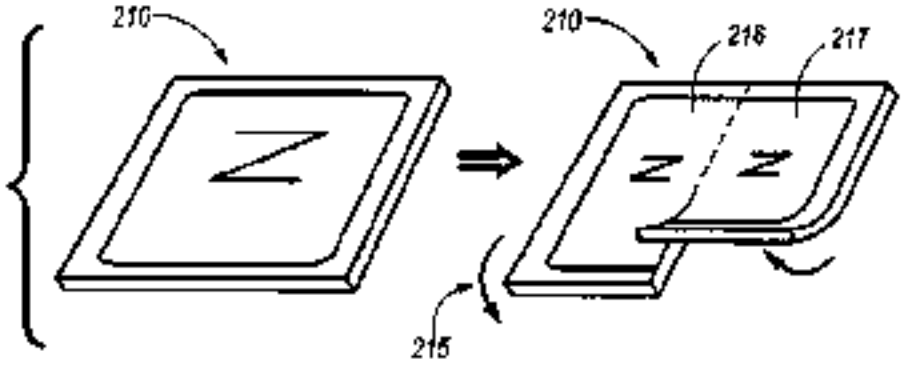


Fig. 12

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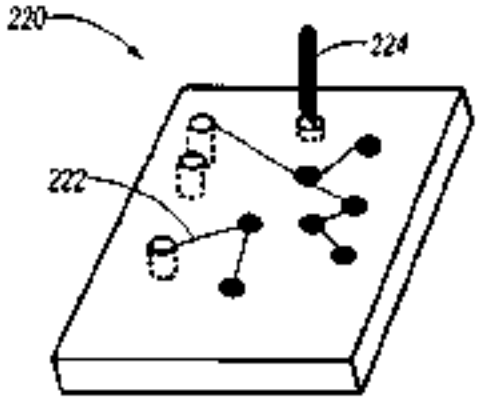


Fig. 13

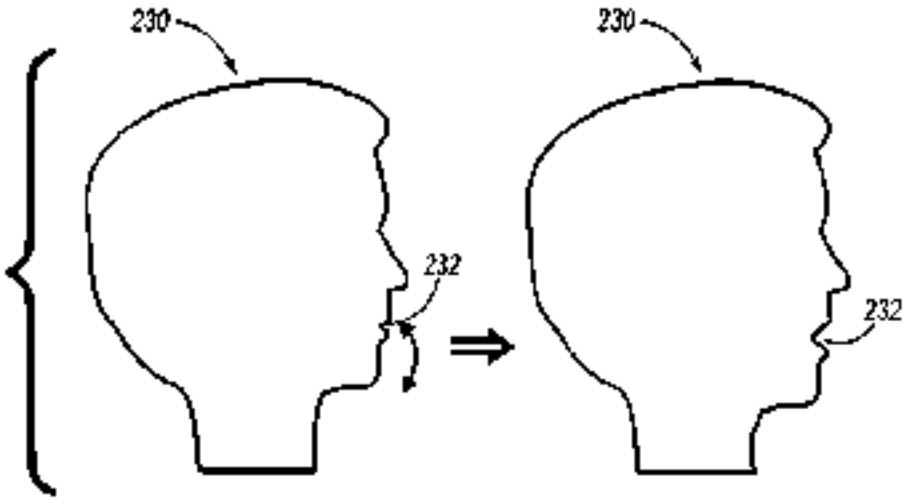


Fig. 14

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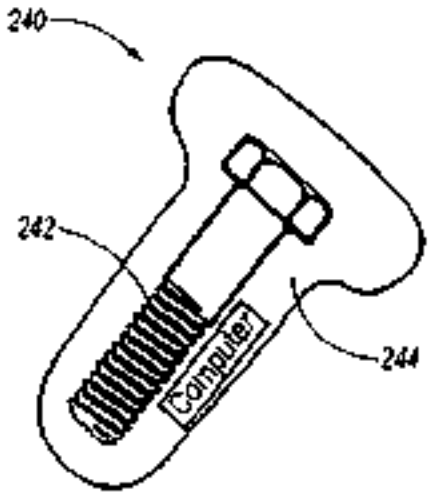


Fig. 15

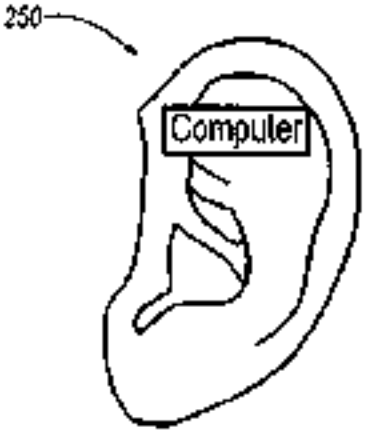


Fig. 16

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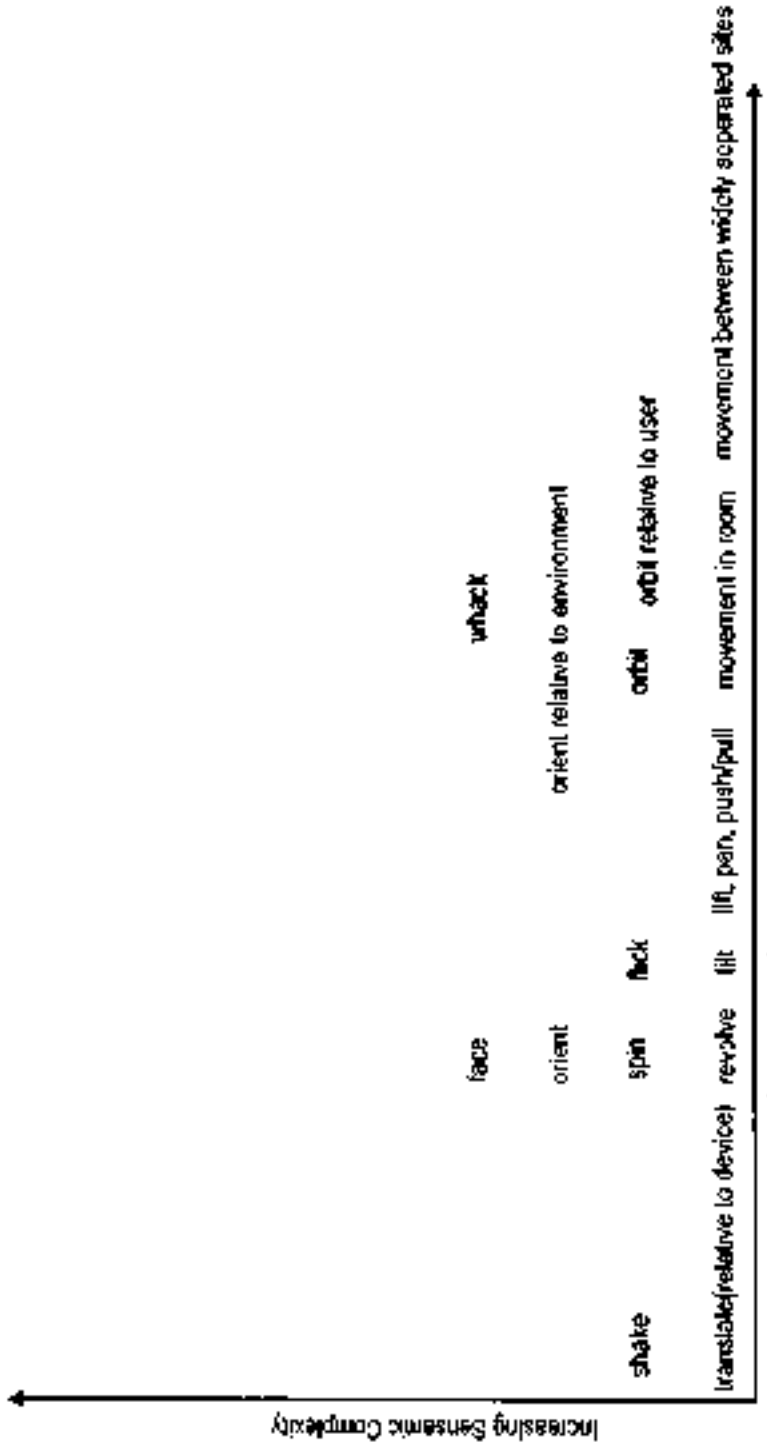


Fig. 17

FITBIT 1002
Fitbit v. Immersion

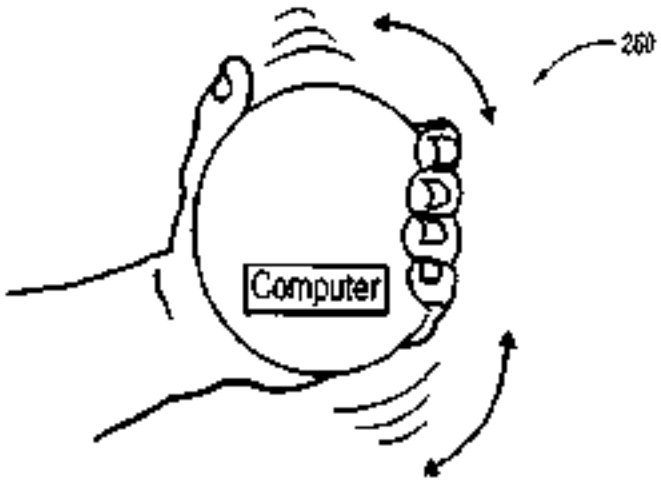


Fig. 18

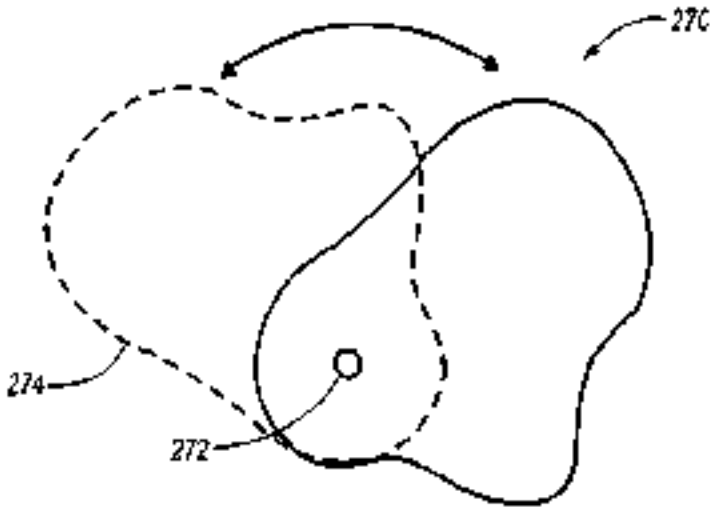


Fig. 19

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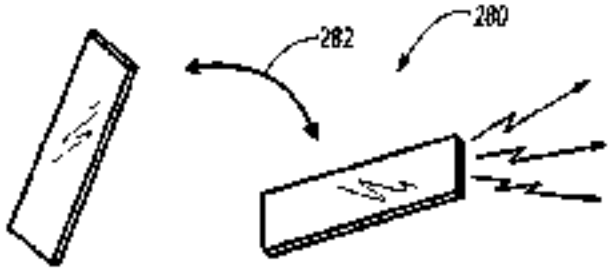


Fig. 20

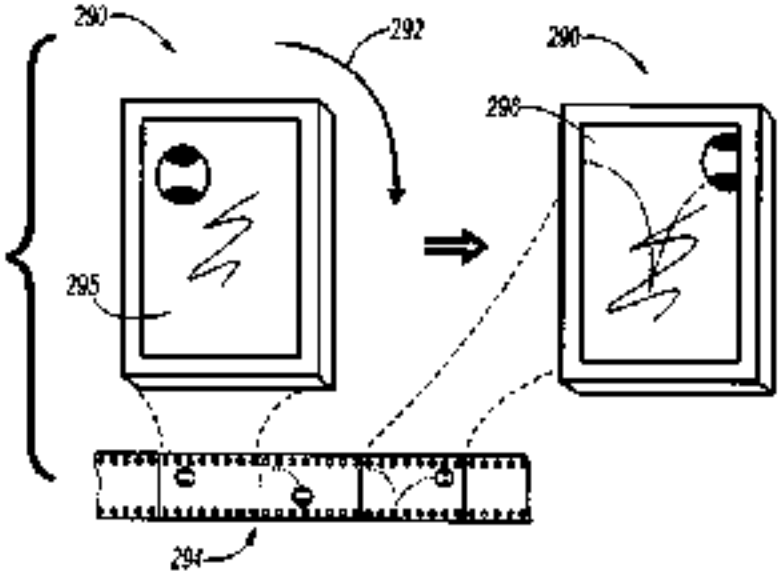


Fig. 21

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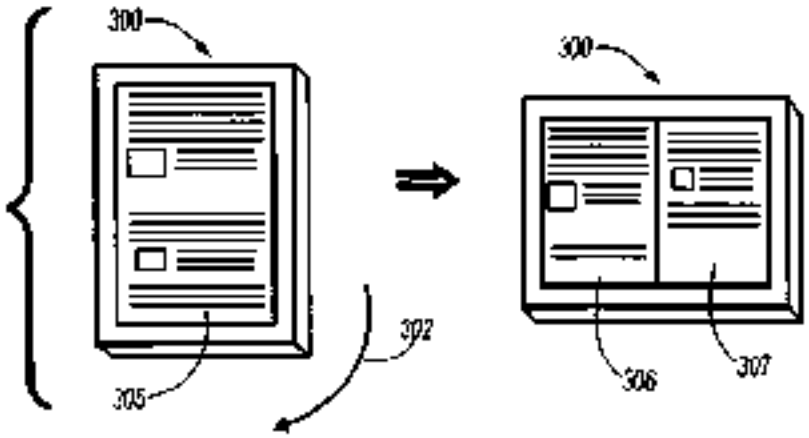


Fig. 22

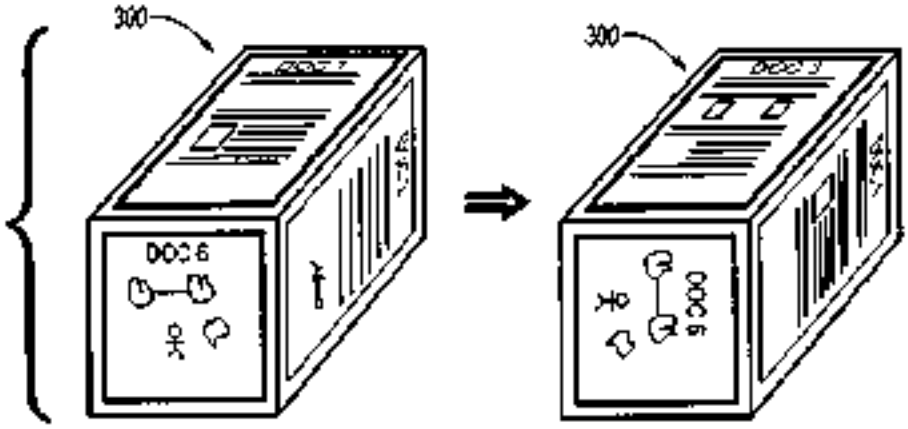


Fig. 23

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Fitbit v. Immersion

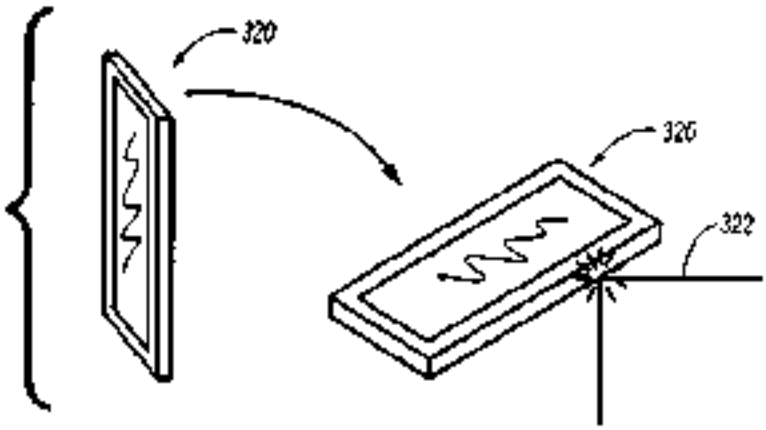


Fig. 24

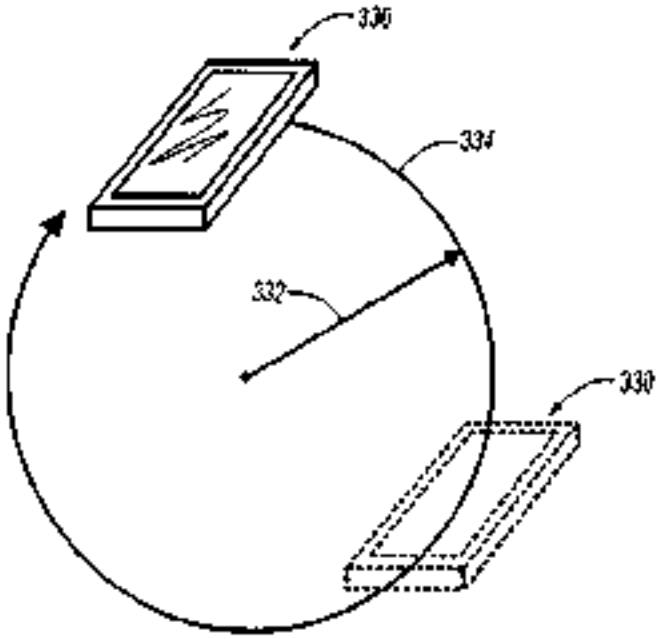


Fig. 25

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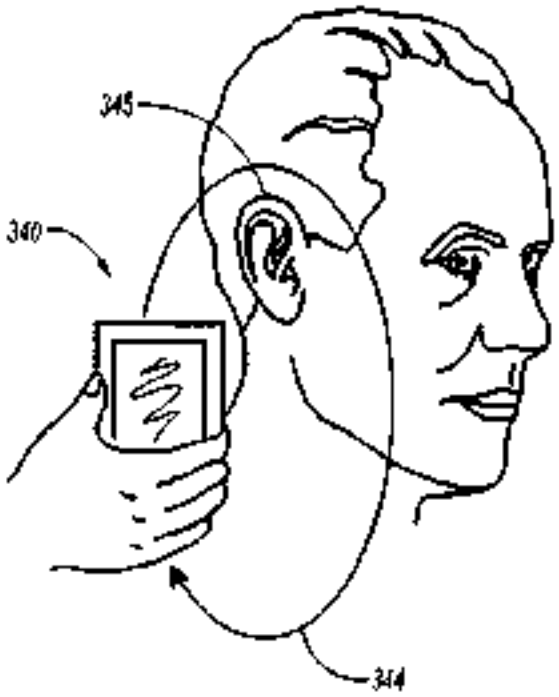


Fig. 26

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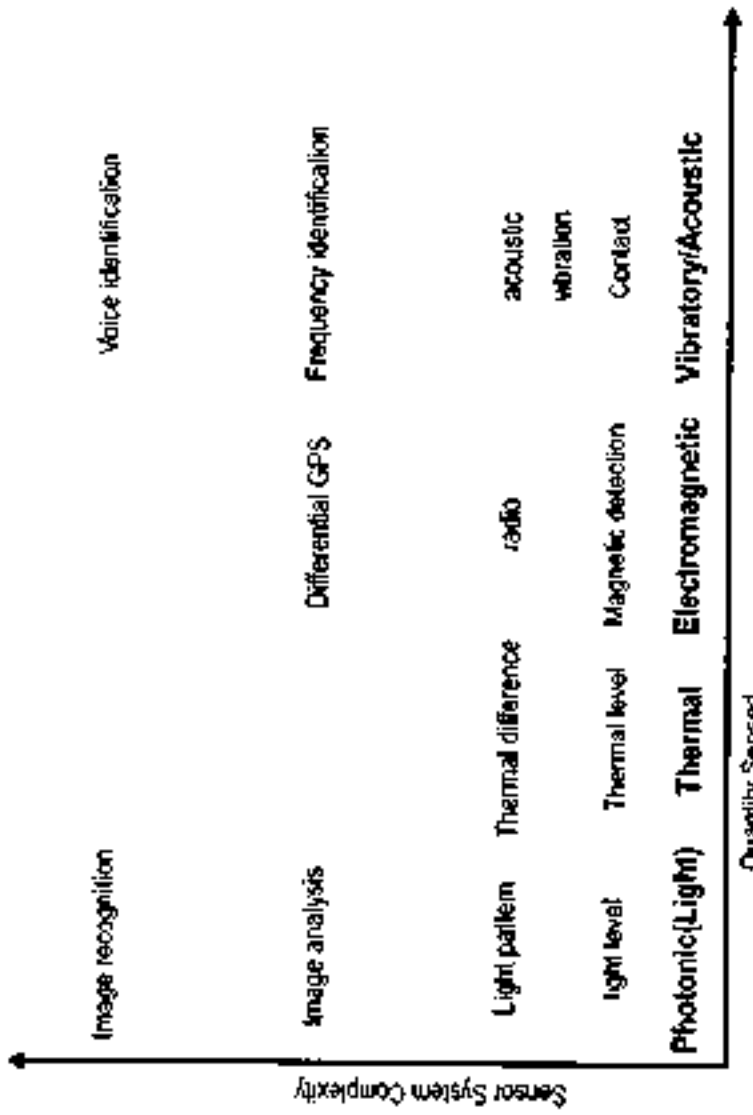


Fig. 27

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Fitbit v. Immersion

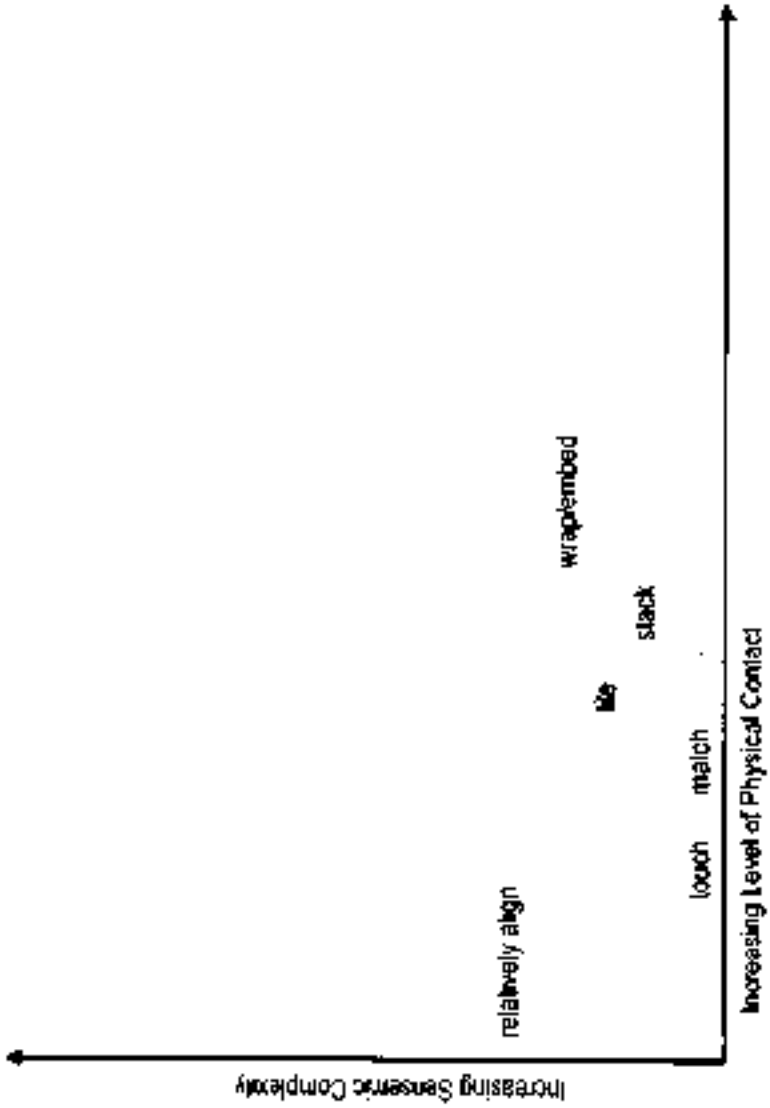


Fig. 28

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Fitbit v. Immersion

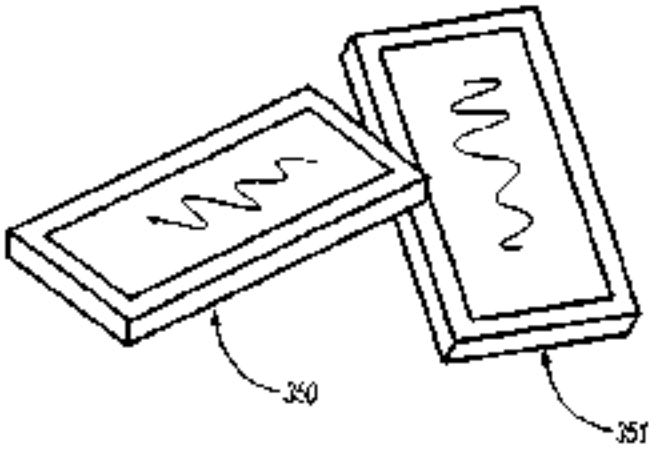


Fig. 29

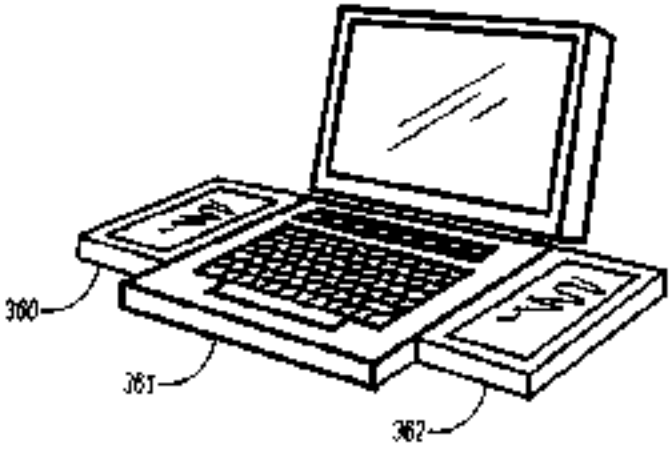


Fig. 30

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Fitbit v. Immersion

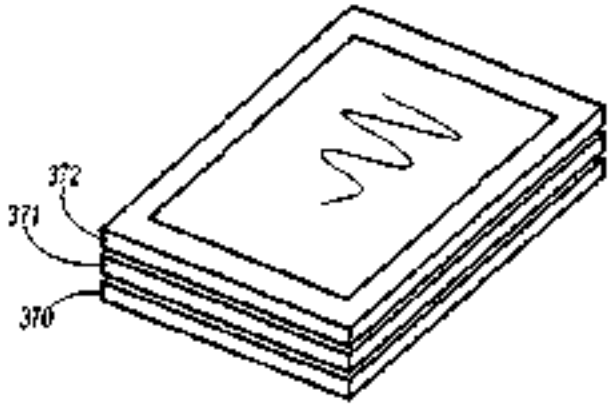


Fig. 31

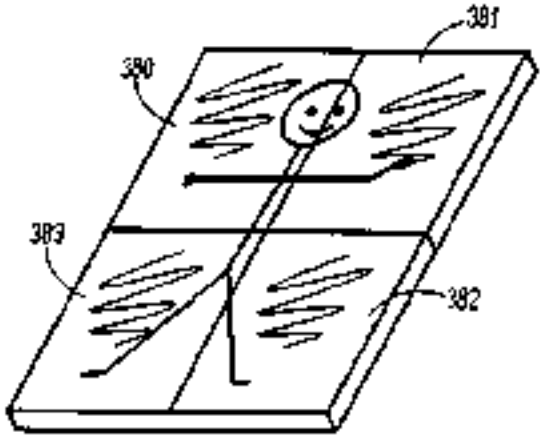


Fig. 32

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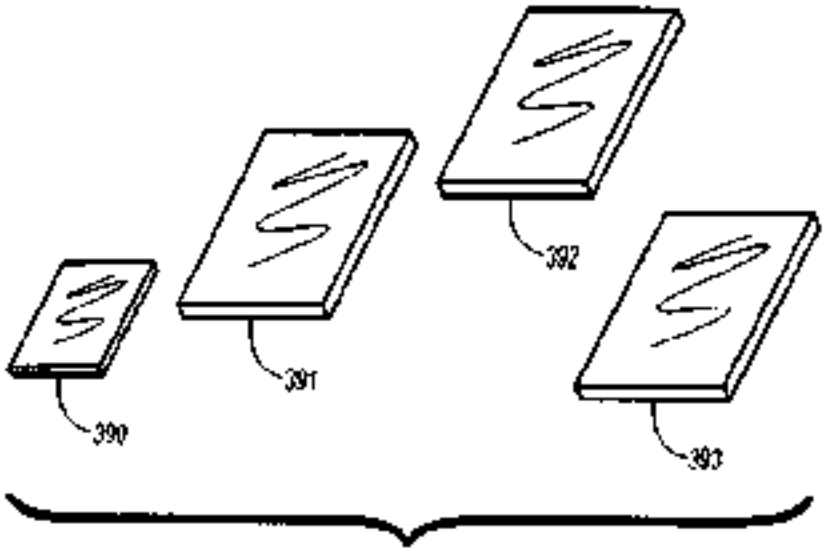


Fig. 33

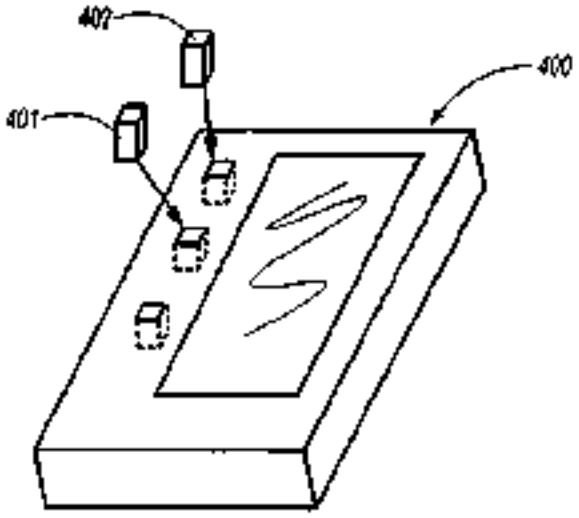


Fig. 34

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Fitbit v. Immersion

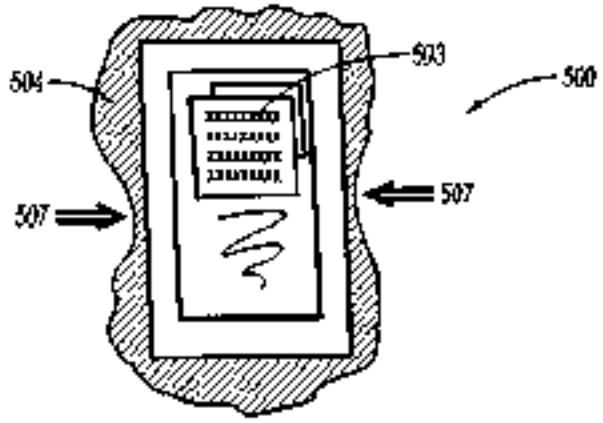


Fig. 35

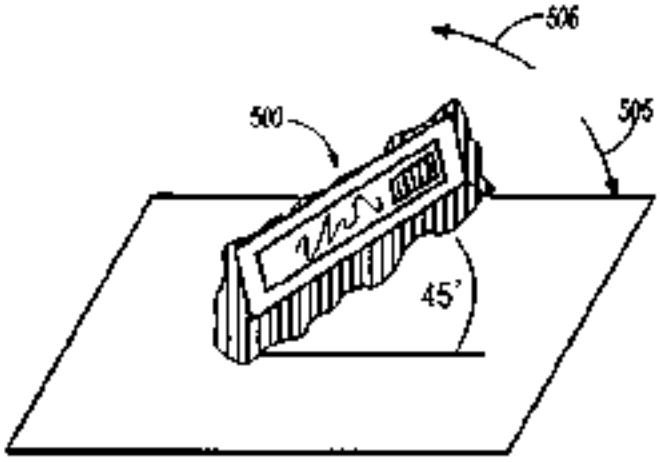


Fig. 36

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Fitbit v. Immersion

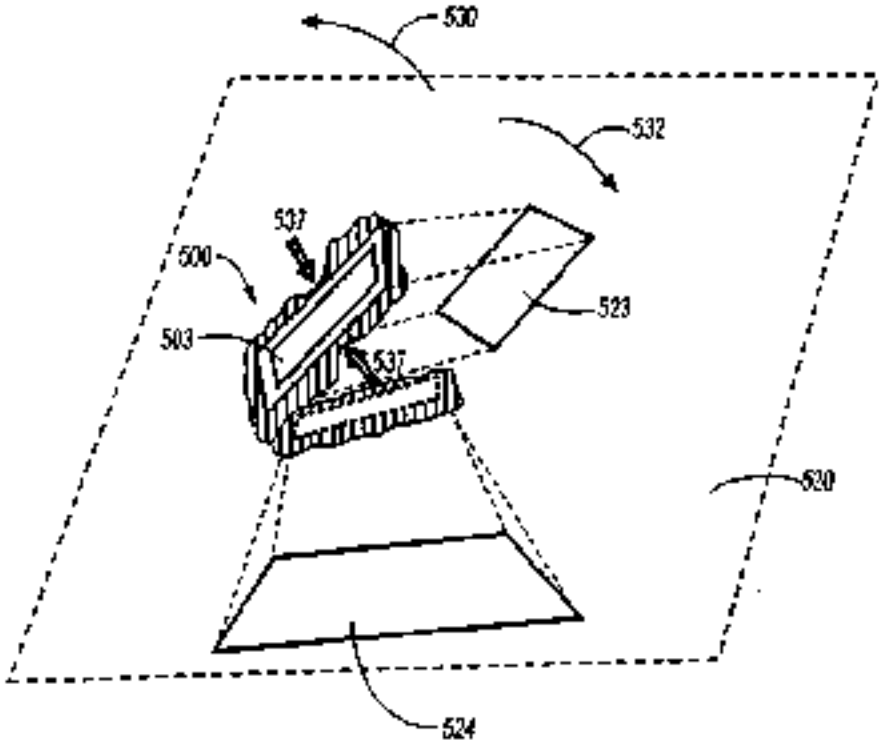


Fig. 37

FITBIT 1002
Fitbit v. Immersion



Fig. 38

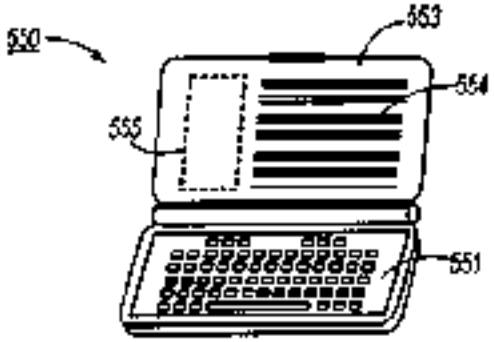


Fig. 39

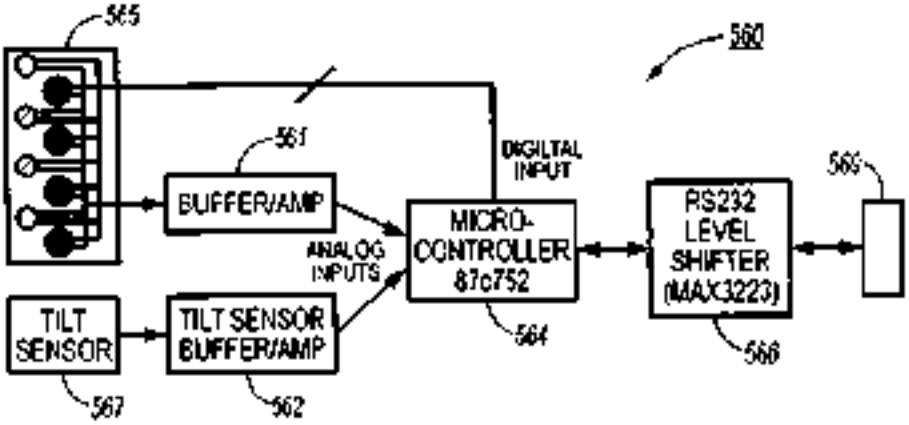


Fig. 40

FITBIT 1002
Fitbit v. Immersion

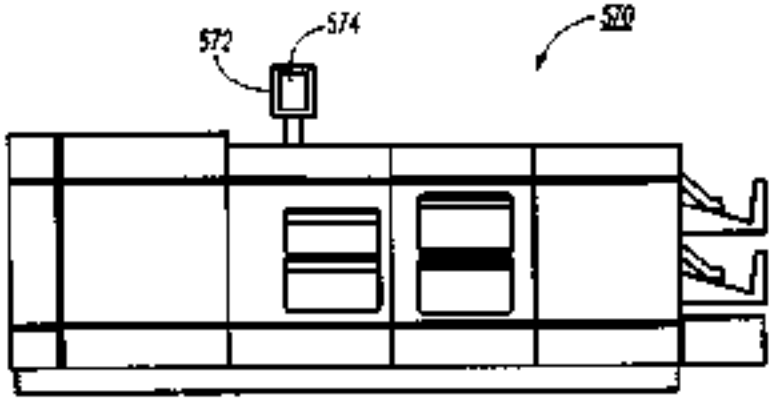


Fig. 41

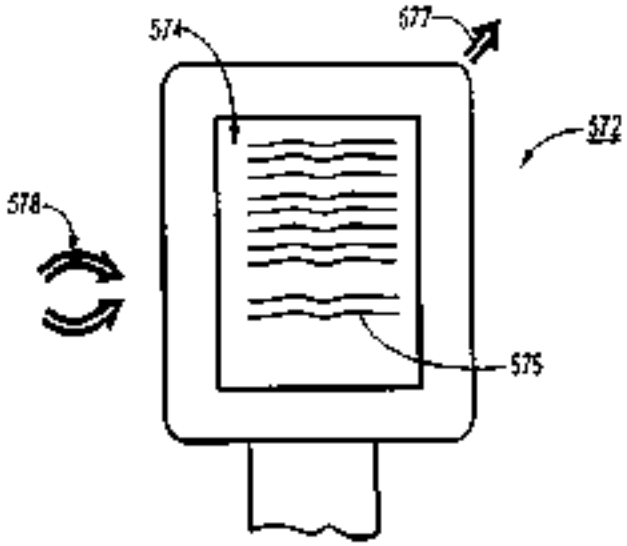


Fig. 42

FITBIT 1002
Fitbit v. Immersion

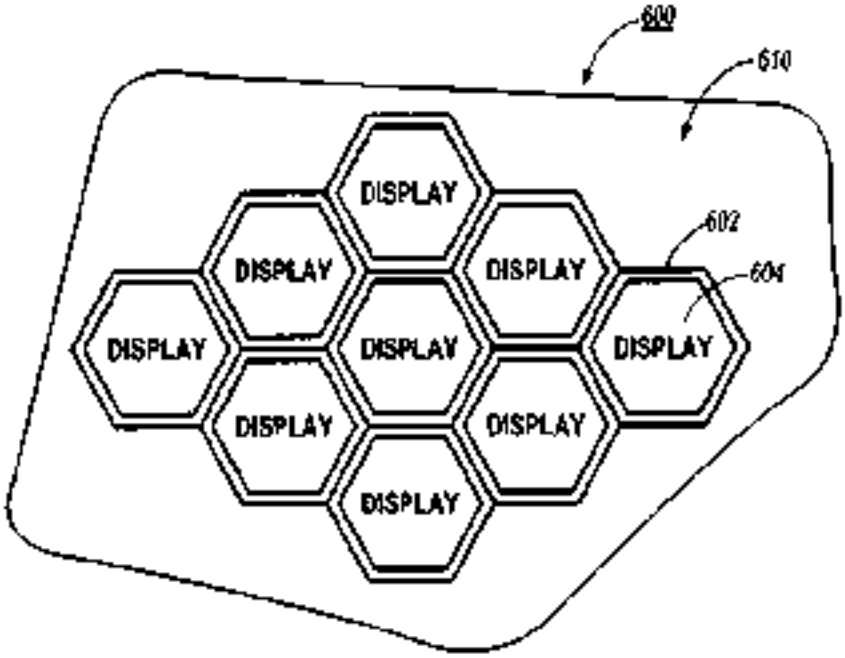


Fig. 43

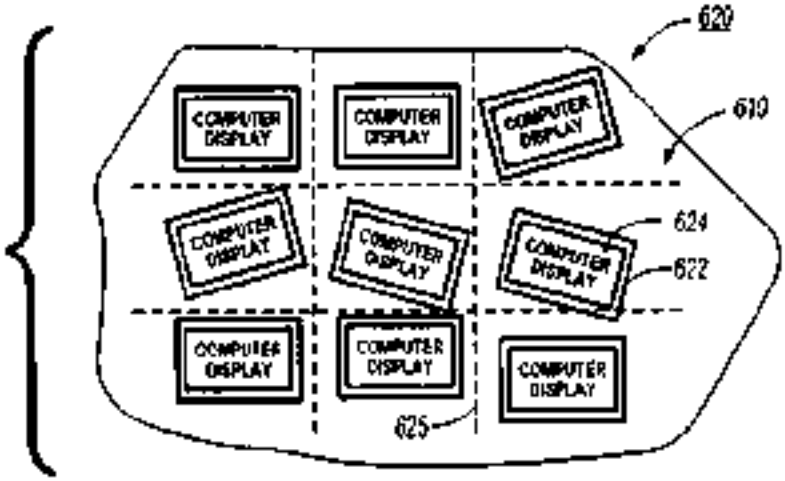


Fig. 44

FITBIT 1002
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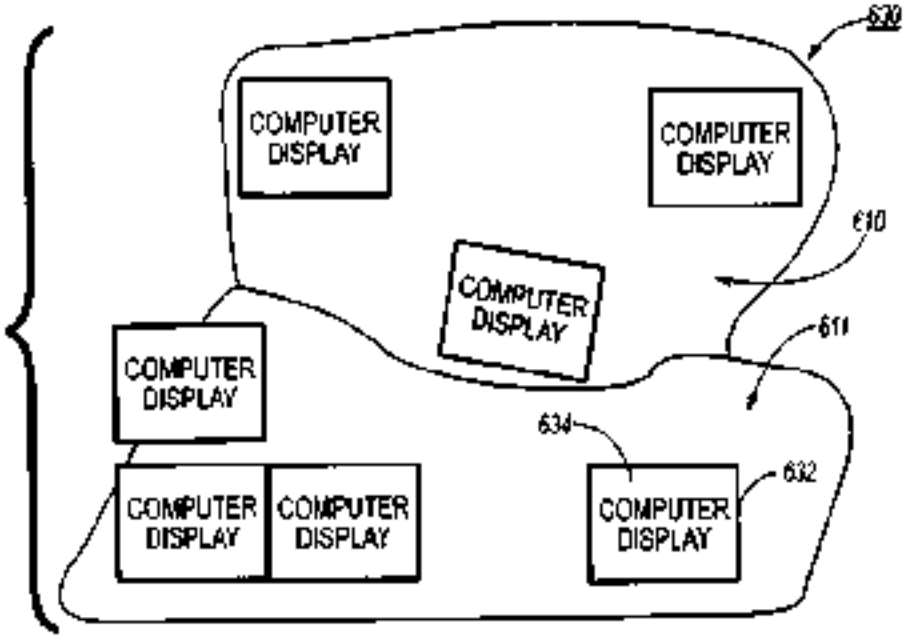


Fig. 45

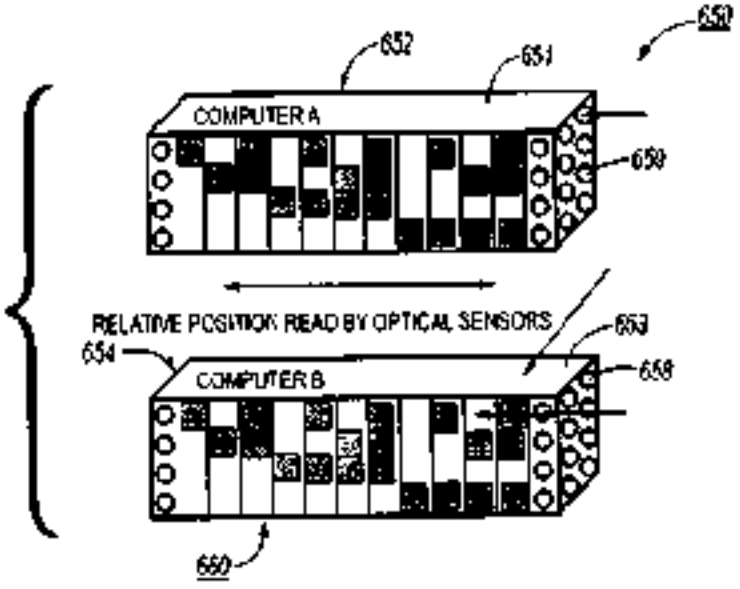


Fig. 46

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Fitbit v. Immersion

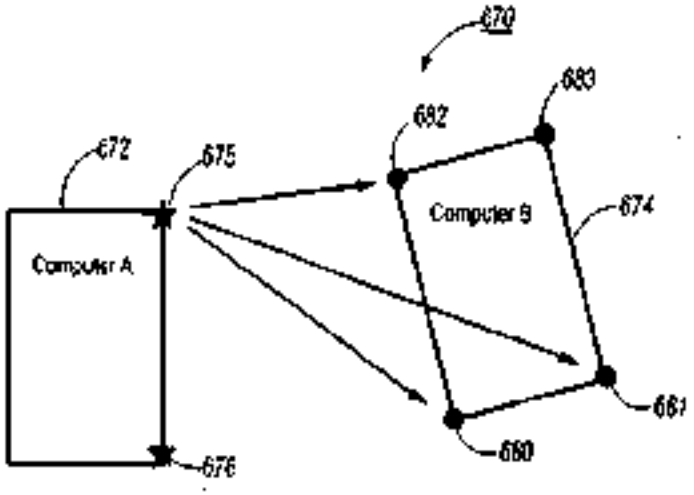


Fig. 47

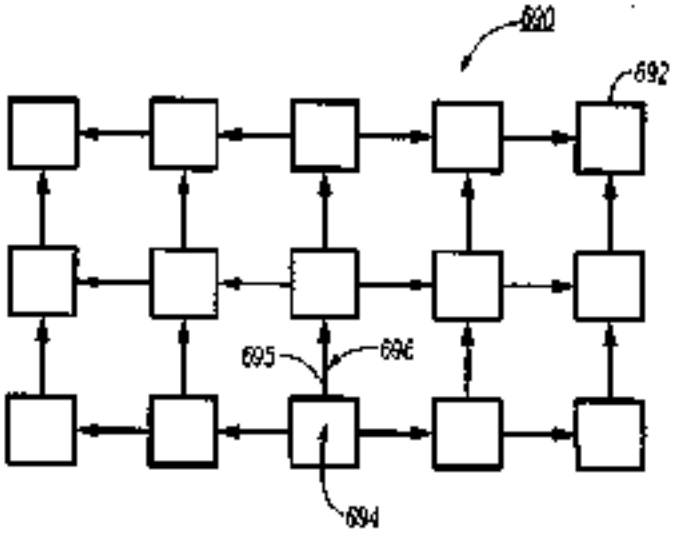


Fig. 48

FITBIT 1002
Fitbit v. Immersion

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(54) Method for giving notice of an incoming call through a specific vibration pattern in a mobile communication terminal

(57) A method for giving notice of incoming call through vibration of a mobile communication terminal, and more particularly a method for giving notice of an incoming call through various vibration patterns. The method configures various vibration patterns according to a user's selection, sets the vibration patterns in a basic or particular incoming call notification mode of the mobile communication terminal and generates vibration based on a particular vibration pattern mapped to a particular caller telephone number set in the particular incoming call notification mode when the incoming call is received.

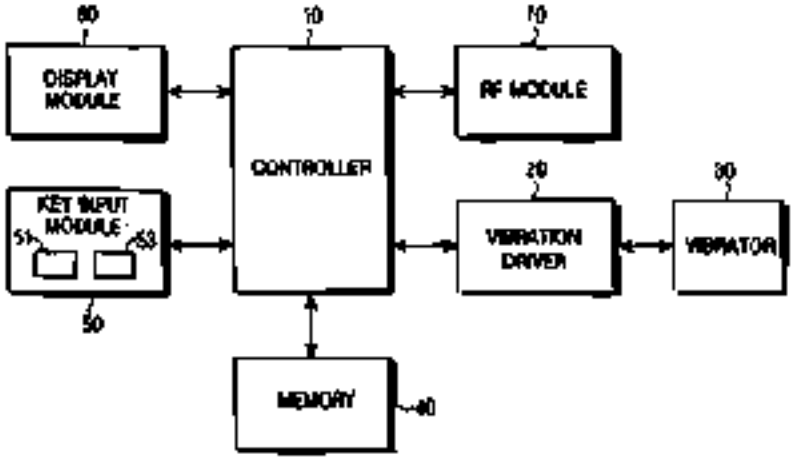


FIG. 1

EP 1 401 185 A1

FITBIT 1002
Fitbit v. Immersion

Description

[0001] The present invention relates to a method for giving notice of an incoming call in a mobile communication terminal and more particularly to a method for giving notice of an incoming call through various vibration patterns.

[0002] Conventionally, as a method for giving notice of an incoming call, a mobile communication terminal generates a ringtone, melody, or vibration. In a method for generating the ringtone and melody, the mobile communication terminal generates a predetermined audible indication upon receiving the incoming call. Moreover, in a method for generating the vibration the mobile communication terminal generates the vibration by driving a vibration motor when the incoming call is received.

[0003] Because the vibration of the mobile communication terminal does not annoy those around a person using the mobile communication terminal in public places, for example a movie theater, the terminal's vibration mode is used for giving notice of an incoming call in the public places. According to a vibration on/off setting, the mobile communication terminal generates vibration based on a fixed vibration pattern.

[0004] As mobile communication terminals are widely used, various supplementary functions are provided to terminal users. One of the supplementary functions, a caller ID service, provides a telephone number of a caller to a mobile communication terminal of a called party. Through the caller ID service, the mobile communication terminal of the called party can display the caller's telephone number received so that the called party can identify the caller of an incoming call. Moreover, the mobile communication terminal can store sound for particular incoming call notification so that the sound can be mapped to a telephone number previously stored by the user. Thus, the mobile communication terminal can generate the sound for particular incoming call notification according to a received telephone number of a caller. Therefore the user can identify the caller of the incoming call through the mobile communication terminal without a special operation.

[0005] However, when the conventional mobile communication terminal gives notice of the incoming call by the vibration a special operation is needed for identifying the caller because a vibration pattern is fixed. In particular, a visually handicapped person can never identify the caller of the incoming call before communicating with the caller.

[0006] It is the object of the present invention to provide a method for giving notice of an incoming call by providing caller information through various vibration patterns.

This object is solved by the subject matters of the independent claims. Preferred embodiments are defined by the dependent claims.

[0007] In accordance with an aspect of the present invention the above and other objects are accomplished by a method for giving notice of an incoming call in a mobile communication terminal, comprising the steps of: a) configuring and storing a plurality of vibration patterns according to a user's input, the vibration patterns being made up of information associated with time periods for which vibration generation is maintained, time periods for which vibration generation stops, and intensity of vibration for each time period; b) setting a vibration pattern of the stored vibration patterns for a particular telephone number of previously stored telephone numbers in a particular incoming call notification mode; and c) when an incoming call is received from a caller, generating vibration based on the set vibration pattern if the caller's telephone number matches the particular telephone number.

[0008] The above features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which

Fig. 1 is a block diagram illustrating a configuration of a mobile communication terminal in accordance with the present invention;

Fig. 2 is a flow chart illustrating a procedure of configuring a vibration pattern in accordance with an embodiment of the present invention;

Fig. 3 is a flow chart illustrating a procedure of setting a configured vibration pattern in accordance with an embodiment of the present invention;

Fig. 4 is a flow chart illustrating a procedure of setting a particular vibration pattern in accordance with an embodiment of the present invention;

Fig. 5 is a flow chart illustrating a procedure of giving notice of an incoming call in accordance with an embodiment of the present invention; and

Fig. 6 is a view illustrating vibration pattern graphs in accordance with an embodiment of the present invention.

[0009] Preferred embodiments of the present invention will be described in detail hereinbelow with reference to the annexed drawings. In the following description, detailed descriptions of known functions and configurations incorporated herein will be omitted when it may make the subject matter of the present invention rather unclear.

[0010] A configuration of a mobile communication terminal to which the present invention is applied will be described with reference to Fig. 1. Fig. 1 is a block diagram illustrating a configuration of a mobile communication terminal to which the present invention is applied. As illustrated in Fig. 1, the mobile communication terminal includes a controller 10, a vibration driver 20, a vibrator 30, a memory 40, a key input module 50, a display module 60, and a RF (Radio Frequency) module 70.

[0011] The controller 10 carries out an entire control operation of the mobile communication terminal. Under control of the controller 10, the RF module 70 carries

EP 1 401 185 A1 (continued)

FITBIT 1002
Fitbit v. Immersion

out transmission and reception of voice data and control data. the display module 60 displays various messages, and the vibrator driver 20 drives the vibrator 30 so that vibration can be generated. When the vibrator is generated in response to an incoming call in accordance with the present invention, intensity of the vibration variest with time for which vibration is generated. The controller 10 controls voltage applied to the vibration driver 20 according to a vibration pattern stored in the memory 40. The vibration driver 20 drives the vibrator 30 on the basis of magnitude of the applied voltage so that the intensity of the vibration can be adjusted.

[0012] The key input module 50 includes a plurality of numeric keys and function keys and outputs key input data corresponding to a key pressed by the user. In accordance with the present invention, the key input module 50 includes an intensity adjustment key 51 and a time adjustment key 53. When a vibration pattern is configured, a function of adjusting intensity of vibration is allocated to the intensity adjustment key 51 and a function of adjusting a time period for which vibration generation is maintained and a time period for which vibration generation stops is allocated to the time adjustment key 53. In accordance with the present invention, numeric keys or direction keys can be employed as the intensity adjustment key 51 and the time adjustment key 53. In accordance with the embodiment of the present invention, volume adjustment keys positioned on a left side of the mobile communication terminal can be allocated as keys having a function of adjusting the intensity for vibration, and left and right direction keys can be allocated as keys having a function of adjusting each time period.

[0013] The memory 40 stores program data necessary for controlling an operation of the mobile communication terminal and stores data generated while the mobile communication terminal is controlled. In accordance with the present invention, the memory 40 additionally stores program data for a "vibration mode menu" and a plurality of vibration patterns. Moreover, the memory 40 saves a list of telephone numbers. Through the vibration mode menu, various vibration patterns can be configured according to the user's selection. Some of the configured vibration patterns can be set in a basic incoming call notification mode.

[0014] Alternatively, a particular telephone number can be mapped to a particular vibration pattern set in a particular incoming call notification mode, and the vibration of a corresponding vibration pattern can be generated according to a received telephone number of a caller when the mobile communication terminal receives an incoming call. The vibration mode menu as described above includes a vibration pattern configuration option and a vibration pattern setting submenu in accordance with the embodiment of the present invention. The vibration pattern is configured as a first vibration pattern graph 3 and a second vibration pattern graph 5 as illustrated in Fig. 6. The first and second vibration pattern graphs 3 and 5 show the generation of vibration and the intensity of vibration, varying with time.

[0015] The controller 10 of the mobile communication terminal configures and stores the various vibration patterns in response to the user's selection. The controller 10 can set a vibration pattern of the stored vibration patterns as the basic incoming call notification mode. Alternatively, a particular telephone number can be mapped to a particular vibration pattern set in the particular incoming call notification mode, and the vibration of a corresponding vibration pattern can be generated according to a received telephone number of a caller when the mobile communication terminal receives an incoming call. This procedure will be described with reference to Figs. 2 to 6.

[0016] First, a procedure of configuring a vibration pattern will be described with reference to Figs. 2 and 4. Fig. 2 is a flow chart illustrating a procedure of configuring a vibration pattern in accordance with an embodiment of the present invention, and Fig. 4 is a view illustrating vibration pattern graphs in accordance with an embodiment of the present invention. Referring to Fig. 2, the controller 10 recognizes that a user has selected a vibration pattern configuration option in step 101. In step 103, the controller 10 switches an operating mode to a vibration pattern configuration mode. In step 105, the controller 10 commands the display module 60 to display an initial screen image 1 for a vibration pattern configuration graph as illustrated in Fig. 4. The initial screen image 1 for a vibration pattern configuration graph is a screen image for visually showing a vibration pattern to be configured by the user. The vibration pattern configuration graph includes a time axis T and an intensity axis S. The time axis T shows time periods for which vibration generation is maintained and time periods for which vibration generation stops. A time unit "t" of the time axis T depends upon mechanical characteristics of a vibration motor, a minimum time unit of a timer of an operating system of the mobile communication terminal, etc. An necessary unit "s" of the intensity axis S depends upon intensity of vibration capable of being recognized by the user.

[0017] After the controller 10 commands the display module 60 to display the initial screen image 1, the controller 10 configures a vibration pattern as the vibration pattern graph shown in Fig. 6 according to the intensity adjustment key 51 and the time adjustment key 53 inputted by the user and then commands the display module 60 to display a graph of the configured vibration pattern. For example, through the intensity adjustment key 51 and the time adjustment key 53, the user sets a first time period of "1t" and first intensity of "1s" of vibration to be generated for the first time period of "1t". The user then sets a second time period of "1t" after the first time period and second intensity of "2s" of vibration to be generated for the second time period of "1t". The user then sets a third time period of "2t" after the second time period and third intensity of "4s" of vibration to be gen-

FITBIT 1002
Fitbit v. Immersion

ecified for the third time period of "2". The user then sets a fourth time period of "4" after the third time period and a fourth intensity of "3.5" of vibration to be generated for the fourth time period of "4". The user then sets a fifth time period of "2" after the fourth time period and fifth intensity of "1.5" of vibration to be generated for the fifth time period of "2". If the user can input the vibration pattern in the mobile communication terminal by manipulating the keys as described above, the controller 10 of the mobile communication terminal sequentially configures the vibration pattern according to input keys and then commands the display module 60 to display a vibration pattern graph as the first vibration pattern graph 3 shown in Fig. 6. The user can arbitrarily configure the vibration pattern and configure the vibration pattern as the second vibration pattern graph 5 shown in Fig. 6. As described above, the vibration pattern graph is displayed so that the user can configure the vibration pattern.

[0018] Returning to Fig. 2, the controller 10 determines in step 107 whether a key for vibration pattern configuration completion is input and then proceeds to step 109 if the key for vibration pattern configuration completion is input. Otherwise, the controller 10 continues to configure the vibration pattern in the above step 105. In step 109, the controller 10 stores the configured vibration pattern and then registers it to a list of vibration patterns. At this time, a storage format of vibration patterns stored in the memory 40 is as follows.

{(Time Period, Vibration Intensity)}

[0019] A storage format of the second vibration pattern graph shown in Fig. 6 is as follows.

{(1, 1), (1, 5), (2, 4), (3, 2), (2, 0), (3, 3)}

[0020] A procedure of setting the stored vibration patterns in an incoming call notification mode will be described with reference to Figs. 3 and 4. Fig. 3 is a flow chart illustrating a procedure of setting a configured vibration pattern in accordance with an embodiment of the present invention, and Fig. 4 is a flow chart illustrating a procedure of setting a particular vibration pattern in accordance with an embodiment of the present invention.

[0021] Referring to Fig. 3, in step 201, a vibration pattern setting submenu is selected by the user. In step 203, the controller 10 switches an operating mode to a vibration pattern setting mode and then commands the display module 60 to display a basic vibration pattern setting option and a particular vibration pattern setting option contained in the vibration pattern setting submenu. The basic vibration pattern setting option is for giving notice of an incoming call on the basis of a basic vibration pattern in the basic incoming call notification mode when the mobile communication terminal receives the incoming call. The particular vibration pattern setting option is for giving notice of an incoming call on the basis of a particular vibration pattern mapped to a particular caller telephone number in the particular incoming call notification mode when the mobile communication terminal receives the incoming call.

[0022] In step 205, the controller 10 determines whether the user selects the basic vibration pattern setting option. The controller 10 proceeds to step 207 if the user selects the basic vibration pattern setting option. Otherwise, the controller 10 proceeds to step 209. In step 207, the controller 10 sets, in the basic incoming call notification mode, a vibration pattern of the vibration patterns previously registered according to the user's selection.

[0023] If, in step 205, the user has selected the particular vibration pattern setting option, i.e., if the user does not select the basic vibration pattern setting option, the controller 10 sets, in the particular incoming call notification mode, a vibration pattern of the vibration patterns previously registered for a particular caller telephone number according to the user's selection in step 209.

[0024] A procedure of setting a particular vibration pattern for a particular telephone number in the particular incoming call notification mode in the above step 209 will be described in detail with reference to Fig. 4. Referring to Fig. 4, the controller 10 switches an operating mode to the particular vibration pattern setting mode, if the user selects the particular vibration pattern setting option at the above step 209 of Fig. 3. The controller 10 commands the display module 60 to display a list of telephone numbers previously registered at step 301. The controller 10 recognizes a telephone number selected by the user at the above step 303 and then proceeds to step 305. In step 306, the controller 10 commands the display module 60 to display a list of registered vibration patterns. In step 307, the controller 10 recognizes a vibration pattern selected by the user. In step 309, the controller 10 sets or maps the vibration pattern selected in the above step 307 and the telephone number selected in the above step 303 in the particular incoming call notification mode.

[0025] Hereinafter, a description will be given of an operation of the controller 10 when the incoming call is received while an incoming call notification mode is set through the above-described procedure with reference to Fig. 5. Fig. 5 is a flow chart illustrating a procedure of giving notice of an incoming call in accordance with an embodiment of the present invention. After an incoming call is received in step 401, the controller 10 proceeds to step 403. In step 403, the controller 10 determines whether an operating mode of the mobile communication terminal is currently a vibration mode. If the operating mode of the mobile communication terminal is currently the vibration mode, the controller 10 proceeds to step 405. If the operating mode of the mobile communication terminal is not currently the vibration mode, the controller 10 proceeds to step 417. In step 417, the controller 10 gives notice of the incoming call according to another operating mode set by the user.

[0026] In step 405, the controller 10 determines whether the incoming call notification mode is a basic

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FITBIT 1002
Fitbit v. Immersion

incoming call notification mode. If the basic incoming call notification mode is set, the controller 10 proceeds to step 407. If the basic incoming call notification mode is not set, the controller 10 proceeds to step 415. In step 415, the controller 10 controls the vibrator 30 through the vibration driver 20 so that the vibrator 30 can generate vibration based on the set vibration pattern for predetermined time periods until the user inputs a response to the vibration.

[0027] On the other hand, the controller 10 determines in the above step 407 whether the incoming call notification mode is a particular incoming call notification mode. If the particular incoming call notice is set, the controller 10 proceeds to step 409. If the particular incoming call notice is not set, the controller 10 proceeds to step 413. In step 415, the controller 10 controls the vibrator 30 through the vibration driver 20 so that the vibrator 30 can generate general vibration for a predetermined period of time until the user gives a response to the vibration.

[0028] In step 409, the controller 10 determines whether a telephone number of an incoming call matches a telephone number mapped to a particular vibration pattern. If a caller's telephone number of an incoming call matches a telephone number mapped to a particular vibration pattern, the controller 10 proceeds to step 411. If a caller's telephone number of an incoming call does not match a telephone number mapped to a particular vibration pattern, the controller 10 proceeds to step 413. In step 411, the controller 10 controls the vibrator 30 through the vibration driver 20 so that the vibrator 30 can generate vibration based on the particular vibration pattern mapped to the caller's telephone number for predetermined time periods until the user inputs a response to the vibration.

[0029] As is apparent from the description above, the present invention provides a method for giving notice of an incoming call by generating vibrations of different vibration patterns based on a caller's telephone number when the mobile communication terminal receives the incoming call.

[0030] Although preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions, and substitutions are possible, without departing from the scope of the invention. Therefore, the present invention is not limited to the above-described embodiments but the present invention is defined by the claims, which follow along with their full scope of equivalents.

Claims

1. A method for giving notice of an incoming call in a mobile communication terminal comprising the steps of

   setting a vibration pattern in an incoming call notification mode; and

   when an incoming call is received, generating vibration based on the set vibration pattern.

2. The method as set forth in claim 1, wherein the vibration pattern is set for a particular telephone number of previously stored telephone numbers in a particular incoming call notification mode.

3. The method as set forth in claim 1 or 2, wherein the incoming call is received from a caller.

4. The method as set forth in claim 2 or 3, wherein the vibration is generated based on the set vibration pattern if a telephone number of the incoming call matches the particular telephone number.

5. The method as described in one of claims 1 to 4 further comprising configuring and storing a plurality of vibration patterns according to a user's input, the plurality of vibration patterns including information associated with time periods for which vibration generation is maintained, time periods for which vibration generation stops, and intensity of vibration for each time period.

6. The method as set forth in claim 5, wherein the plurality of vibration patterns are configured by inputs of an intensity adjustment key and a time adjustment key from a user.

7. The method as set forth in claim 6, wherein the intensity adjustment key and the time adjustment key are volume adjustment keys of the mobile communication terminal.

8. The method as set forth in claim 5 or 6, wherein the configuring and storing the plurality of vibration patterns according to a user's input comprises the steps of

   displaying a graph corresponding to information associated with time periods for which vibration generation is maintained, time periods for which vibration generation stops, and intensity of vibration for each time period, in response to the inputs of the intensity adjustment key and the time adjustment key from the user; and

   storing a vibration pattern based on the displayed graph in response to a configuration completion command from the user.

9. The method as set forth in one of claims 5, 6 or 8, wherein the plurality of vibration patterns are displayed in form of a graph according to a user's request.

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FITBIT 1002
Fitbit v. Immersion

10. The method as set forth in one of claims 5, 6, 8 or 9, wherein the plurality of application patterns are displayed in said form according to a user's request.

11. A mobile communication terminal adapted to operate according to one of claims 1 to 10.

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FITBIT 1002
Fitbit v. Immersion

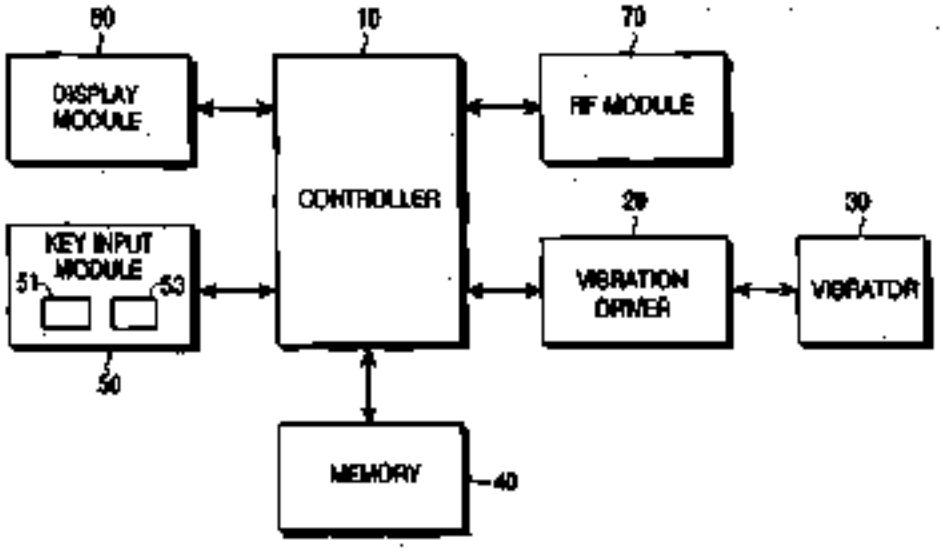


FIG.1

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Fitbit v. Immersion

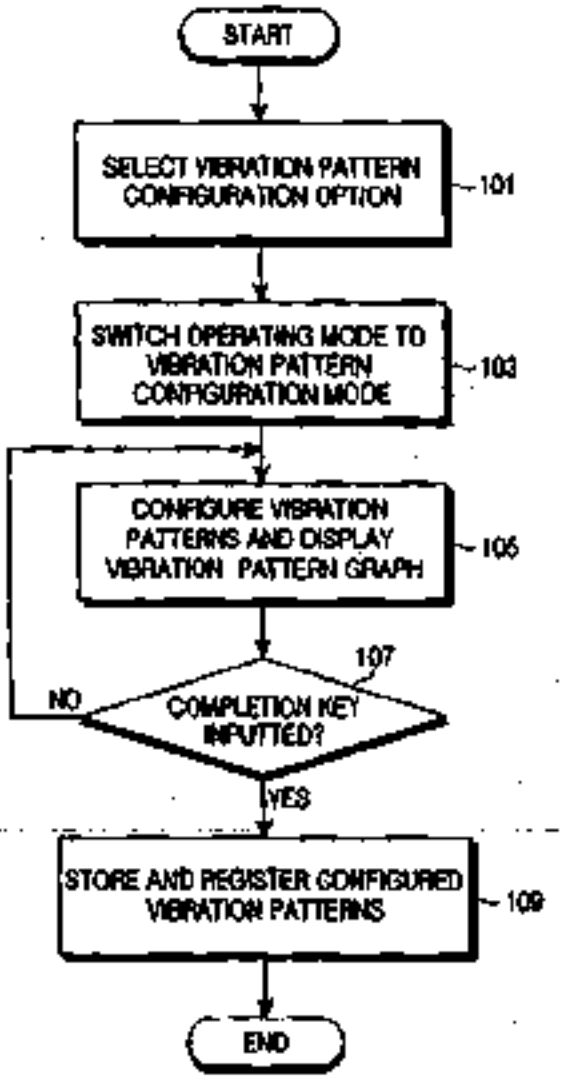


FIG.2

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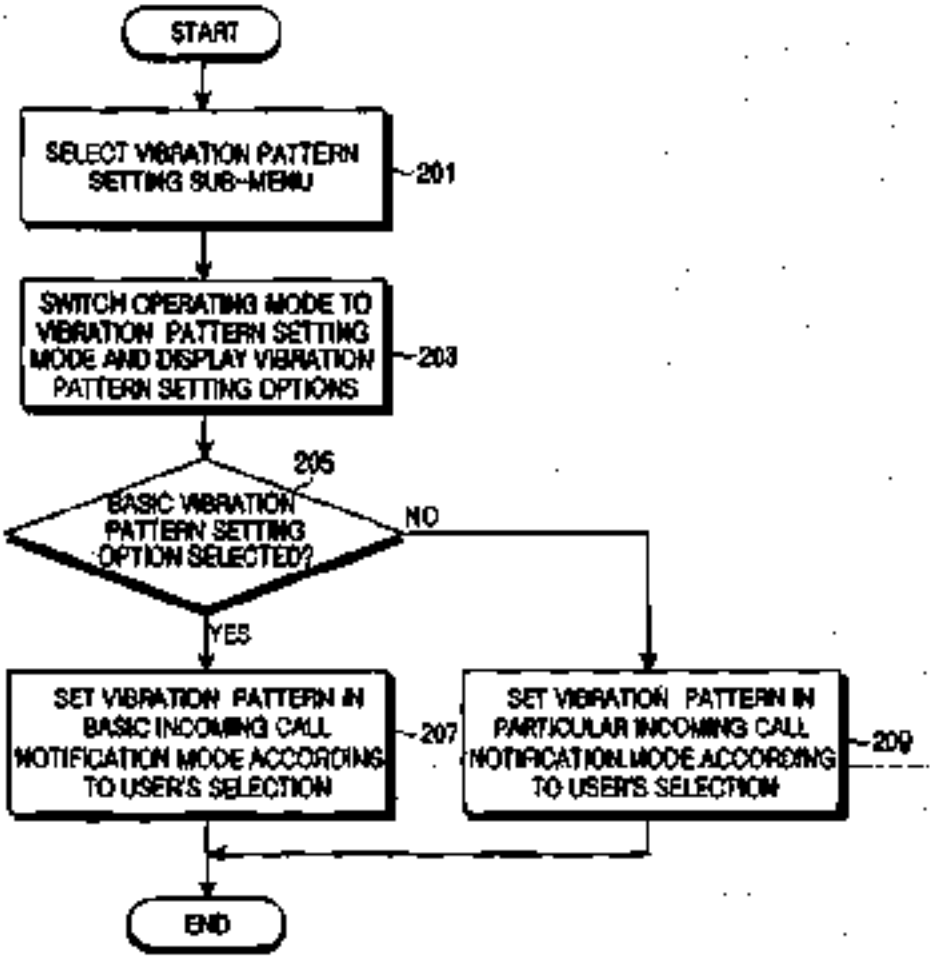


FIG.3

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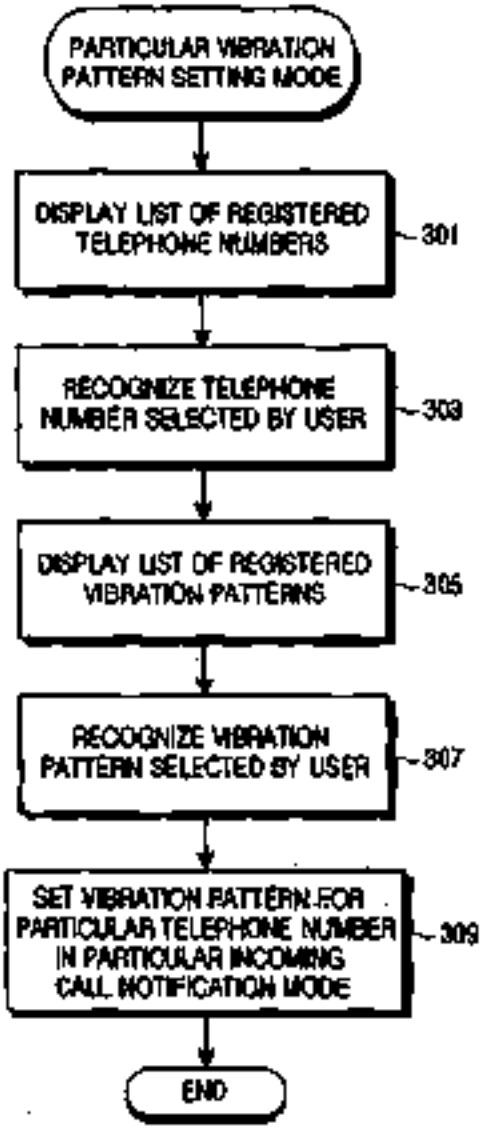


FIG.4

FITBIT 1002
Fitbit v. Immersion

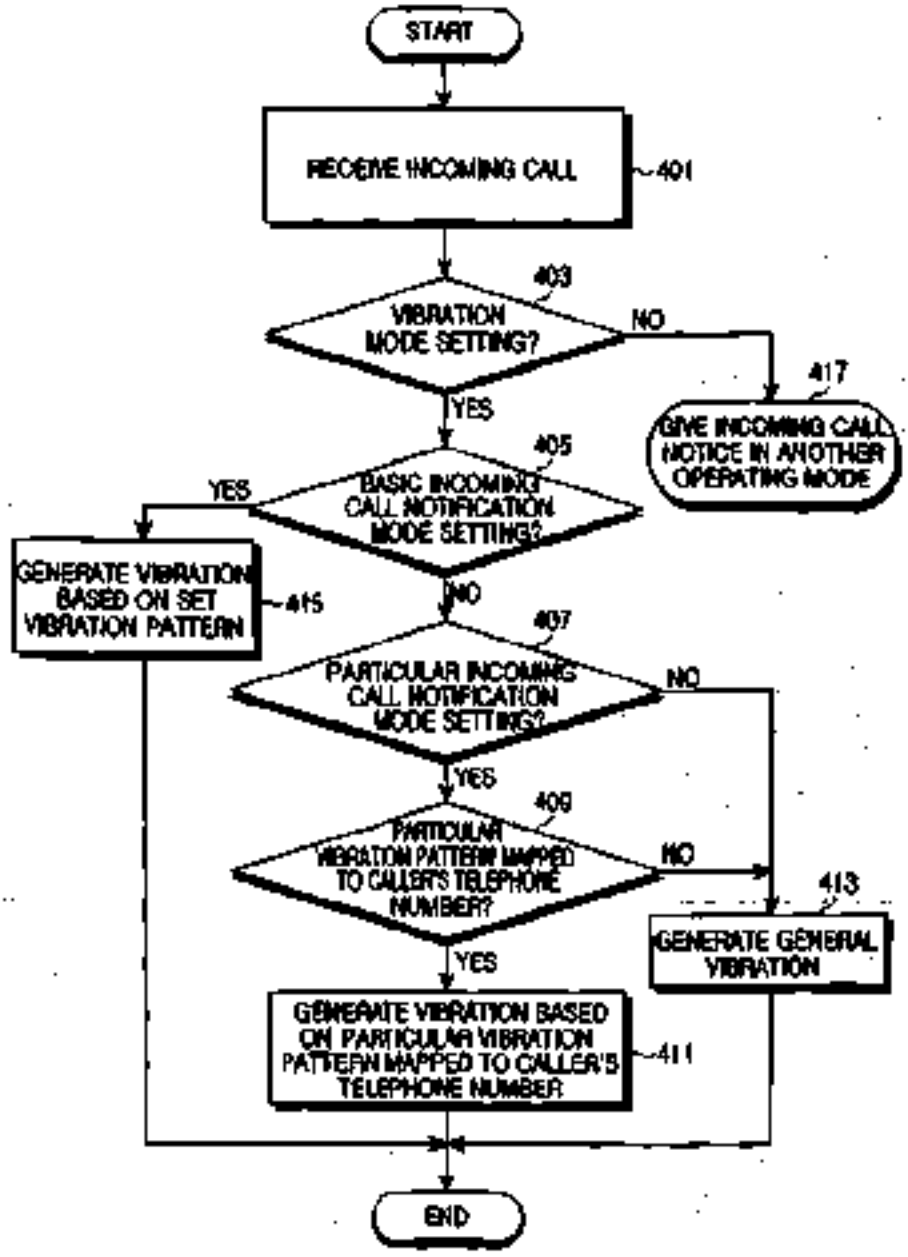
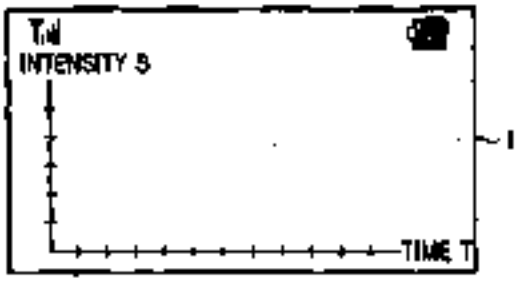
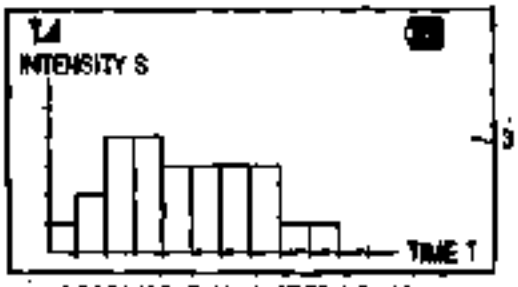


FIG.5

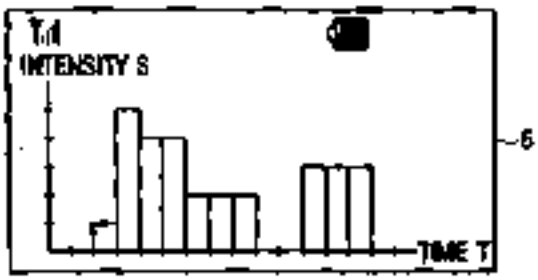
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Fitbit v. Immersion



INITIAL SCREEN IMAGE FOR VIBRATION PATTERN CONFIGURATION



FIRST VIBRATION PATTERN GRAPH



SECOND VIBRATION PATTERN GRAPH

FIG.6

FITBIT 1002
Fitbit v. Immersion

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 02 1328

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 6 180 489 A (PERRY THERESA SUE ET AL) 12 December 2000 (2000-12-12) * abstract * * column 1, line 5-18 * * column 5, line 33 - column 6, line 66 * * figures 2-4 *	1-11	H04M19/04
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H04M

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	6 November 2003	Pohl, M

CATEGORY OF CITED DOCUMENTS

T: theory or principle underlying the invention
E: earlier patent document, but published on, or after the filing date
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FITBIT 1002
Fitbit v. Immersion

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO. EP 03 02 1324

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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FITBIT 1002
Fitbit v. Immersion

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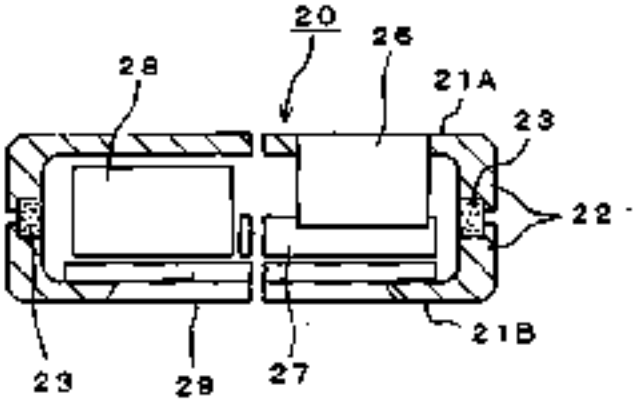
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(54) INPUT DEVICE HAVING TACTILE FUNCTION, INFORMATION INPUT METHOD, AND ELECTRONIC DEVICE

(57) Digital camera (100) shown in FIG. 4 has input detection section (24), which has an input detection plane, that detects a touching position of a finger (30a) of an operator and a sliding speed of the finger (30a), (32) that computes a vibration pattern based on the sliding speed detected by the input detection section (24), and vibration section that vibrates the input detection plane based on the vibration pattern thus computed. The (32) computes a vibration pattern of the input detection plane to generate vibrations from a low frequency and small amplitude to a high frequency and large amplitude, as the finger (30a) goes away from a position where it has touched the input detection plane.

FIG. 3A

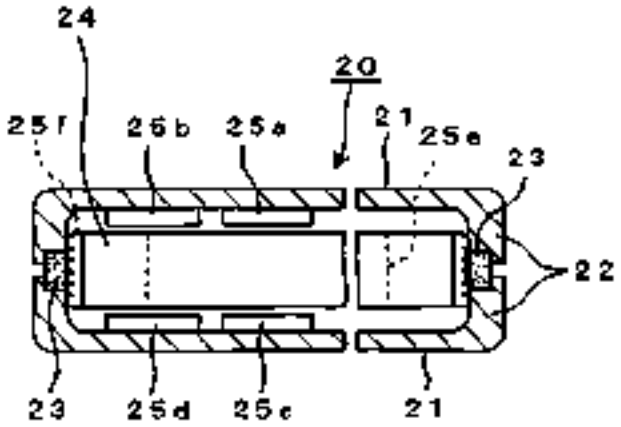


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EP 1 731 993 A1

FITBIT 1002
Fitbit v. Immersion

FIG. 3B



FITBIT 1002
Fitbit v. Immersion

Description

TECHNICAL FIELD

[0001] The present invention relates to an input device having a haptic function, an information input method, and an electronic device that are well applicable to a digital camera, information-processing apparatus, portable telephone, information portable terminal unit, etc. to which information is input by performing haptic operation on an input detection plane in a sliding manner. More specifically, it relates to those having vibration means for vibrating the input detection plane by using a vibration pattern composed on the basis of a haptic position by an operation body on this input detection plane and a sliding speed of this operation body, thereby enabling to be generated plural kinds of vibrations which have different period of vibration time (amplitude, frequency, and the number of times of vibration) for each separate operator and which corresponds to a sliding speed or a sliding pace of one of the finger etc. of the operator, which is the operation body.

BACKGROUND ART

[0002] Recently, users (operators) have come to photograph a subject by using a digital camera having many kinds of operation modes and to take various contents into a portable terminal unit such as a portable telephone or a personal digital assistant (PDA) and utilize the contents. These digital cameras, portable terminal unit, etc. each has an input device. As the input device, a keyboard and a touch panel having both of input means such as a JOG dial and display portion and the like are used in many cases.

[0003] As for this kind of digital camera, portable terminal unit, etc., a portable information terminal and programs therefor have been disclosed in Patent Literature 1 of Japan (Japanese Patent Application Laid Open Publication No. 2003-256120, pp. 2-3, FIG. 1). This portable information terminal has a display portion on its terminal unit body and a JOG dial at approximately middle of the body. The JOG dial is provided at a position different from that of the display portion. This JOG dial is rotated clockwise or counterclockwise so that an image on the display portion may be rotated or interlocked with that rotation. Moreover, by pressing the JOG dial toward the body, an image range is changed. By configuring an information terminal in such a manner, a variety of kinds of operations can be performed more comfortably. This is the JOG dial employs a mechanical structure so that the operator may be given a haptic sense synchronized with any changes in contents displayed on the display portion for each time when he or she selects an input item on the display portion.

[0004] Further, as the other portable terminal units having a haptic input function, they are input function-provided display portion that combines any ones of various types of touch panels and display portions. By this type of portable terminal unit, an operator selects an input item by directly touching an icon display position in a space of two dimensions other than a depth-wise direction of the display portion as viewed from the operator. In such a manner, the operator can perform an input operation through a selecting (inputting, giving a touch of) a variety of icons displayed on the display portion with a smaller eyeball movement than the JOG dial type, thus more directly selecting an input item.

[0005] It is to be noted that an electronic device relative to the past examples such as a digital camera, an information processing apparatus, a portable telephone, and an information portable terminal unit that are provided with a haptic input function have the following problems.

i. By a portable information terminal in which a display portion and a JOG dial are separated in arrangement as disclosed in Patent Literature 1, an operator can get only a single haptic sense generated by a mechanical structure, so that this haptic sense does not have a large impact on him or her personally.

ii. By an input function-provided portable terminal unit that combines any ones of various types of touch panels and display portions, when having selected an icon on the display portion, the operator cannot get a haptic sense synchronized with that selection.

iii. In this connection, in the case of configuring a haptic function-provided input device by combining a plurality of vibrations and input means so that a haptic sense may be obtained through an operation to straightly locate its input operation surface, it is predicted that mere combination of the mechanism of separately arranging a display portion and input means as disclosed in Patent Literature 1 and an input function that combines various types of touch panels and display portion will not give a sufficient haptic sense if the operator touches the input operation surface at different speeds.

DISCLOSURE OF THE INVENTION

[0006] A haptic function-provided input device related to the present invention is a device that performs touch operation to slide on an input detection plane. The input device has input detection means, which has the input detection plane,

EP 1 731 998 A1 (...)

FITBIT 1002
Fitbit v. Immersion

for detecting a touching position of an operation body and a sliding speed of the operation body, computation means for computing a vibration pattern based on the sliding speed detected by the input detection means, and vibration means for vibrating the input detection plane based on the vibration pattern computed by the computation means.

[0007] According to a haptic function-provided input device related to the present invention, on the assumption that performing touch operation to slide on an input detection plane, input detection means having the input detection plane detects a touching position of finger of an operator, which is one example of an operation body, and a sliding speed of this finger. Computation means computes vibration patterns based on the sliding speed of the finger etc. of the operator detected by the input detection means.

[0008] For example, the computation means computes a vibration pattern of the input detection plane to generate vibrations from a low frequency and small amplitude to a high frequency and large amplitude, as the operation body goes away from a position where it has touched the input detection plane. Therefore, it is possible to generate plural kinds of vibrations which have different vibration patterns (amplitude, frequency, and vibration time) for each operator and which correspond to a sliding speed or a sliding lapse of time of the finger of the operator.

[0009] An information input method related to the present invention is a method for inputting information by performing touch operation to slide on an input detection plane. The method has the steps of detecting a touched position and a sliding speed of an operation body that touches the input detection plane, computing a vibration pattern based on the touched position and the sliding speed that are detected, and vibrating the input detection plane based on the computed vibration pattern.

[0010] According to the information input method related to the present invention, in a case of inputting information by performing touch operation to slide on an input detection plane, it is possible to generate plural kinds of vibrations which have different vibration patterns for each operator and which correspond to a sliding speed or a sliding lapse of time of the finger etc. of the operator, which is the operation body.

[0011] An electronic device related to the present invention is an electronic device having a haptic function-provided input device that performs touch operation to slide on an input detection plane and display means for displaying a display image based on information input by the input device. The input device includes input detection means, which has the input detection plane, for detecting a touching position of an operation body and a sliding speed of the operation body, computation means for computing a vibration pattern based on the sliding speed detected by the input detection means, and

vibration means for vibrating the input detection plane based on the vibration pattern computed by the computation means.

[0012] According to the electronic device related to the present invention, the haptic function-provided input device related to the present invention is applied thereto, so that in the case of inputting information by performing touch operation to slide on an input detection plane, it is possible to generate plural kinds of vibrations which have different vibration patterns for each operator and which correspond to a sliding speed or a sliding lapse of time of the finger etc. of the operator, which is the operation body.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is a perspective view of a digital camera 100 for illustrating a configuration thereof to which a haptic function-provided input device according to each of the embodiments of the present invention is applied;

FIG. 2 is a perspective view of a camera body 20 for illustrating a configuration of a rear thereof;

FIG. 3A is a cross-sectional view of the camera body 20 for illustrating a configuration thereof as viewed from a bottom thereof;

FIG. 3B is a cross-sectional of the camera body 20 for illustrating a configuration thereof as viewed from a top thereof;

FIG. 4 is a block diagram for showing an internal configuration of the digital camera 100;

FIG. 5 is a perspective view of an input detection section 24 for showing an example of operation thereof;

FIG. 6A is a diagram for showing an example of setting input positions P1-P5 on the input detection section 24;

FIG. 6B is a drawing for showing an example of a relationship between the input detection section 24 and input points P1-P5;

FIG. 7A is a drawing for showing an example of setting input positions P1-P5 in operation case I;

FIG. 7B is a drawing for showing an example of a vibration pattern at time point Tp2+Tα between input positions P2 and P4 in operation case I;

FIG. 7C is a drawing for showing an example of a vibration pattern at time point Tp2+Tα+Tβ between input positions P2 and P4 in operation case I;

FIG. 7D is a drawing for showing an example of a vibration pattern at time point Tp2+Tα+2XTβ between input positions P2 and P4 in operation case I;

FIG. 7E is a drawing for showing an example of a vibration pattern at time point Tp2+Tα+3XTβ between input

FITBIT 1002
Fitbit v. Immersion

positions P2 and P4 in operation case I;
FIG. 7F is a drawing for showing an example of a vibration pattern at time point Tp2+To+4XTβ between input positions P2 and P4 in operation case I;
FIG. 7G is a drawing for showing an example of a haptic image between input points P2 and P4 in operation case I;
FIG. 8A is a drawing for showing an example of setting input positions P1-P5 in operation case II;
FIG. 8B is a drawing for showing an example of a vibration pattern at time point Tp2+To between input positions P2 and P4 in operation case II;
FIG. 8C is a drawing for showing an example of a vibration pattern at time point Tp2+To+Tβ between input positions P2 and P4 in operation case II;
FIG. 8D is a drawing for showing an example of a vibration pattern at time point Tp2+To+2XTβ between input positions P2 and P4 in operation case II;
FIG. 8E is a drawing for showing an example of a vibration pattern at time point Tp2+To+8XTβ between input positions P2 and P4 in operation case II;
FIG. 8F is a drawing for showing an example of a vibration pattern at time point Tp2+To+4XTβ between input positions P2 and P4 in operation case II;
FIG. 8G is a drawing for showing an example of a haptic image between input points P2 and P5 in operation case II;
FIG. 9A is a drawing for showing an example of a vibration pattern to an actuator 25e when a sliding speed is VT, related to a conventional method;
FIG. 9B is a drawing for showing an example of a vibration pattern to another actuator 25f when the sliding speed is VT, related to the conventional method;
FIG. 9C is a drawing for showing an example of a long lapse of time of touching an input detection section related to the conventional method;
FIG. 9D is a drawing for showing an example of a vibration pattern to the actuator 25e when the sliding speed is V2, related to the conventional method;
FIG. 9E is a drawing for showing an example of a vibration pattern to another actuator 25f when the sliding speed is V2, related to the conventional method;
FIG. 9F is a drawing for showing an example of a short lapse of time of touching the input detection section related to the conventional method;
FIG. 10A is a drawing for showing an example of a vibration pattern to an actuator 25e when the sliding speed V=VT, related to a method of the present invention;
FIG. 10B is a drawing for showing an example of a vibration pattern to another actuator 25f when the sliding speed is V=VT, related to the method of the present invention;
FIG. 11A is a drawing for showing an example of setting input positions P1-P5 at the time of a sliding speed of VT when finger moves slow according to the method of the present invention and the conventional method;
FIG. 11B is a drawing for showing an example of a haptic image at the time of the sliding speed of VT according to the method of the present invention and the conventional method;
FIG. 11C is a drawing for showing an example of setting input positions P1-P5 at the time of a sliding speed of V2 when the finger moves fast according to the method of the present invention and the conventional method;
FIG. 11D is a drawing for showing an example of a haptic image at the time of the sliding speed of V2 according to the conventional method;
FIG. 11E is a drawing for showing an example of a haptic image at the time of the sliding speed of V2 according to the method of the present invention;
FIG. 12A is a conceptual diagram for showing an example of image display before zoom-in in a zoom-in mode;
FIG. 12B is a conceptual diagram for showing an example of image display during zoom-in;
FIG. 12C is a conceptual diagram for showing an example of image display after zoom-in;
FIG. 13A is a conceptual diagram for showing an example of operations before adjustment in a volume adjustment mode;
FIG. 13B is a conceptual diagram for showing an example of operations during adjustment;
FIG. 13C is a conceptual diagram for showing an example of operations after adjustment;
FIG. 14A is a flowchart showing an information processing example (No. 1) in a digital camera 100 according to a first embodiment;
FIG. 14B is a flowchart showing an information processing example (No. 2) in the digital camera 100;
FIG. 14C is a flowchart showing an information processing example (No. 3) in the digital camera 100;
FIG. 14D is a flowchart showing an information processing example (No. 4) in the digital camera 100;
FIG. 15 is a flowchart (subroutine) showing a processing example in the zoom-in mode; and
FIG. 16 is a perspective view of a digital camera 200 according to a second embodiment for illustrating an example of a haptic function provided input mechanism used therein.

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BEST MODE FOR CARRYING OUT THE INVENTION

[0014] The present invention has solved the conventional problems, and it is an object of the present invention to provide a haptic function-provided input device, an information input method, and an electronic device that enable to be generated plural kinds of vibrations which have different vibration times for each operator and which correspond to a sliding speed or a lapse of sliding time of the finger etc. of the operator.

[0015] The following will describe one embodiment of the haptic function-provided input device, the information input method, and the electronic device related to the present invention.

[First Embodiment]

[0016] In the first embodiment, vibration means for vibrating an input detection plane in accordance with a vibration pattern computed based on a touch position and a sliding speed of an operation body on this input detection plane is provided, thereby enabling to be generated plural kinds of vibrations which have different periods of vibration time (frequency), amplitude, and the number of times) for each operator and which correspond to a sliding speed or a lapse of sliding time of the finger etc. of the operator, which is the operation body.

[0017] A digital camera 100 shown in FIG. 1 is one example of electronic devices to which a haptic function-provided input device related to the present invention is applied. This digital camera 100 has a camera body 20. The camera body 20 is constituted of a chassis 22. The chassis 22 is assembled by causing a front case 21A and a rear case 21B that are roughly box-shaped to abut against each other with a roughly square-shaped shock absorber 23 made of rubber being sandwiched between openings of these respective cases.

[0018] On an upper face plate of the chassis 22, an input detection section 24 constituting a haptic function-provided input device (input detection means) is mounted. The input detection section 24 has the input detection plane and is operated in a slide input mode. The slide input mode is referred to as an operation to perform any touch input to slide on an input detection plane when switching modes such as a playback/fast-forward mode, a zoom-out mode, a zoom-in mode, and a volume adjustment mode. As in the embodiment, besides the slide input mode, other processing modes are prepared. In these other modes, a shutter button operation mode, an erasure button operation mode, a power source button operation mode, an operation mode to switch between a standard mode and a snap mode, etc. are included. As the input detection section 24, a rectangular electrostatic input sheet is used.

[0019] Inside the front case 21A, along a longitudinal direction of the input detection section 24, actuators 25a and 25b constituting the vibration means are provided with a predetermined spacing therebetween and configured to vibrate the input detection plane based on a desired vibration pattern. Similarly, inside the rear case 21B, along a longitudinal direction of the input detection section 24, actuators 25c and 25d are provided with a predetermined spacing therebetween and configured to vibrate the input detection plane based on the desired vibration pattern. In the present embodiment, the actuators 25a and 25c are faced to each other and the actuators 25b and 25d are faced to each other. This forms the vibrations to be made strong.

[0020] Besides, the front case 21A shown in FIG. 1, is provided a lens 26, shown in FIG. 1, to have a zoom function so that an image of a subject may be formed when photographing the subject. Further, at the right corner of the front case 21A, an external interface terminal 39 is provided to connect an external device to which any information can be transferred.

[0021] The rear case 21B shown in FIG. 2 is provided with a display portion 29 to display an image to be displayed on the basis of information input by the input detection section 24. The display portion 29 is configured to perform a monitor function as well as other functions such as a finder function. As the display portion 29, a liquid crystal display (LCD) is used which has a resolution of about 640 pieces by 480 pixels.

[0022] As can be seen from a bottom of the camera body 20 shown in FIG. 3A, besides the lens 26 and the display portion 29, substrate mounting components 27 and a battery 28 are mounted inside the chassis 22. As can be seen from a top of the camera body 20 shown in FIG. 3B, the input detection section 24 and the actuators 25a-25f are mounted inside the chassis 22. The input detection section 24 shown in FIG. 3B is constituted of an electrostatic capacitive input sheet. One sheet of electrostatic capacitive input sheet is constituted of a roughly rectangular sheet, so that by pressing a plurality of predetermined positions of this electrostatic capacitive sheet, the above-described mode buttons function respectively.

[0023] In the present embodiment, at right and left positions under the input detection section 24, besides the actuators 25a-25d mounted inside the front case 21A and the rear case 21B, the actuators 25e and 25f are also mounted to vibrate the input detection plane based on a desired vibration pattern so that vibrations may propagate to, for example, an operation direction. Each of the actuators 25a-25f is constituted of a piezoelectric sheet or a piezoelectric element.

[0024] Next, a haptic function-provided input device, the digital camera 100, and a haptic feedback input method in the digital camera 100 of the present invention will be described. FIG. 4 is a block diagram for showing an internal configuration of the digital camera 100, indicating blocks of important sections of the functions constituted of the substrate mounting components 27 etc. in the chassis shown in FIGS. 1, 2, and 3A, and 3B. Like components in FIGS. 4 and 2

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are indicated by the same symbols.

[0025] The digital camera 100 shown in FIG. 4 is provided with the input detection section 24, the display portion 29, an A/D driver 31, a CPU 32, a power source unit 33, a camera 34, other devices 35, a speaker 36, and a vibration section 40.

[0026] The input detection section 24 has the input detection face as shown in FIG. 2 etc. and is configured to detect a touch position by the finger 30a of the operator as the operation body and a degree of sliding (moving speed) of the finger 30a of the operator. Although, in FIG. 2, an electrostatic capacitive input device has been described as the electrostatic capacitive sheet as for the input detection section 24, the present invention is not limited to this; any device may be used as far as it can distinguish between a cursoring and a selection function.

[0027] For example, the input detection section 24 may be an input device such as a resistance film type one, a surface acoustic wave (SAW) type one, an optical type one, or a multiple-stage type hot switch. Preferably, any input device may be used as far as it is configured to be able to give position information and force information to the CPU 32. The above-described input detection section 24 is supplied with at least position information S1 and force information S2 (pressing force), which provides an input quantity, via the operator's finger 30a.

[0028] The display portion 29 is configured to display an image to be displayed based on information input by the input detection section 24. The display portion 29 is set to perform a monitor function as well as such functions as a finder function. For example, the display portion 29 displays each of the zoom-in mode, the zoom-out mode, the playback/fast-forward mode, the volume (Vol) adjustment mode, etc. based on control information (command D) from the CPU 32.

[0029] The input detection section 24 has the A/D driver 31 connected thereto, to receive the position information S1 and the input quantity S2 output from the input detection section 24 and perform analog-to-digital conversion thereof. For example, the A/D driver 31 converts an analog signal composed of the position information S1 and the input quantity S2 into digital data in order to distinguish between the cursoring and the selection function. According to it, the A/D driver 31 detects, through computation, which is cursoring input or selection information and supplies the CPU 32 with data D3 constituted of a flag indicating either cursoring or selection, position detection data D1 or input quantity data D2. These computations may be performed in the CPU 32.

[0030] The A/D driver 31 is connected with the CPU 32 which is one example of computation means, and receives an input signal from the A/D driver 31 and supplies a command D to devices of the power source unit 33, the camera section 34, the other devices 35, the display portion 29, the speaker 36, and an actuator drive section 37.

[0031] For example, the CPU 32 has a function (algorithm) to process a sine wave form generated in the actuator drive circuit 37 by using a sliding speed of an operator 30 as a parameter in the same vibration mode. The CPU 32 is configured to compute a vibration pattern based on the sliding speed detected by the input detection section 24. In the present embodiment, the CPU 32 computes a vibration pattern of the input detection plane such that as the finger 30a of the operator goes away from a point where it has touched the input detection plane originally, the input detection plane can generate vibration pattern from low frequency and small amplitude to high frequency and large amplitude.

[0032] Further, the CPU 32 constitutes control means, and conducts variable control on input information based on the sliding speed. For example, the CPU 32 conducts such a control as to set a larger quantity of input information when the operator's finger has been slid larger than a quantity of input information when it has been slid at a standard sliding speed.

[0033] The vibration section 40 is constituted of the actuator drive circuit 37 and the actuators 28a-28f, to vibrate the input detection plane based on a vibration pattern computed by the CPU 32 in such a manner that vibrations may propagate to an operation direction thereof. The above-described CPU 32 is connected to the actuator drive circuit 37 to generate vibration control signals Sa-Sf in accordance with each command D from the CPU 32 and supply the plural actuators 28a, 28b, 28c, 28d, 28e, and 28f with the vibration control signals Sa-Sf. The vibration control signals Sa-Sf have, for example, output waveforms W1-W3, ... with sine wave shape. This enables to be driven the six actuators 28a-28f.

[0034] Further, the CPU 32 is connected to the camera 34 to photograph a subject through the above-described lens 26 in accordance with the command D. As the camera 34, an imaging device (CCD), not shown, is used to output photographed data obtained through photographing of the subject.

[0035] The other devices 35 include a storage device, an external terminal, etc. For example, the storage device stores photographed data and reads the photographed data in accordance with the command D from the CPU 32. The external terminal includes the external interface terminal 39 shown in FIG. 1 to output the command D from the CPU 32 to an external device such as a printer so that a printer mode, not shown, may be activated. The speaker 36 produces icon confirmation sound or device-handling announcing sound in accordance with the command D from the CPU 32.

[0036] The power source unit 33 is connected to the battery 29 described earlier and supplies power to the input detection section 24, the display portion 29, the A/D driver 31, the CPU 32, the camera 34, the other devices (storage device, external terminal, etc.) 35, the vibration section 40, etc.

[0037] By configuring the digital camera 100 as the above, it is possible to generate plural kinds of vibrations which correspond to a sliding speed or a lapse of sliding time of the operator's finger 30a and which have different vibration patterns (amplitude, frequency, and vibration time) for each operator. The operator 30 senses function-specific vibrations from the CPU as a haptic sense when having received vibrations through his or her finger 30a. Also, contents displayed

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on the display portion 29 are utilized so that each function can be decided through visual perception by operator's eyes and a sound produced by speaker 36 is utilized so that each function can be decided through auditory perception of his ears.

[0038] Next, an operation example will be described in which the operator gets a haptic sense from the camera body 20 with him or her sliding his or her finger 30a on the input operation face. FIG. 5 is a perspective view of the input detection section 24 for showing an example of operation on the input detection section 24, in which a portion of the operator's finger 30a is expanded.

[0039] In the present embodiment, the input detection section 24 shown in FIG. 5 has an input operation face PR and is operated in such a manner that the operator's finger 30a may be slid (go over) on this input operation face PR at a predetermined speed Vo=a. For example, a left lower portion or a right top portion in the figure is a condition where that the finger 30a is in contact with that face PR through constant force. The input operation face PR is defined to be a region enclosed by a broken line including an upper of the pressure to when the input detection section 24 is projected.

[0040] In the present embodiment, on the right and left sides of the input detection section 24 shown in FIG. 6A, the actuators 25a and 25c are respectively provided. The input detection section 24 and the actuators 25a, 25b, 25a, 25', and so on are all fixed to the chassis 22 by adhesive 27. As the input detection section 24, an electrostatic capacitive sheet (touch panel) and the like are used to detect a sliding speed of the operator's finger 30a.

[0041] In FIG. 6B, five points of positions P1-P5 are set on the input operation face PR. In the present embodiment, an example is employed in which one end of the input detection section 24 is arranged between positions P1 and P2 and the other end of the input detection section 24 is arranged between positions P4 and P5. The operator goes over the input operation face PR at a sliding speed Vo in a direction from position P1 to position P5. In this case, the CPU 32 calculates a rate of change Vx, which is detected by the input detection section 24, in input positions P1 through P5 on a time axis thereof, that is, a sliding speed Vx of the operator's finger 30a.

[0042] In the present embodiment, the input detection section 24 prepares beforehand a haptic waveform Wo when a standard rate of change in input positions P1 through P5 along the time axis thereof, that is, a standard sliding speed of the operator's finger 30a is set to Vo. Table 1 shows contents of the haptic waveform Wo with respect to the standard sliding speed Vo.

Table 1

Haptic waveform Wo with respect to rate of change Vo in position along a basic time axis	
Frequency fo	Ho, H2, H3, H4, ...
Amplitude Ao	A1, A2, A3, A4, ...
The number of times No	n1, n2, n3, n4, ...

[0043] In Table 1, fo indicates a frequency of the haptic waveform Wo, Ao indicates its amplitude, and No indicates the number of times (of its waves). At the first stage of a vibration pattern, the haptic waveform Wo has a frequency fo=H1[Hz], an amplitude Ao=A1[μm], the number of times No=n1. Similarly, at the second stage thereof, it has fo=H2, the amplitude Ao=A2, and the number of times No=n2; at the third stage thereof, it has fo=H3, the amplitude Ao=A3, and the number of times No=n3; at the fourth stage thereof, it has fo=H4, the amplitude Ao=A4, and the number of times No=n4, ..., where units are omitted.

[0044] Further, in the present embodiment, a sliding speed Vx in a case where the finger goes over on the input operation face PR at the standard sliding speed Vo or slower (V1≤Vo)=a set equal to V1 (Vo=V1). This is defined to be operation case 1. Table 2 shows contents of a haptic waveform Wv with respect to sliding speed V1.

Table 2

Haptic waveform Wv with respect to rate of change Vx in position along a detected time axis	
Frequency fv	H1, H2, H3, H4, ...
Amplitude Av	A1, A2, A3, A4, ...
The number of times Nv	$n1 \cdot \frac{Vo}{Vv}$, $n2 \cdot \frac{Vo}{Vv}$, $n3 \cdot \frac{Vo}{Vv}$, $n4 \cdot \frac{Vo}{Vv}$, ...

[0045] In the operation case 1 shown in Table 2, fv indicates a frequency of the haptic waveform Wv, Av indicates its amplitude, and Nv indicates the number of times of its waves. At the first stage of a vibration pattern, the haptic waveform

FITBIT 1002
Fitbit v. Immersion

Wv has a frequency fix=H1[Hz], an amplitude Ax=A1[μm], the number of times N1=n1·Vo/Vx. Similarly, at the second stage thereof, it has fix=H2, the amplitude Ax=A2, and the number of times N1=n2·Vo/Vx; at the third stage thereof, it has fix=H3, the amplitude Ax=A3, and the number of times N1=n3·Vo/Vx; at the fourth stage thereof, it has fix=H4, the amplitude Ax=A4, and the number of times N1=n4·Vo/Vx,... where units are omitted.

[0046] Furthermore, in the present embodiment, a sliding speed Vx in a case where the finger goes over faster than the standard sliding speed Vo (V2>Vo)is set equal to V2 (V1<V2). This is defined to be operation case II. Table 3 shows contents of the haptic waveform Wv with respect to the sliding speed V2.

Table 3

haptic waveform Wv when N1>(Vo/Vx)	
Frequency fx	H1, H2, H3, H4, ...
Amplitude Ax	A1, A2, A3, A4, ...
The number of times N1	1, 1, 1, 1, ...

[0047] In Table 3, fx indicates a frequency of the haptic waveform Wv, Ax indicates its amplitude, and N1 indicates the number of times of its vibration. In this case, however, these contents are employed only when at least one of the number of times N1=n1 · Vo/Vx, N1=n2 · Vo/Vx, N1=n3 · Vo/Vx, N1=n4 · Vo/Vx, ... takes a value bigger one (1). At the first stage of a vibration pattern, the haptic waveform Wv has a frequency fx=H1[Hz], an amplitude Ax=A1[μm], and the number of times N1=1. Similarly, at the second stage thereof, it has fx=H2, the amplitude Ax=A2, and the number of times N1=1; at the third stage thereof, it has fx=H3, the amplitude Ax=A3, and the number of times N1=1; at the fourth stage thereof, it has fx=H4, the amplitude Ax=A4, and the number of times N1=1,..., where units are omitted.

[0048] In this case, if the number of times N1 is set to n1 · Vo/Vx (n1=1, 2, 3, 4, ...) when distinguishing between the operation cases I and II, the CPU 32 decides whether n1 · Vo/Vx is 1 with respect to the standard sliding speed Vo. By using a result of this decision, the digital camera 100 can generate plural kinds of haptic senses having the same haptic image but different periods of vibration time in the same vibration mode.

[0049] Next, an example of a vibration pattern and an example of a haptic image in the operation case I will be described. Along a horizontal axis shown in FIG. 7A, input positions P1-P5 reflecting operation case I are given. Vertical axes shown in FIG. 7B-7G will give amplitude Ax and horizontal axes thereof will give time t. Each graduation of the time axis corresponds to 0.1[s]. Each graduation of the input position axis corresponds to 1cm. This example exemplifies the case of moving from input positions P1 to P5 by taking 2[s], that is, the case of moving over a distance of all sections of 4cm at a sliding speed of 2cm/s (operation case I).

[0050] FIG. 7A shows the operation case I, that is, a case where the operator's finger 30a has gone over the input operation face PR at a sliding speed of V1 of the operator's finger 30a that is the standard sliding speed Vo or slower (V1≤Vo). In this case, during a stage of time when the operator's finger 30a moves from input positions P1 to P5, the input detection section 24 detects the sliding speed V1 of the operator's finger 30a.

[0051] Based on a rate of change Vx with respect to the time axis in the input positions P1-P5, which is detected by the input detection section 24, the CPU 32 detects and recognizes that a sliding speed of V1=2cm/s at which the operator's finger 30 has gone over the input operation face PR is the same as the standard speed Vo or slower than that (V1≤Vo). If having detected operation case I, the CPU 32 supplies the actuator drive circuit 37 with such a command D (control information) as to generate the vibration pattern shown in Table 2.

[0052] In FIG. 7B showing a vibration pattern example at TP2=Td, TP2 indicates an input detection time when the input detection section 24 detects an input position P2. In FIG. 7B, Td indicates a vibration delay time, that is, a time lag from input detection time TP2 to excitation starting time. In this case, it is about 0.1s.

[0053] At this input detection time TP2, the actuator drive circuit 37 shown in FIG. 4 outputs such vibration control signals Sa-Se as to generate the vibration pattern shown in Table 2 based on the command D. The actuator 25a is supplied with the vibration control signal Sa; the actuator 25b is supplied with the vibration control signal Sb; the actuator 25c is supplied with the vibration control signal Sc; the actuator 25d is supplied with the vibration control signal Sd; the actuator 25e is supplied with the vibration control signal Se; and the actuator 25f is supplied with the vibration control signal Sf, respectively.

[0054] Of course, this invention is not limited to this. for example, drive signals of four patterns may be supplied such that the actuators 25a and 25c are supplied with the vibration control signal Sa having the same contents, the actuators 25b and 25d are supplied with the vibration control signal Sb, the actuator 25e is supplied with the vibration control signal Sc, and the actuator 25f is supplied with the vibration control signal Sd.

[0055] The actuators 25a-25f vibrate for about 0.8s based on the vibration control signals Sa-Sd. Specifically, in the vibration waveforms shown in FIG. 7B, they vibrate in accordance with a vibration pattern having frequency fx=50Hz,

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Fitbit v. Immersion

amplitude Axe5μm, and the number of times Nx=10 for about 0.2s at the first stage i thereof. Hereinafter, this pattern is described as [fx Ax Nx]=[50 5 10]. Similarly, they vibrate in accordance with vibration pattern [fx Ax Nx]=[100 10 20] for about 0.2s at the second stage ii thereof too. At the third stage iii thereof too, they vibrate in accordance with vibration pattern [fx Ax Nx]=[200 20 40] for about 0.2s. At the fourth stage iv thereof too, they vibrate in accordance with vibration pattern [fx Ax Nx]=[400 30 80] for about 0.2s.

[0056] Further, in FIG. 7C showing a vibration pattern example at TP2+To+Tβ, Tβ indicates vibration propagation delay time, that is, slight delay time with respect to the vibration delay time To. That is, in a vibration pattern constituted of the first through fourth stages i-iv shown in FIG. 7C, vibration propagates later than that of FIG. 7B by the vibration propagation delay time Tβ.

[0057] Further, relative to FIG. 7D showing a vibration pattern example at TP2+To+2xTβ, in a vibration pattern constituted of the first through fourth stages i-iv, vibration propagates later than that of FIG. 7C further by the vibration propagation delay time Tβ. Relative to FIG. 7E showing a vibration pattern example at TP2+To+3xTβ, in a vibration pattern constituted of the first through fourth stages i-iv, vibration propagates later than that of FIG. 7D further by the vibration propagation delay time Tβ.

[0058] Relative to FIG. 7F showing a vibration pattern example at TP2+To+4xTβ, in a vibration pattern constituted of the first through fourth stages i-iv, vibration propagates later than that of FIG. 7E further by the vibration propagation delay time Tβ.

[0059] According to a haptic image obtained through the operator's finger 30a in operation case I shown in FIG. 7G, in a period of time when the finger moves from input positions P2 to P4, it is possible to obtain a haptic sense based on the vibration patterns shown in FIGS. 7B-7F. At the input position P2, in about 0.2s of its first stage i, the haptic sense based on the vibration pattern [fx Ax Nx]=[50 5 10] is obtained and in about 0.2s of its second stage ii, the haptic sense based on the vibration pattern [fx Ax Nx]=[100 10 20] is obtained, and in about 0.2s of its following third stage iii, the haptic sense based on the vibration pattern [fx Ax Nx]=[200 20 40] is obtained and in about 0.2s of its fourth stage iv, the haptic sense based on the vibration pattern [fx Ax Nx]=[400 30 80] is obtained.

[0060] Next, an example of a vibration pattern and an example of a haptic image in operation case I will be described. Along a horizontal axis shown in FIG. 8A, input positions P1-P5 in operation case II are given.

[0061] Vertical axes shown in FIG. 8B-8G all give amplitude Ax and horizontal axes thereof all give time t. Each graduation of the time axis corresponds to 0.1[s]. Each graduation of the input position axis corresponds to 1cm. This example exemplifies the case of moving from the input position P1 to the input position P2 by taking 0.5[s], moving from the input position P2 to the input position P4 by taking 0.5s, and moving from the input position P4 to the input position P5 by taking 0.5s again, that is, the case of moving over a distance from input position P1 to the input position P2 at a sliding speed of 2cm/s, a distance from the input position P2 to the input position P4 at a sliding speed of 4cm/s, and a distance from input position P4 to the input position P5 at a sliding speed of 2.5cm/s again, of a moving distance of all sections of 4 cm (operation case II).

[0062] FIG. 8A shows the operation case II, that is, a case where a sliding speed V2 of the operator's finger 30a at which the operator's finger 30a has gone on the input operation face PR is faster than the standard sliding speed Vo (V2>Vo). In this case too, during a lapse of time when the operator's finger 30a moves from input positions P1 to P3, the input detection section 24 detects a sliding speed V2 of the operator's finger 30a.

[0063] Based on a rate of change Vx in input positions P1-P5 with respect to the time axis detected by the input detection section 24, the CPU 32 detects and recognizes that a sliding speed of V2=4cm/s of the operator's finger 30a at which the operator's finger 30a has gone on the input operation face PR is faster than the standard speed Vo (V2>Vo). Having detected operation case II, the CPU 32 supplies the actuator drive circuit 37 with the command D (control information) to generate the vibration pattern shown in Table 3.

[0064] Further, in FIG. 8B showing a vibration pattern example at TP2+To, TP2 indicates an input detection time when the input detection section 24 detects the input position P2. In FIG. 8B, To indicates vibration delay time, that is, a time lag from input detection time TP2 to excitation-starting time. In the case, it is about 0.1s.

[0065] At this input detection time TP2, the actuator drive circuit 37 shown in FIG. 4 outputs such vibration control signals Sa-Se as to generate the vibration pattern shown in Table 3 based on the command D. The actuator 25a is supplied with the vibration control signal Sa; the actuator 25b is supplied with the vibration control signal Sb; the actuator 25c is supplied with the vibration control signal Sc; the actuator 25d is supplied with the vibration control signal Sd; the actuator 25e is supplied with the vibration control signal Se; and the actuator 25f is supplied with the vibration control signal Sf, respectively.

[0066] The actuators 25a-25f vibrate the input detection plate for about 0.4s based on the vibration control signals Sa-Sf. Specifically, in the vibration waveform shown in FIG. 8B, they vibrate in accordance with a vibration pattern having a frequency fx=50Hz, amplitude Axe5μm, and the number of times Nx=5 for about 0.1s at the first stage i thereof. Hereinafter, this pattern is described as [fx Ax Nx]=[50 5 5]. Similarly, they vibrate in accordance with vibration pattern [fx Ax Nx]=[100 10 10] for about 0.1s at the second stage ii thereof too. At the third stage iii thereof too, they vibrate in accordance with vibration pattern [fx Ax Nx]=[200 20 20] for about 0.1s. At the fourth stage iv thereof too, they vibrate

FITBIT 1002
Fitbit v. Immersion

in accordance with vibration pattern [fx Ax fx][400 30 40] for about 0.1s

[0067] Further, in FIG. 8C showing a vibration pattern example at TP2+To+Tβ, Tβ indicates vibration propagation delay time, that is, eight delay time with respect to the vibration delay time To. That is, in the vibration pattern constituted of the first through fourth stages i-iv, shown in FIG. 8C, vibration propagates later than that of FIG. 8B by the vibration propagation delay time Tβ

[0068] Relative to FIG.8D showing a vibration pattern example at TP2+To+2xTβ, in a vibration pattern constituted of the first through fourth stages i-iv, vibration propagates later than that of FIG. 8C further by the vibration propagation delay time Tβ. Further, relative to FIG. 8E showing a vibration pattern example at TP2+To+3xTβ, in a vibration pattern constituted of the first through fourth stages i-iv, vibration propagates later than that of FIG. 8D further by the vibration propagation delay time Tβ. Relative to FIG. 8F showing a vibration pattern example at TP2+To+4xTβ, in a vibration pattern constituted of the first through fourth stages i-iv, vibration propagates later than that of FIG. 8E further by the vibration propagation delay time Tβ.

[0069] According to a haptic image obtained through the operator's finger 30a in operation case II shown in FIG. 9G, in a period of time when the finger moves from input positions P2 to P4, it is possible to obtain a haptic sense based on the vibration patterns shown in FIGS. 8B-8F. At the input position P2, in about 0.1s of its first stage i, the haptic sense based on the vibration pattern [fx Ax fx][450 5 5] is obtained and in about 0.1s of its second stage ii, the haptic sense based on the vibration pattern [fx Ax fx][400 10 10] is obtained, and in about 0.1s of its following third stage iii, the haptic sense based on the vibration pattern [fx Ax fx][200 20 20] is obtained and in about 0.1s of its fourth stage iv, the haptic sense based on the vibration pattern [fx Ax fx][400 30 40] is obtained.

[0070] Accordingly, in a case where the finger 30a moves on the input operation face PR faster than the standard sliding speed Vo, in the conventional method, the third and fourth stages iii and iv go dead. however, in the embodiment of the present invention, no stage goes dead. so that such a haptic image as shown in FIG. 9G can be obtained

[0071] FIGS. 9A-9F, FIG. 10A-10B, and FIGS. 11A-11E show a comparison example in which the method of the present invention for obtaining such a haptic sense as shown in FIG. 9G is compared with the conventional method

[0072] This comparison example examplifies a case where the input detection section 2d and the actuators 25e and 25f are provided in the same plane such as shown in FIG. 6A. In this case, when performing a mode (hereinafter referred to as "vibration mode") in which a "vibration direction" is assembled by using the two actuators 25e and 25f, a case to which the method of the present invention is applied for selecting a sliding speed Vx on a waveform generation timing is compared to the case of the conventional method in which no vibration mode is performed. It is to be noted that explanation of vibration propagation delay time Tβ will be omitted

[0073] In FIGS. 9A, 9B, 9D, and 9E, their vertical axes represent amplitude Ax of a vibration pattern due to the actuators 25e, 25f, etc. In FIGS. 9A-9E, their horizontal axes all represent time t. Further, in FIGS. 9A, 9B, 9DE, and 9E, T represents vibration time difference between the actuators 25e and 25f at the standard sliding speed Vo.

[0074] In this example, the vibration time difference T is set to a constant value no matter whether the sliding speed Vx of the operator's finger 30a is equal to, smaller than, or larger than the standard sliding speed Vo. That is, according to the conventional method, no matter whether the sliding speed Vx of the operator's finger 30a is equal to, smaller than, or larger than the standard sliding speed Vo, the actuator 25e vibrates first and then the actuator 25f vibrates with the vibration time difference T.

[0075] Therefore, if the sliding speed V1 of the operator's finger 30a is equal to or smaller than the standard sliding speed Vo, it is possible to obtain a haptic image constituted of the first stage i through the fourth stage iv as shown in FIG. 11B. However, according to the conventional method, if the sliding speed V2 of the operator's finger 30a exceeds the standard sliding speed Vo, that is, if the sliding speed V2 becomes larger than the sliding speed V1, it is possible to obtain a haptic image constituted of the first stage i and the second stage ii as shown in FIG. 11C; however, since the vibration time difference T between the third stage iii and the fourth stage iv is fixed, vibration waveforms of the third and fourth images iii and iv are prevented from sufficiently propagating to the operator's finger 30a, thus disabling obtaining a haptic image.

[0076] According to the method of the present invention, one standard sliding condition is set. In this embodiment, a shift in excitation timing between the two actuators 25e and 25f at the standard sliding speed Vo, that is, as a standard time thereof is set to a vibration shift time T. With respect to this, a vibration time difference T between the actuators 25e and 25f varies in accordance with the sliding speed Vx of the operator's finger 30a as shown in FIGS. 10A and 10B.

[0077] The following will describe a vibration pattern when the sliding speed is Vx. In FIG. 10A, a vertical axis represents an amplitude Ax of the vibration pattern of the actuator 25e. In FIG. 10B, a vertical axis represents an amplitude Ax of the vibration pattern of the actuator 25f. Their horizontal axes both represent time t. In the figure, T indicates vibration time difference and equivalent rising time difference between the actuators 25e and 25f.

[0078] According to the method of the present invention, a sliding speed Vx of the operator's finger 30a at a given input position is detected and, by assuming a shift in excitation timing between the two actuators 25e and 25f as the one of this detection to be a vibration time difference T, decremental T=Vo-dVx is introduced to decide whether operation case I or II is entered. Based on this decision on which one of operation cases I and II is entered, vibration patterns

FITBIT 1002
Fitbit v. Immersion

shown in FIGS. 2 and 3 are created.

[0079] Next, a haptic image in a case where the finger 30a moves slowly in the method of the present invention is compared with that of the conventional method. Further, a haptic image in a case where the finger 30a moves faster in the method of the present invention is compared with that of the conventional method.

[0080] According to the conventional method, if the sliding speed V2 of the operator's finger 30a exceeds the standard sliding speed Vo, that is, if the sliding speed V2 becomes larger than the sliding speed V1, vibration waveforms of the third and fourth stages iii and iv is prevented from sufficiently propagating to the operator's finger 30a because the vibration time difference T between the actuators 25a and 25f is fixed, so that a dead portion SD occurs, thus disabling obtaining a haptic image.

[0081] In contrast, according to the method of the present invention, the vibration time difference T' varies in conjugation with the standard sliding speed Vo as described in FIGS. 10A and 10B, so that even if the sliding speed V2 which represents movements of the operator's finger 30a, exceeds the standard speed Vo, that is, even if the sliding speed V2 is larger than the sliding speed V1, as shown in FIGS. 11E and 6G, a haptic image of the first stage i through the second stage ii can be obtained and vibration waveforms propagate to the finger 30a of the operator sufficiently, thereby enabling to be obtained a haptic image of the third stage iii through the fourth stage iv.

[0082] Next, reverse to an information input method according to the present invention, an information processing example in the digital camera 100 will be described with reference to FIGS. 12A-12C, 13A-13C, 14A-14D and 15.

[0083] In the present embodiment, relative to an example of information processing at the time of sliding operation in the digital camera 100, it is assumption that information is input by performing any touch operation to slide on an input detection plane of the input detection section 24.

[0084] In this embodiment, according to an example of image display shown in FIG. 12A, there are buildings on right and left sides of a road shown at a center of an image with a subject such as a person standing on of the road shown at the back center of the image when the sliding function is to be zoomed in.

[0085] In this example, if the input detection section 24 detects an amount of go-over distance over a set amount thereof, that is, if a relationship of $|X2-X1|>\alpha$ is satisfied where X1 is a coordinate value of an input start point, X2 is a coordinate value of a current point, and α is a control threshold value and represents a difference in coordinate values corresponding to the set amount of go-over distance under the condition where an input is continuously provided, the CPU 32 causes the display portion 29 to display a zoom-in mode image having a size corresponding to the sliding speed Vs. In this case, the CPU 32 outputs the command D to the display portion 29, so that the displayed image shown in FIG. 12A can be switched on the display portion to a displayed image such as ones shown in FIG. 12B or 12C.

[0086] Further, according to an example of image display in natively in-through zoom-in shown in FIG. 12B, if performing touch operation to slide on the input detection plane of the input detection section 24, for example, at the standard sliding speed Vo, after having felt a haptic sense, the operator 30 can confirm an image display of the buildings on the right and left sides of the road at the center of the image and the subject standing on the road and moving forward him or her.

[0087] Further, according to an example of post-zoom-in image display shown in FIG. 12C, if performing a touch operation to slide on the input detection plane of the input detection section 24 at the sliding speed Vs=V2 that is larger than the standard sliding speed Vo, after having felt a haptic sense, the operator 30 can confirm an image display of the subject further showing whether his or her hair is curly as shown in FIG. 12B. In the embodiment, it is possible to display a zoom-in mode image having a size corresponding to the speed, and to confirm a display of a close-up image of the face of the subject at the center of the displayed image.

[0088] Thus, by making the sliding speed Vs in sliding on the input detection plane larger than the standard sliding speed Vo, it is possible to control a size of an image to be zoomed in. The example of the information processing at the time of sliding operation in the digital camera 100 is not limited to the zoom-in mode but may be applied to the playback/fast-forward mode, the zoom-out mode, the reverse mode, the focus adjustment mode, the sound volume adjustment mode, the channel (CH) change mode, etc. It is to be noted that the digital camera 100 may be configured to be able to detect plural input position differences $|X2-X1|$ by one time of sliding or only one input position difference of $|X2-X1|$ by one time of sliding.

[0089] Next, an example of operations in the sound volume (Vol) adjustment mode will be described. In this example, in a case where a sliding function is set to "Vol adjustment", according to an example of image display before Vol adjustment shown in FIG. 13A, a sound volume adjustment bar 29a is displayed at a lower part of the image. The sound volume adjustment bar 29a has, for example, six adjustment frames in a direction from "-" toward "+". In the figure, a first adjustment frame is indicated by hatching.

[0090] In this example, if the input detection section 24 detects an amount of a go-over distance over a set amount thereof, that is, if a relationship of $|X2-X1|>\alpha$ is satisfied where X1 is a coordinate value of an input start point, X2 is a coordinate value of a current point, and α is a control threshold value that is a difference in coordinate values corresponding to the set amount of go-over distance under a condition where an input is continuously provided, the CPU 32 causes the display portion 29 to display a sound volume adjustment image corresponding to the sliding speed Vs. In this case, the CPU 32 outputs the command D to the display portion 29, so that the image shown in FIG. 13A can be switched on

FITBIT 1002
Fitbit v. Immersion

the display portion to an image such as ones shown in FIG. 13B or 13C.

[0091] For example, according to an example of image display in relation to sound volume adjustment shown in FIG. 13B, if performing a touch operation to slide on the input detection plane of the input detection section 24 at the standard sliding speed Vo, after having felt a haptic sense, another "+" directional adjustment frame of the sound volume adjustment bar 29a at the lower part of the image is switched to a hatched frame. The CPU 32 outputs a command D to the speaker 36, to control the speaker 36 so that its sound volume may be increased by one step as compared to that of FIG. 13A.

[0092] Further, according to an example of image display after the sound volume adjustment shown in FIG. 13C, if performing a touch operation to slide on the input detection plane of the input detection section 24 at the sliding speed Vx=V2 that is larger than the standard sliding speed Vo, after having felt a haptic sense, the operator 30 can confirm such a display that a further "+" directional adjustment frame of the sound volume adjustment bar 29a is switched at the lower part of the image by a hatched one than one shown in FIG. 13B. In this case the CPU 32 outputs the command D to the speaker 36, to control the speaker 36 so that its sound volume may be increased by, for example, three steps as compared to that of FIG. 13A. Thus, by making the sliding speed Vx in sliding on the input detection plane larger than the standard sliding speed Vo, it is possible to control a sound volume adjustment quantity.

[0093] Next, an example of information processing in the digital camera 100 according to the first embodiment will be described with reference to FIGS. 14A-14D and 15.

[0094] In the present embodiment, it is assumed that information is input by performing a touch operation to slide on the input detection plane. In this embodiment, such a case is assumed that a touched position and a sliding speed of a finger 30a of the operator who performs the touch operation on the input detection plane are detected, to compute a vibration pattern based on these detected touched position and sliding speed of the finger 30a of the operator's finger 30a, thereby to vibrate the input detection plane based on the computed vibration pattern.

[0095] Further, in computation of the vibration pattern, as the finger 30a of the operator goes away from a point where it has touched the input detection plane originally, such a vibration pattern of the input detection plane is computed as to generate vibrations from its low frequency and small amplitude to its high frequency and large amplitude. As operation modes of this digital camera 100, a slide input mode and the other processing mode are prepared, so that based on switchover of these modes, various kinds of information processing are performed. The other mode contains a shutter button operation, an execute button operation, a power source button operation, a switchover operation between the standard mode and the shift mode, etc.

[0096] In these information processing conditions, a power-on operation is switched at step #1 of a flowchart of FIG. 14A. For example, the CPU 32 detects power-on information and then activates the system. The power-on information generally occurs when a user function starts, to turn on a power switch on a portable telephone which has been sleeping.

[0097] The process goes to step #2 where the CPU 32 branches its process in accordance with whether the system is in the slide input mode or the other processing mode. The slide input mode is referred to as an operation to provide an input by performing a touching input to slide on the input detection plane when making switchover among the playback/fast-forward mode, the zoom-out mode, the zoom-in mode, the sound volume adjustment mode, etc.

[0098] If the slide input mode is set, the process goes to step #3 where it is detected whether an input is provided. Whether an input is provided or not is decided by detecting whether the input detection section 24 is touched. If the input detection section 24 is touched, the process goes to step #4 where the control branches in accordance with whether the input mode is selected back to the playback/fast-forward mode or the other mode. It is to be noted that which one of the input modes is selected will be described in the case of, for example, processing the playback/fast-forward mode, the zoom-out mode, the zoom-in mode, and the sound volume adjustment mode in this order.

[0099] In this embodiment, when the operator 30 touches a playback mode region, not shown, of the input detection section 24, touch position information S1 and force information S2 are supplied to the A/D driver 31, so that a playback mode image can be displayed on the display portion 29 of the digital camera 100. Then, the A/D driver 31 converts a position detection signal into a digital signal and detects section information D1 and force information D2 and whether the system is in the cursoring state or the selection state, thus generating cursoring/selection data D3 as a flag.

[0100] If the playback/fast-forward mode is selected, the process goes to step #5 where it is determined how much a sliding speed Vx is given. In this case, the CPU 32 calculates a rate of change Vx, for example, with respect to the time axis in the input positions P1-P6 shown in FIGS. 6A and 6B, which is detected by the input detection section 24, that is, the sliding speed Vx of the operator's finger 30a.

[0101] Then, the process goes to step #6 where the CPU 32 detects operation case I or operation case II based on a determination of Vx≥Vo or Vx<Vo, to provide a control branch. In this embodiment, the sliding speed Vx in the case of going over the input operation face #A at the standard sliding speed Vo or lower (Vx≤Vo) is set to be equal to VI (Vx=VI). This case is defined to be operation case I. Table 2 shown earlier shows contents of a haptic waveform Wx with respect to the sliding speed Vx.

[0102] Therefore, if a relationship of Vo<Vx≤V2 is found as a result of the above decision, the process goes to step #7 where the actuator drive circuit 37 is supplied with such control information as to generate a vibration pattern corre-

FITBIT 1002
Fitbit v. Immersion

sponding to operation case I. In this case, according to such an example as shown in FIGS. 7B-7G, at the input detection time point TP2, based on the command D, the actuator drive circuit 37 outputs such the vibration control signals Sa-Sf as to generate the vibration pattern shown in Table 2. The actuator 25a is supplied with the vibration control signal Sa; the actuator 25b is supplied with the vibration control signal Sb; the actuator 25c is supplied with the vibration control signal Sc; the actuator 25d is supplied with the vibration control signal Sd; the actuator 25e is supplied with the vibration control signal Se; and the actuator 25f is supplied with the vibration control signal Sf, respectively.

[0183] The actuators 25a-25f vibrate for about 0.6s based on the vibration control signals Sa-Sd. Specifically, in the vibration waveform shown in FIG. 7B, they vibrate in accordance with a vibration pattern having frequency fx=50Hz, amplitude Ax=5μm, and the number of times Nx=10 for about 0.2s at the first stage i thereof. Hereinafter, this pattern is described as [fx Ax Nx]=[50 5 10]. Similarly, they vibrate in accordance with vibration pattern [fx Ax Nx]=[100 10 20] for about 0.2s at the second stage ii thereof too. At the third stage iii thereof too, they vibrate in accordance with vibration pattern [fx Ax Nx]=[200 20 40] for about 0.2s. At the fourth stage iv thereof too, they vibrate in accordance with vibration pattern [fx Ax Nx]=[400 30 80] for about 0.2s.

[0184] Further, according to a haptic image received by the operator's finger 30a in operation case I in FIG. 7G as a result of such propagation of vibration patterns shown in FIGS. 7C, 7D, 7E, and 7F, it is possible to obtain a haptic sense based on the vibration patterns shown in FIGS. 7B-7F in a period of time when moving the input positions P2-P4. At the input position P2, it is possible to obtain a haptic sense based on the vibration pattern [fx Ax Nx]=[50 5 10] for about 0.2s of the first stage i, a haptic sense based on the vibration pattern [fx Ax Nx]=[100 10 20] for about 0.2s of the second stage ii, a haptic sense based on the vibration pattern [fx Ax Nx]=[200 20 40] for about 0.2s of the following third stage iii, and a haptic sense based on the vibration pattern [fx Ax Nx]=[400 30 80] for about 0.2s of the fourth stage iv. Then, the process goes to step R9 where the fast-forward mode is performed based on the sliding speed Vx.

[0185] In this embodiment, the sliding speed Vx at which the input operation face PR is gone over faster than the standard sliding speed Vo (V2<Vo) is set equal to V2 (Vx=V2). This is defined to be operation case II. Table 3 shown earlier shows contents of the haptic waveform Wx with respect to the sliding speed V2. The above, the relationship of Vo-Vx>1 is decided at the above-described step R6, the process goes to step R8 where the actuator drive circuit 37 is supplied with such control information as to generate a vibration pattern corresponding to the operation case II.

[0186] In this case, according to such an example as shown in FIGS. 8A-8G, at the input detection time TP2, based on the command D, the actuator drive circuit 37 outputs such vibration control signals Sa-Sf as to generate the vibration pattern shown in Table 3. The actuator 25a is supplied with the vibration control signal Sa; the actuator 25b is supplied with the vibration control signal Sb; the actuator 25c is supplied with the vibration control signal Sc; the actuator 25d is supplied with the vibration control signal Sd; the actuator 25e is supplied with the vibration control signal Se; and the actuator 25f is supplied with the vibration control signal Sf, respectively.

[0187] The actuators 25a-25f vibrate for about 0.4s based on the vibration control signals Sa-Sf. Specifically, in the vibration waveform shown in FIG. 8B, they vibrate in accordance with a vibration pattern having a frequency fx=50Hz, amplitude Ax=5μm, and the number of times Nx=5 for about 0.1s at the first stage i thereof. Hereinafter, this pattern is described as [fx Ax Nx]=[50 5 5]. Similarly, they vibrate in accordance with vibration pattern [fx Ax Nx]=[100 10 10] for about 0.1s at the second stage ii thereof too. At the third stage iii thereof too, they vibrate in accordance with vibration pattern [fx Ax Nx]=[200 20 20] for about 0.1s. At the fourth stage iv thereof too, they vibrate in accordance with vibration pattern [fx Ax Nx]=[400 30 40] for about 0.1s.

[0188] Further, according to a haptic image received by the operator's finger 30a in the operation case II in FIG. 8G as a result of such propagation of vibration patterns shown in FIGS. 8C, 8D, 8E, and 8F, it is possible to obtain a haptic sense based on vibration patterns shown in FIGS. 8B-8F in a period of time when moving to the input positions P2-P4. At the input position P2, it is possible to obtain a haptic sense based on the vibration pattern [fx Ax Nx]=[50 5 5] for about 0.1s of the first stage i, a haptic sense based on the vibration pattern [fx Ax Nx]=[100 10 10] for about 0.1s of the second stage ii, a haptic sense based on the vibration pattern [fx Ax Nx]=[200 20 20] for about 0.1s of the third stage iii, and a haptic sense based on the vibration pattern [fx Ax Nx]=[400 30 40] for about 0.1s of the fourth stage iv.

[0189] Accordingly, if the finger 30a moves on the input operation face PR faster than the standard sliding speed Vo, the third and fourth stages iii and iv provide the dead portion 80n the conventional method, but in the embodiment of the present invention, such a dead portion 80 disappears, so that such a haptic image as shown in FIG. 8G can be obtained. Subsequently, the process goes to step R9 where the fast-forward mode is performed based on the sliding speed Vx. Then, the process returns to the step R3.

[0190] Further, when the input detection section 24 is further touched at the step R3 and if the input mode is the other mode that is any other than the playback/fast-forward mode at step R4, the process goes to step R10 where a control branch is provided in accordance with whether the zoom-out mode or the other mode is set. If the zoom-out mode is selected, the process goes to step R11 in a flowchart shown in FIG. 14B where it is detected how much the sliding speed Vx (see the step R6) is given.

[0191] Then, the process goes to step R12 where the CPU 32 detects operation case I or II based on a discriminant of Ts-Vo-1/Vx to provide a control branch. In this embodiment, if a relationship of Vo-1/Vx>1 is established, the process

FITBIT 1002
Fitbit v. Immersion

goes to step R13 where the actuator drive circuit 37 is supplied with such control information as to generate a vibration pattern corresponding to the operation case I (see the step R7).

[0112] Then, the process goes to step R15 where the zoom-out mode is performed. On the other hand, if a relationship of $V_0/V_x \leq \alpha$ is decided at the above-described step R12, the process goes to step R14 where the actuator drive circuit 37 is supplied with such control information as to generate a vibration pattern corresponding to operation case II (see the step R8). Subsequently, the process goes to the step R15 where the zoom-out mode is performed based on the sliding speed Vx. Then, the process returns to the step R3 of the flowchart shown in FIG. 14A.

[0113] Further, when the input detection section 24 is touched again at the step R3 and if the input mode is the other mode that is any other than the playback/fast-forward mode and the zoom-out mode at the steps R4 and R10, the process goes to step R16 where a control branch is provided in accordance with whether the zoom-in mode or the other mode is set. If the zoom-in mode is set, the process goes to step R17 of a flowchart shown in FIG. 14C to detect how much the sliding speed Vx (see the step R6) is given.

[0114] Then, the process goes to step R18 where the CPU 32 detects operation case I or II based on a discriminant of $T_\alpha \leq V_0/V_x$ to provide a control branch. In this embodiment, if a relationship of $V_0/V_x \geq 1$ is established, the process goes to step where the actuator drive circuit 37 is supplied with such control information as to generate a vibration pattern corresponding to the operation case I (see the step R7).

[0115] Then, the process goes to step R21 where the zoom-in mode is performed based on the sliding speed Vx. Simultaneously, the CPU 32 outputs the command D to the display portion 29 to carry out a display control. For example, the CPU 32 calls a subroutine of FIG. 15 to detects a difference between a coordinate value X1 of an input start point and a coordinate value X2 of a current point, that is, an input position difference of X2-X1 at step ST1 in its flowchart. Then, the process goes to step ST2 where the input position difference |X2-X1| is compared with a preset control threshold value α. If |X2-X1|≥α is decided at step ST3, the process goes to step ST4 where the CPU 32 outputs the command D to the display portion 29. Based on the command D, the display portion 29 switches display of a pre-zoom-in image shown in FIG. 12A to that of a post-zoom-in image shown in FIG. 12B at step ST5.

[0116] On the other hand, if a relationship of $V_0/V_x < 1$ is decided at the above-described step R18, the process goes to step R20 where the actuator drive circuit 37 is supplied with such control information as to generate a vibration pattern corresponding to operation case II (see the step R8). Then, the process goes to the step R21 where the zoom-in mode is performed based on the sliding speed Vx. Simultaneously, based on the command D, the display portion 29 switches display of the pre-zoom-in image shown in FIG. 12A to that of the post-zoom-in image shown in FIG. 12C. Then the process returns to the step R3 of the flowchart shown in FIG. 14A.

[0117] Further, when the input detection section 24 is further touched at the step R3 and if the input mode is the other mode that is any other than the playback/fast-forward mode, the zoom-in mode, and the zoom-out mode at the steps R4, R10, and R16, to set (select) the sound volume adjustment mode and the process goes to step R22 of a flowchart shown in FIG. 14D where it is detected how much the sliding speed Vx (see the step R6) is given.

[0118] Then, the process goes to step R23 where the CPU 32 detects operation case I or II based on the discriminant of $T_\alpha \leq V_0/V_x$ to provide a control branch. In this embodiment, if $V_0/V_x \geq 1$ is decided, the process goes to step R24 where the actuator drive circuit 37 is supplied with such control information as to generate a vibration pattern corresponding to the operation case I (see the step R7).

[0119] Then, the process goes to step R25 where the sound volume adjustment mode is performed based on the sliding speed Vx. Simultaneously, the CPU 32 outputs the command D to the display portion 29 to carry out a display control. For example, the CPU 32 calls the subroutine of FIG. 15 to detect a difference between a coordinate value X1 of an input start point and a coordinate value X2 of a current point, that is, an input position difference of X2-X1 at the step ST1 in its flowchart. Then, the process goes to the step ST2 where the input position difference X2-X1 is compared with a preset control threshold value α. If |X2-X1|≥α is decided at the step ST3, the process goes to the step ST4 where the CPU 32 outputs the command D to the display portion 29. Based on the command D, the display portion 29 switches display of a pre-sound-volume-adjustment image shown in FIG. 13A to that of a post-sound-volume-adjustment image shown in FIG. 13B at the step ST5.

[0120] On the other hand, if a relationship of $V_0/V_x < 1$ is decided at the above-described step R23, the process goes to step R25 where the actuator drive circuit 37 is supplied with such control information as to generate a vibration pattern corresponding to the operation case II (see the step R8). Then, the process goes to step R26 where the sound volume adjustment mode is performed based on the sliding speed Vx. Simultaneously, based on the command D, the display portion 29 switches display of the pre-sound-volume-adjustment image shown in FIG. 13A to that of the post-sound-volume-adjustment image shown in FIG. 13C. Then, the process returns to the step R3 of the flowchart shown in FIGS. 14A-14D.

[0121] It is to be noted that if the other processing mode is selected at the step R2, the process goes to step R27 where the other processing mode is performed. In the other processing mode, a shutter button operation, an eraser button operation, a power source button operation, an operation to switch between the standard mode and the snap mode, etc. are performed. Then, the process goes to step R28. Further, if the input detection section 24 is not touched

FITBIT 1002
Fitbit v. Immersion

at the step R2, the process goes to step R28 where the CPU 32 decides whether to end the information processing. For example, if having detected any power-off information, the process ends the information processing. If no power-off information is detected, the process returns to the step R2.

[0122] In such a manner, according to the embodiments of the digital camera and the information input method related to the present invention, on the presumption that the touch operation is performed to slide on the input detection plane of the input detection section 24, the input detection section 24 detects a touched position and a sliding speed of the operator's finger 30a. The CPU 32 computes the vibration pattern based on the sliding speed of the operator's finger 30a detected by the input detection section 24. Based on the vibration pattern computed by the CPU 32, the actuators 25a-25f etc. vibrate the input detection plane.

[0123] Therefore, it is possible to generate plural kinds of vibrations which have different vibration patterns for each operator and which correspond to a sliding speed or a shape of sliding time of the operator's finger 30a. It is thus possible to improve convenience and certainty of the haptic input function. Besides, a haptic-provided input function can be introduced into more kinds of input forms.

[Second Embodiment]

[0124] The following will describe an example of a haptic function-provided input mechanism of a digital camera 200 as the second embodiment. In the second embodiment, input information is controlled variably based on distance information Ls on a distance from a point where the finger 30a of an operator touches an input detection plane PR to a point where its sliding stops.

[0125] In contrast to the first embodiment, according to the haptic function-provided input mechanism of the digital camera 200 shown in FIG. 16, below an input detection section 24, actuators A and B are provided. The input detection section 24 is arranged to bridge between the actuators A and B in such a configuration that these actuators A and B serve as bridge girders. As the actuators A and B, the actuators 25e and 25f described with the first embodiment are used.

[0126] The input detection section 24, the actuators A and B, etc. are all fixed with an adhesive agent or the like via space members 28a-28f. As the input detection section 24, an electrostatic capacitive sheet (touch panel) and the like are used to detect a position where the operator's finger 30a has touched. An arrow in the figure indicates a touch-and-moving direction of the operator's finger 30a. It is to be noted that for a configuration of a camera system, the first embodiment can be referred to here, so that its explanation will be omitted. This haptic function-provided input mechanism is arranged approximately at an upper part of a body of the camera.

[0127] In FIG. 16, on the input detection section 24 six input positions P1-P6 are set. In terms of operation contents, the input position P1 indicates a "start point" of an input operation. The input point P2 indicates a point representing, for example, a zoom quantity "X0.5" as an input operation quantity. With respect to input position P1 as an origin point O, the input position P2 is set to a position that is distant therefrom by separation distance L1. The input point P3 indicates a point representing a zoom quantity "X1". Similarly, the input point P3 is set to a position distant by separation distance L2.

[0128] The input point P4 indicates a point representing a zoom quantity "X2" as an input operation quantity. The input point P4 is set to a position distant by separation distance L3. The input point P5 indicates a point representing a zoom quantity "X4" as an input operation quantity. The input point P5 is set to a position distant by separation distance L4. The input point P6 indicates a point representing an "end position" of the input operation. The input point P6 is set to a position distant by separation distance L5.

[0129] The operator goes over the input operation face PR at an arbitrary sliding speed along the touch-and-moving direction indicated by the arrow in the figure. In this case, a CPU 32 described with the first embodiment detects which one of the input positions P2-P6 the operator's finger 30a has reached from the input position P1 detected by the input detection section 24.

[0130] Further, according to the haptic function-provided input mechanism, if the operator's finger 30a touches the input detection plane at the input position P1 thereof, the actuator A vibrates the input operation face PR based on a vibration pattern having frequency of fz=400Hz, amplitude of Az=30μm, and the number of times of Nz=20. Further, if the operator's finger 30a is slid from its input position P1 toward the arrow direction, the actuator A once stops vibrating thereof and, when the next input position P2 is reached, vibrates the input operation face PR based on a vibration pattern having fz=200Hz, Az=10μm, and Nz=1.

[0131] Further, if the operator's finger 30a is slid from its input position P2 toward the arrow direction, the actuator A once stops vibrating thereof and, when the next input position P3 is reached, vibrates the input operation face PR based on a vibration pattern having fz=200Hz, Az=15μm, and Nz=1. Further, if the operator's finger 30a is slid from its input position P3 toward the arrow direction, the actuator A once stops vibrating thereof and, when the next input position P4 is reached, vibrates the input operation face PR based on a vibration pattern having fz=200Hz, Az=20μm, and Nz=1.

[0132] Further, if the operator's finger 30a is slid from its input position P4 toward the arrow direction, the actuator A once stops vibrating thereof and, when the next input position P5 is reached, vibrates the input operation face PR based on a vibration pattern having fz=200Hz, Az=25μm, and Nz=1. Further, if the operator's finger 30a is slid from its input

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position P5 toward the arrow direction, the actuator A once stops vibrating thereof and, when the next input position P6 is reached, vibrates the input operation face PR based on a vibration pattern having fx=100Hz, Ax=30μm, and Nx=20.

[0133] It is to be noted that while the operator's finger 30a is in contact with the input operation face PR, the actuator B is continuously vibrates the input operation face PR based on a vibration pattern having fx=200Hz and Ax=30μm.

Table 4 shows relationships between input positions P1~P6 and any one of the vibration patterns of the actuators A and B, their vibration sounds, and the operation contents thereof.

Table 4

Input position	P1	P2	P3	P4	P5	P6
Vibration of actuator A	400Hz 30μm 20 times	None	200Hz 15μm 1 time	None	200Hz 30μm 1 time	None	200Hz 25μs 1 time	None	400Hz 30μm 20 times
Vibration of actuator B	200Hz Ax=30μm Non-Continuous					
Vibration sound	Peep		Peep		Peep		Peep		Peep		Peep
Operation contents	Start position (dead end)	X0.5	X1	X2	X4	End position (dead end)

[0134] Next, an example of input operations in the haptic function-provided digital camera 200 will be described.

[0135] For example, if the operator's finger 30a shown in FIG. 16 has touched the input position P1, the input detection section 24 detects that the operator's finger 30a has touched the input position P1 and notifies the CPU 32 of it. When having received this notification, the CPU 32 controls outputs of the actuators A and B. The actuator A vibrates the input operation face PR based on a vibration pattern having fx=400Hz, Ax=30μm, and Nx=20. As a result of this vibration, a "peep" vibration sound occurs. The actuator B continuously vibrates the input operation face PR based on a vibration pattern having fx=200Hz and Ax=30μm. The CPU 32 identifies a "start position" of the input operation.

[0136] Further, if the operator's finger 30a moves from, for example, the input position P1 by the separation distance L1 as the distance information Lx, it reaches the input position P2. In this case, the input detection section 24 detects that the operator's finger 30a has arrived at the input position P2 and notifies the CPU 32 of it. When having received this notification, the CPU 32 controls an output of the actuator A. According to this control, the actuator A, which has once stopped vibrating thereof, vibrates the input operation face PR based on the vibration pattern having fx=200Hz, Ax=10μm, and Nx=1 when the operator's finger 30a has arrived at the input position P2. As a result of this vibration, a "peep" vibration sound occurs. The CPU 32 sets a zoom quantity "X0.5" to a zoom drive system etc. as an input operation quantity.

[0137] Further, if the operator's finger 30a moves from the input position P1 by the separation distance L2, it reaches the input position P3. In this case, the input detection section 24 detects that the operator's finger 30a has arrived at the input position P3 and notifies the CPU 32 of it. When having received this notification, the CPU 32 controls an output of the actuator A. According to this control, the actuator A, which has once stopped vibrating thereof, vibrates the input operation face PR based on a vibration pattern having fx=200Hz, Ax=15μm, and Nx=1 when the operator's finger 30a has arrived at the input position P3. As a result of this vibration, a "peep" vibration sound occurs. The CPU 32 sets a zoom quantity "X1" to the zoom drive system etc. as an input operation quantity.

[0138] Further, if the operator's finger 30a moves from the input position P1 by the separation distance L3, it reaches the input position P4. In this case, the input detection section 24 detects that the operator's finger 30a has arrived at the input position P4 and notifies the CPU 32 of it. When having received this notification, the CPU 32 controls an output of the actuator A. According to this control, the actuator A, which has once stopped vibrating, vibrates the input operation face PR based on a vibration pattern having fx=200Hz, Ax=20μm, and Nx=1 when the operator's finger 30a has arrived at the input position P4. As a result of this vibration, a "peep" vibration sound occurs. The CPU 32 sets a zoom quantity "X2" to the zoom drive system etc. as an input operation quantity.

[0139] Further, if the operator's finger 30a moves from the input position P1 by the separation distance L4, it reaches the input position P5. In this case, the input detection section 24 detects that the operator's finger 30a has arrived at the input position P5 and notifies the CPU 32 of it. When having received this notification, the CPU 32 controls an output of the actuator A. According to the control, the actuator A, which has once stopped vibrating thereof, vibrates the input

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operation face PR based on the vibration pattern having fw=200Hz, Aw=25μm, and Nw=1 when the operator's finger 30a has arrived at the input position P5. As a result of this vibration, a "peep" vibration sound occurs. The CPU 32 sets a zoom quantity "X4" to the zoom drive system etc. as an input operation quantity.

[0140] It is to be noted that if the operator's finger 30a moves from the input position P1 by the separation distance L5, it reaches the input position P5. In this case, the input detection section 24 detects that the operator's finger 30a has arrived at the input position P5 and notifies the CPU 32 of it. When having received this notification, the CPU 32 controls an output of the actuator A. According to this control, the actuator A, which has once stopped vibrating thereof, vibrates the input operation face PR based on the vibration pattern having fw=400Hz, Aw=30μm, and Nw=20 when the operator's finger 30a has arrived at input position P5. As a result of this vibration, a "peep" vibration sound occurs. The CPU 32 identifies an "end position" of the input operation.

[0141] In such a manner, according to the digital camera 200 with the haptic function-provided input mechanism related to the second embodiment, input information is controlled variably based on the distance information L_2 on a distance from a point where the finger 30a of an operator has touched an input detection plane PR to a point where it is sliding stops.

[0142] Therefore, it is possible to obtain a haptic sense that matches an input operation to adjust an analog quantity and that corresponds to a sliding position of the operator's finger 30a. It is thus possible to generate a sense of operation that matches an operation image, thereby improving convenience and comfort of the haptic input function.

[0143] Although the above embodiments have described a case of the digital camera in relation to an electronic device, the haptic function-provided input device is applicable to an information processing apparatus such as a notebook-sized personal computer and an information portable terminal unit such as a portable telephone, an electronic notebook, a game device or an electronic book.

INDUSTRIAL APPLICABILITY

[0144] The present invention could be extremely well applied to a digital camera, an information processing apparatus, a portable telephone, an information portable terminal unit, etc. in which information is input by performing the touch operation to slide on an input detection plane.

Claims

1. A haptic function-provided input device that performs touch operation to slide on an input detection plane, said device comprising:

   input detection means, which has the input detection plane, for detecting a touching position of an operation body and a sliding speed of the operation body;
   computation means for computing a vibration pattern based on the sliding speed detected by the input detection means; and
   vibration means for vibrating the input detection plane based on the vibration pattern computed by the computation means.

2. The haptic function-provided input device according to claim 1, wherein the computation means computes a vibration pattern of the input detection plane to generate vibrations from a low frequency and small amplitude to a high frequency and large amplitude, as the operation body goes away from a position where it has touched the input detection plane.

3. The haptic function-provided input device according to claim 1, comprising control means for controlling the input information variably based on the sliding speed.

4. The haptic function-provided input device according to claim 1, comprising control means for controlling input information variably based on distance information on a distance from a point where the operation body touches the input detection plane to a point where its sliding then stops.

5. An information input method for inputting information by performing touch operation to slide on an input detection plane, said method comprising the steps of:

   detecting a touched position and a sliding speed of an operation body that touches the input detection plane;
   computing a vibration pattern based on the touched position and the sliding speed that are detected; and

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vibrating the input detection plane based on the computed vibration pattern.

6. The information input method according to claim 5, wherein when computing the vibration pattern, a vibration pattern of the input detection plane to generate vibrations from its low frequency and small amplitude to its high frequency and large amplitude is computed, as the operation body goes away from a position where it has touched the input detection plane.

7. The information input method according to claim 6, wherein an amount of the input information is adjusted on the basis of the sliding speed.

8. The information input method according to claim 5, wherein the input information is selected on the basis of distance information on a distance from a point where the operation body touches the input detection plane to a point where its sliding then stops.

9. An electronic device comprising a haptic function-provided input device that performs touch operation to slide on an input detection plane and display means for displaying a display image based on information input by the input device, wherein said input device includes:

input detection means, which has the input detection plane, for detecting a touching position of an operation body and a sliding speed of the operation body,
computation means for computing a vibration pattern based on the sliding speed detected by the input detection means; and
vibration means for vibrating the input detection plane based on the vibration pattern computed by the computation means.

10. The electronic device according to claim 9, wherein the computation means computes a vibration pattern of the input detection plane to generate vibrations from its low frequency and small amplitude to its high frequency and large amplitude, as the operation body goes away from a position where it has touched the input detection plane.

11. The electronic device according to claim 9, comprising control means for controlling the input information variably based on the sliding speed.

12. The electronic device according to claim 9, comprising control means for controlling the input information variably based on distance information on a distance from a point where the operation body touches the input detection plane to a point where its sliding then stops.

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FIG. 1

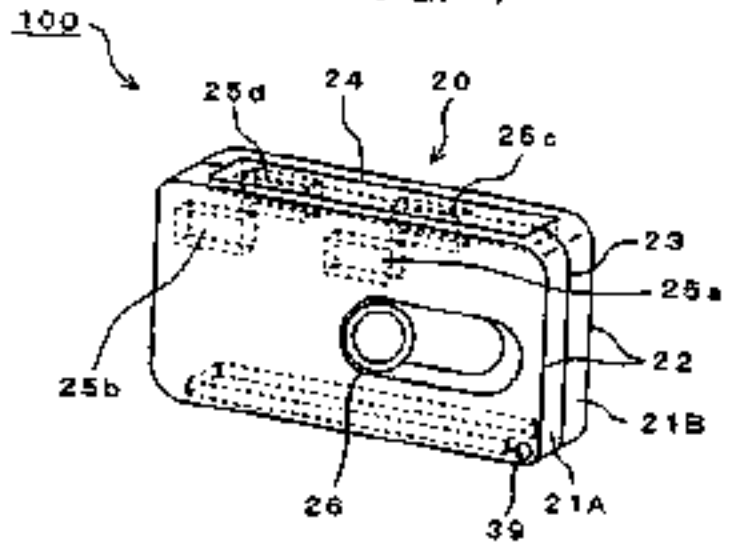
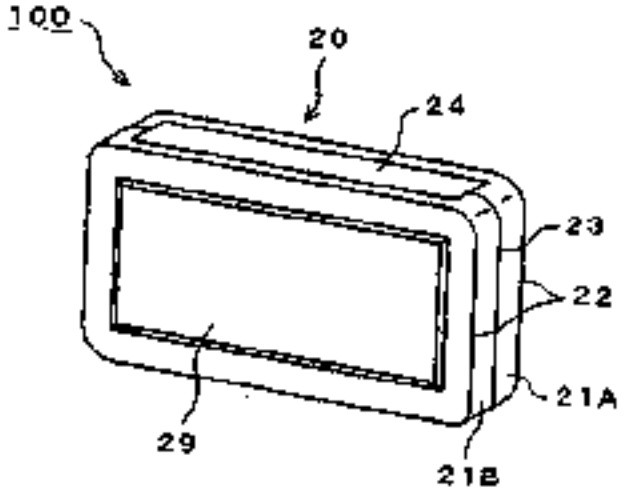


FIG. 2



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FIG. 3A

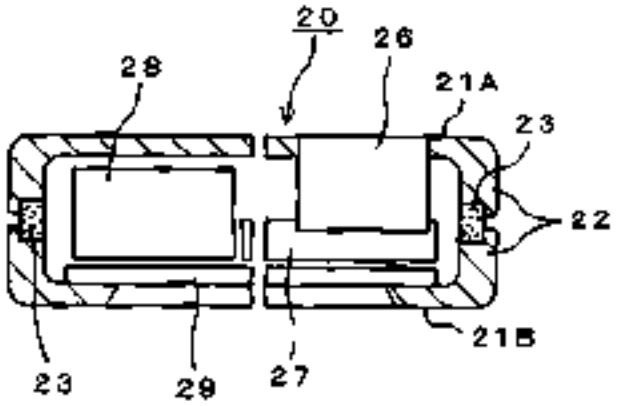
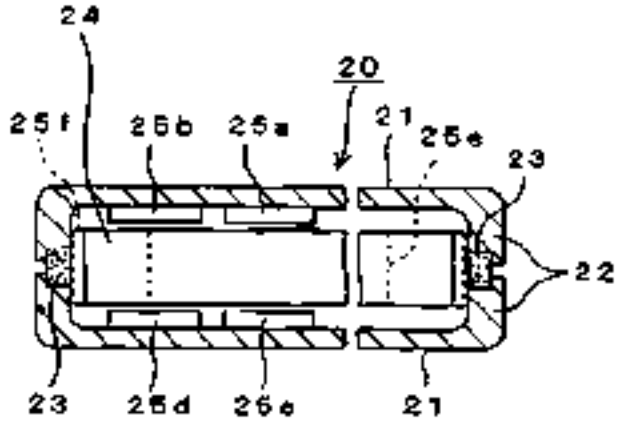
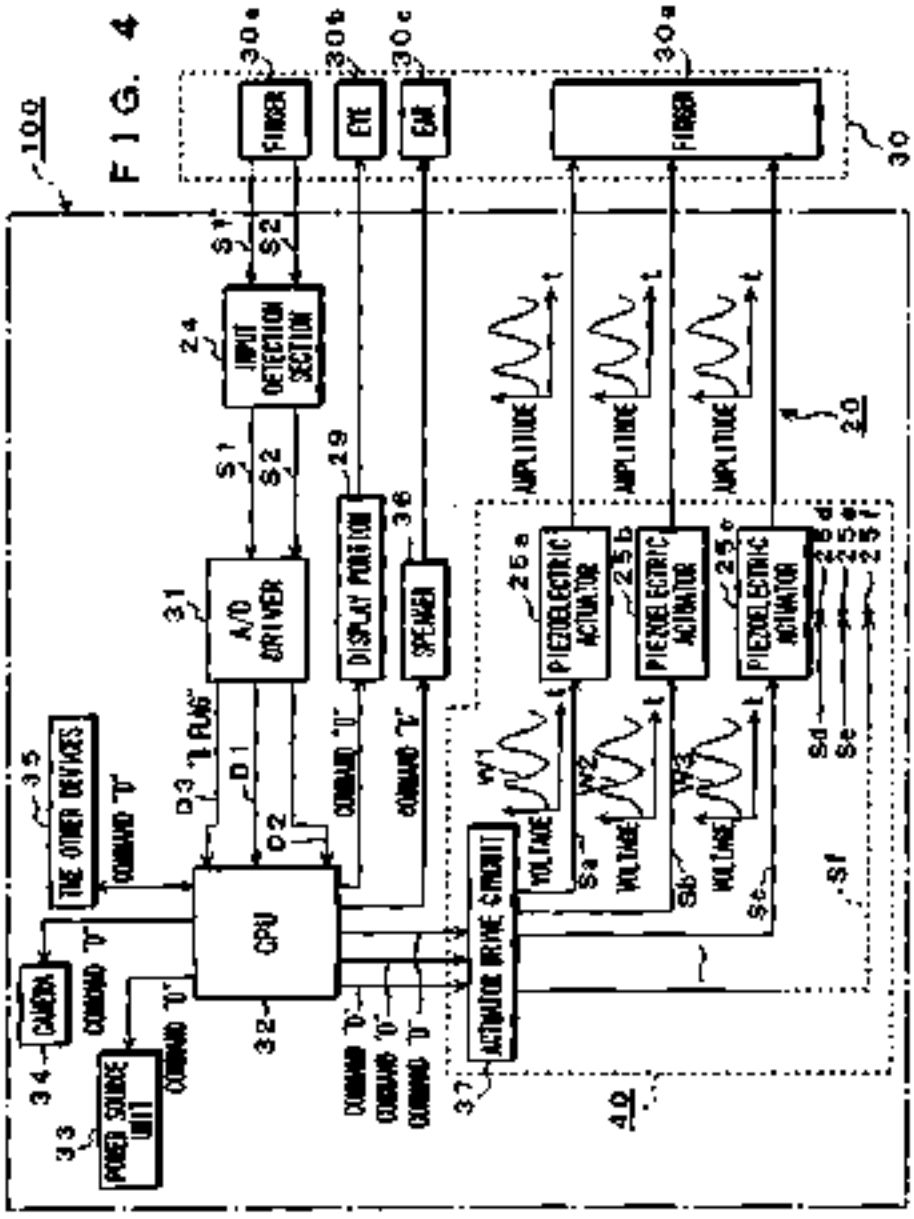


FIG. 3B



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FIG. 4



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FIG. 5

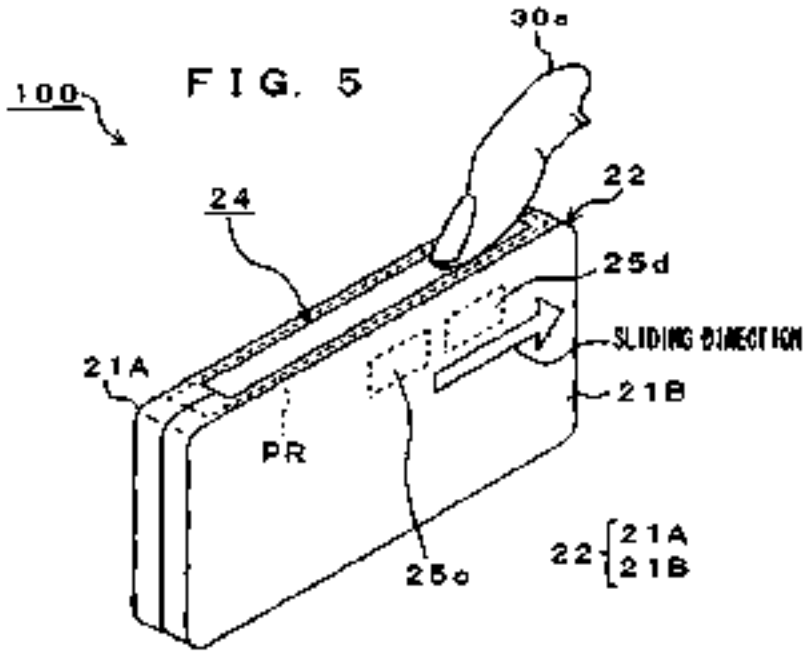


FIG. 6B

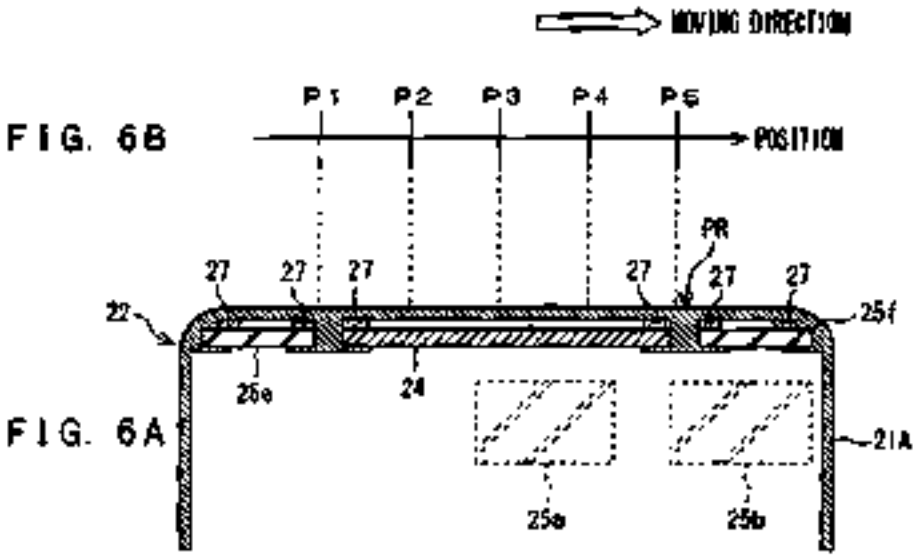
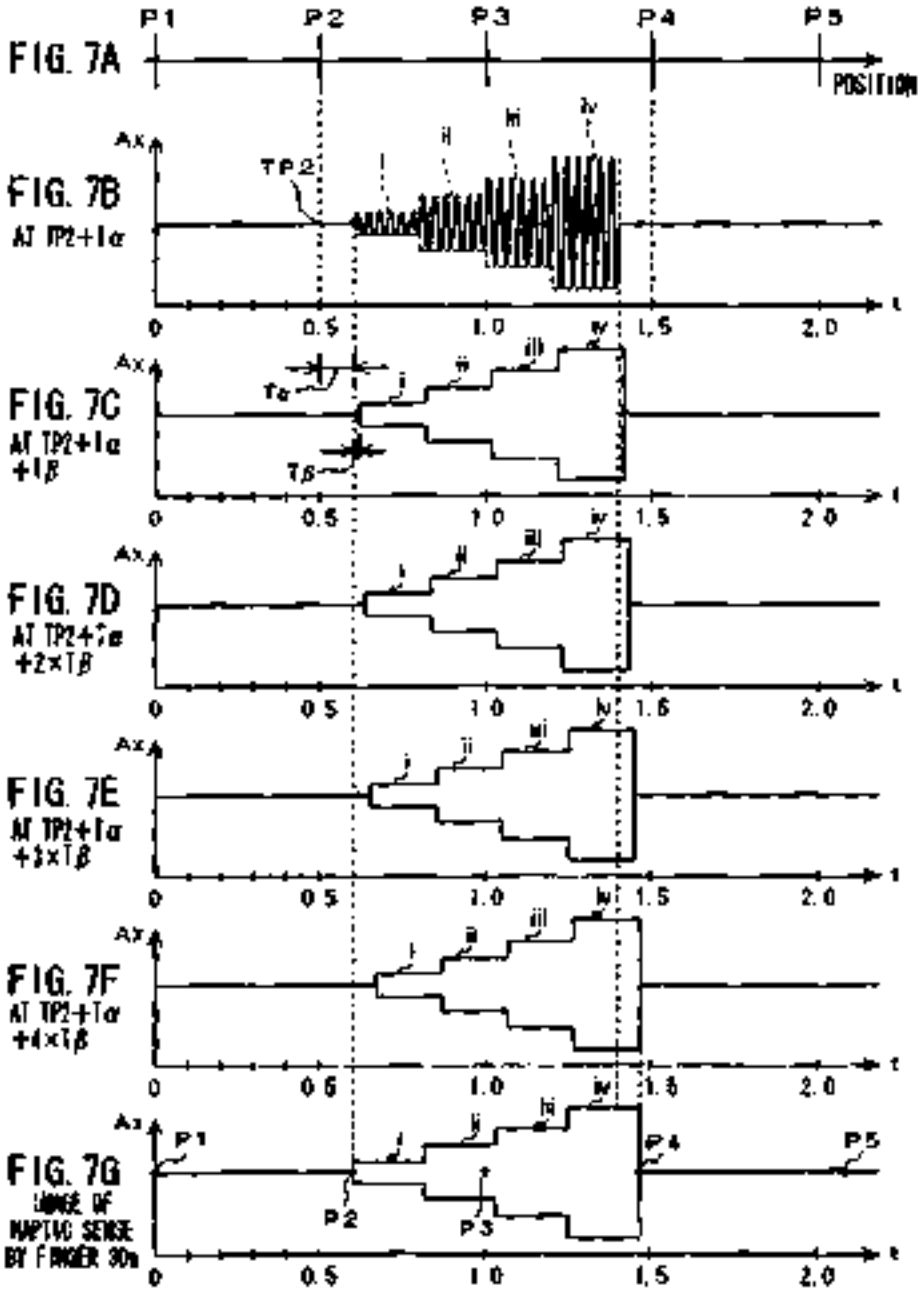
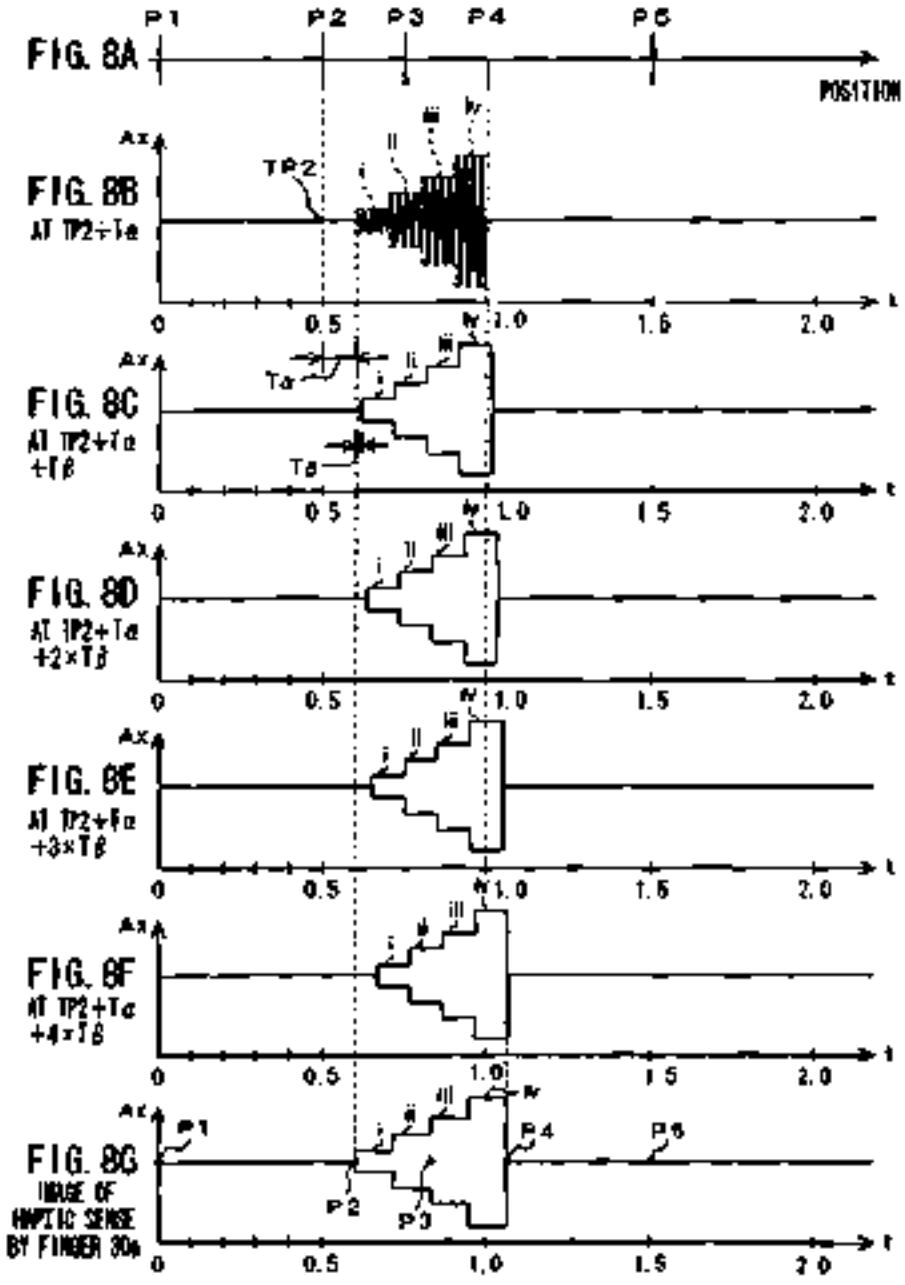


FIG. 6A

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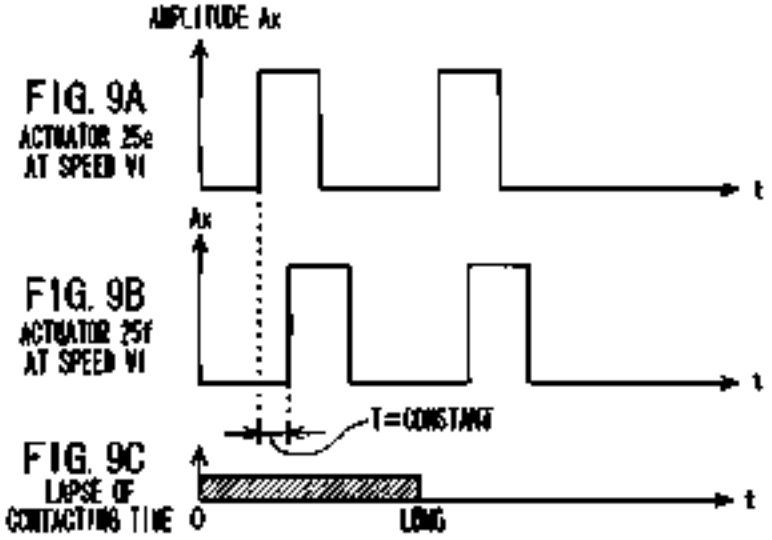


FIG. 9A
ACTUATOR 25e
AT SPEED V1

FIG. 9B
ACTUATOR 25f
AT SPEED V1

FIG. 9C
LAPSE OF
CONTACTING TIME

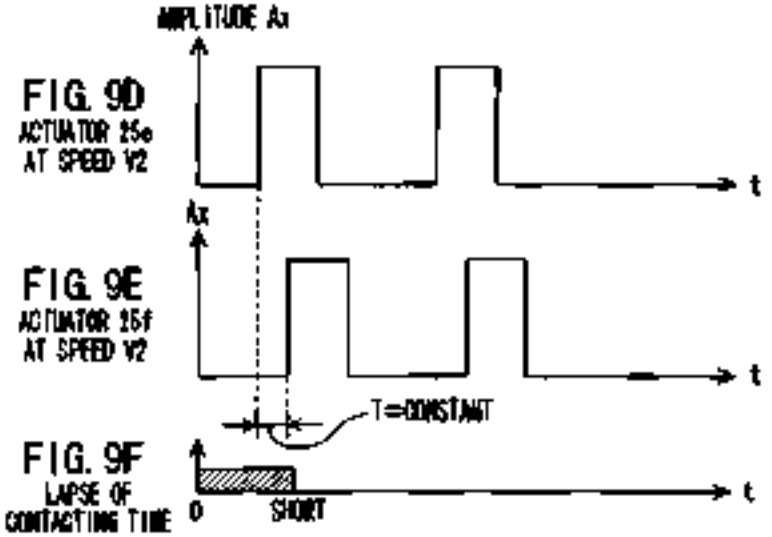


FIG. 9D
ACTUATOR 25e
AT SPEED V2

FIG. 9E
ACTUATOR 25f
AT SPEED V2

FIG. 9F
LAPSE OF
CONTACTING TIME

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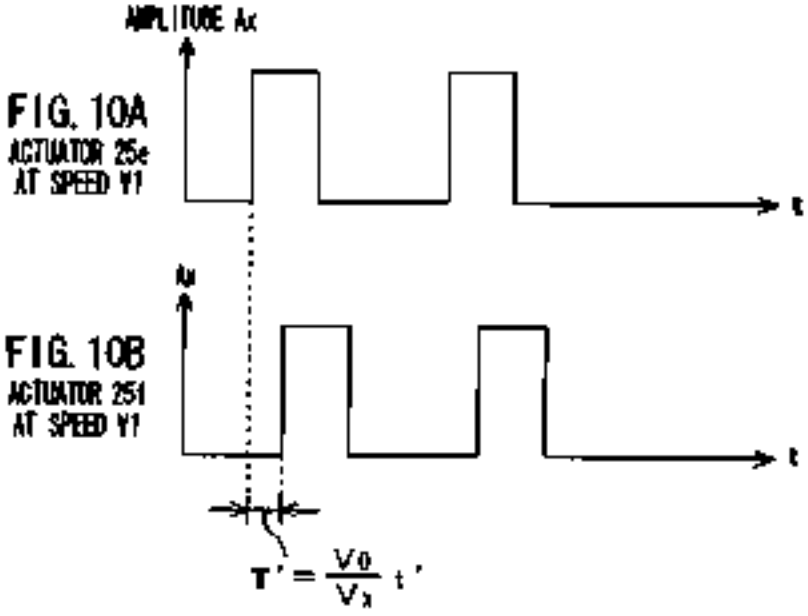
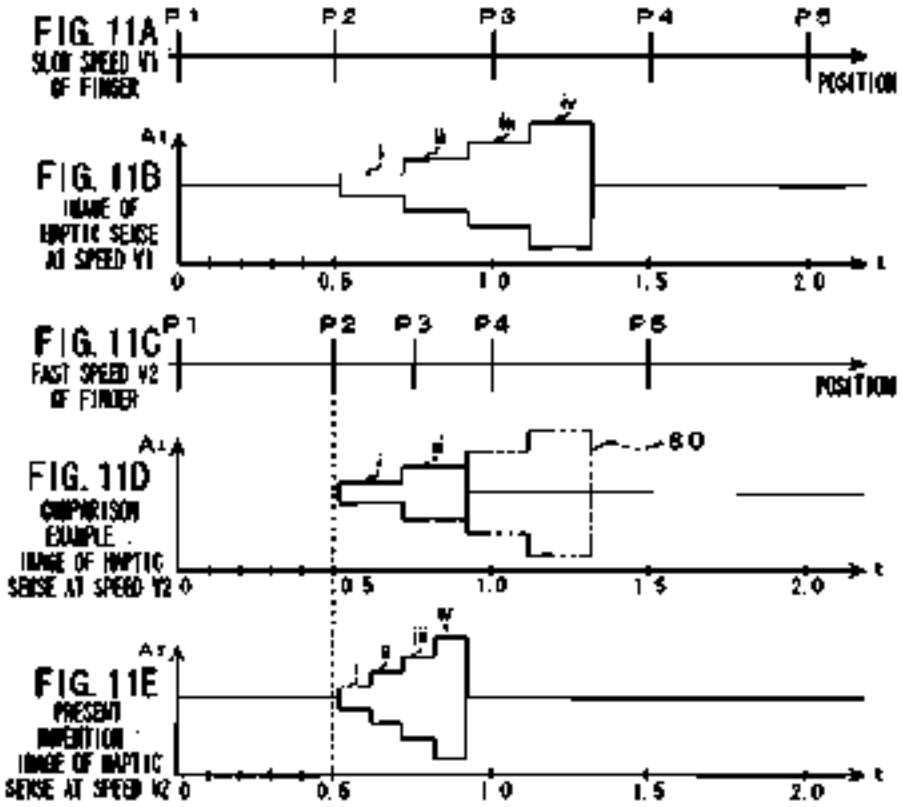


FIG. 10A
ACTUATOR 25c
AT SPEED V1

FIG. 10B
ACTUATOR 25i
AT SPEED V1

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FIG. 12A

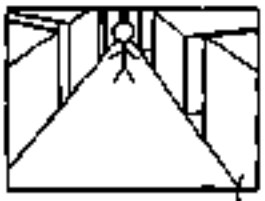


FIG. 12B

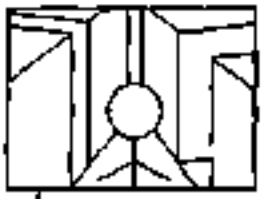
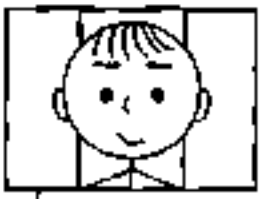


FIG. 12C



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FIG. 13A

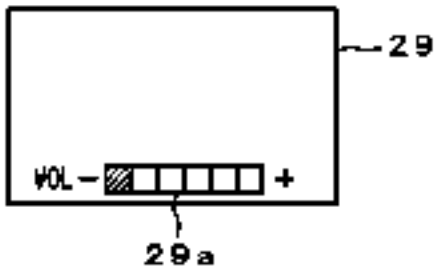


FIG. 13B

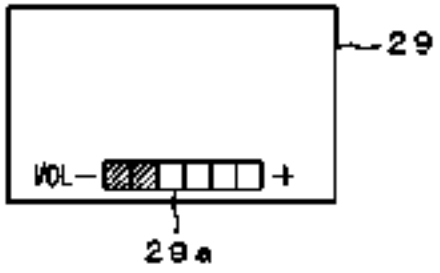
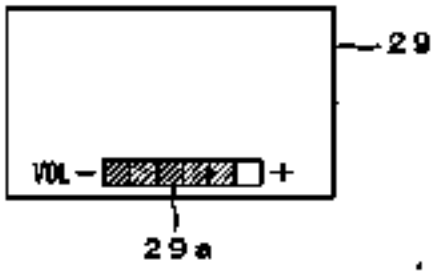


FIG. 13C



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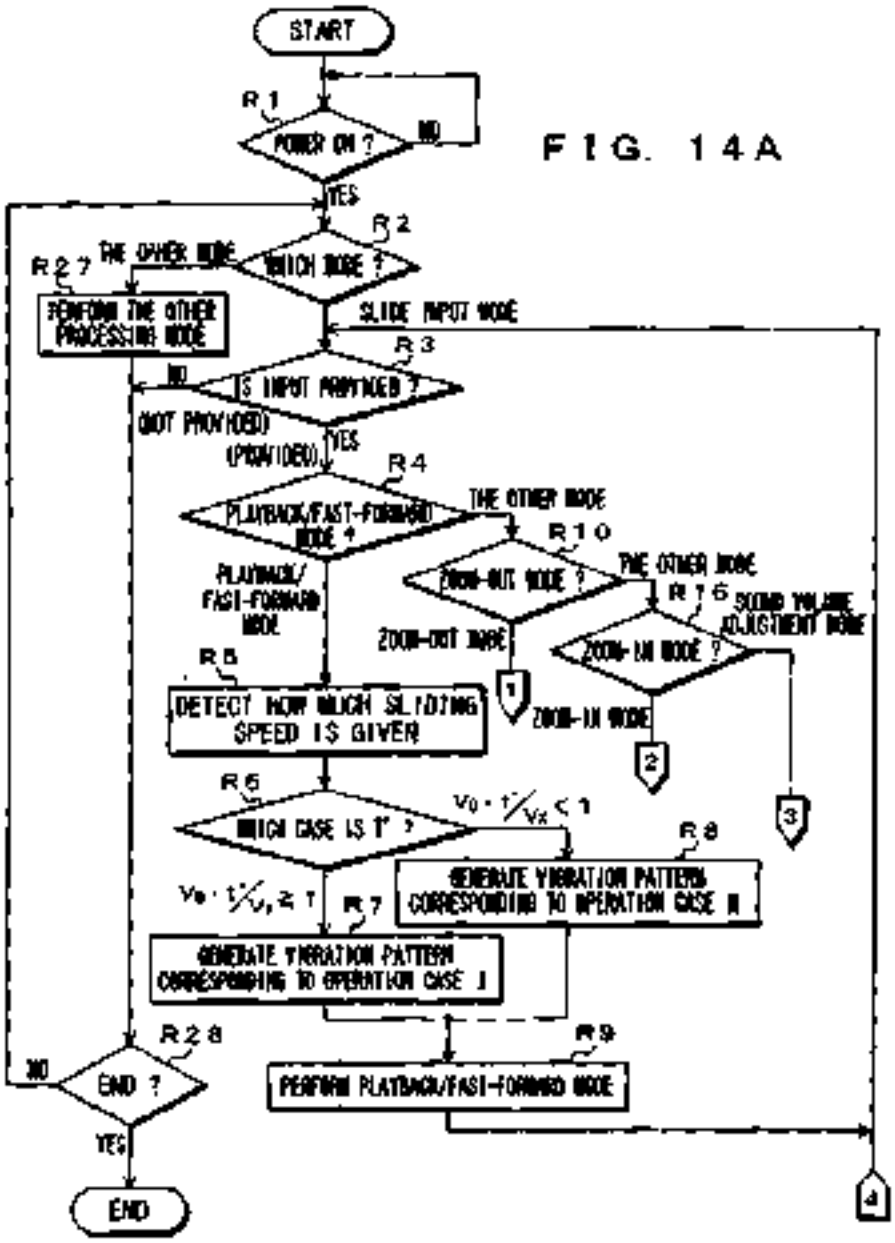


FIG. 14A

FITBIT 1002
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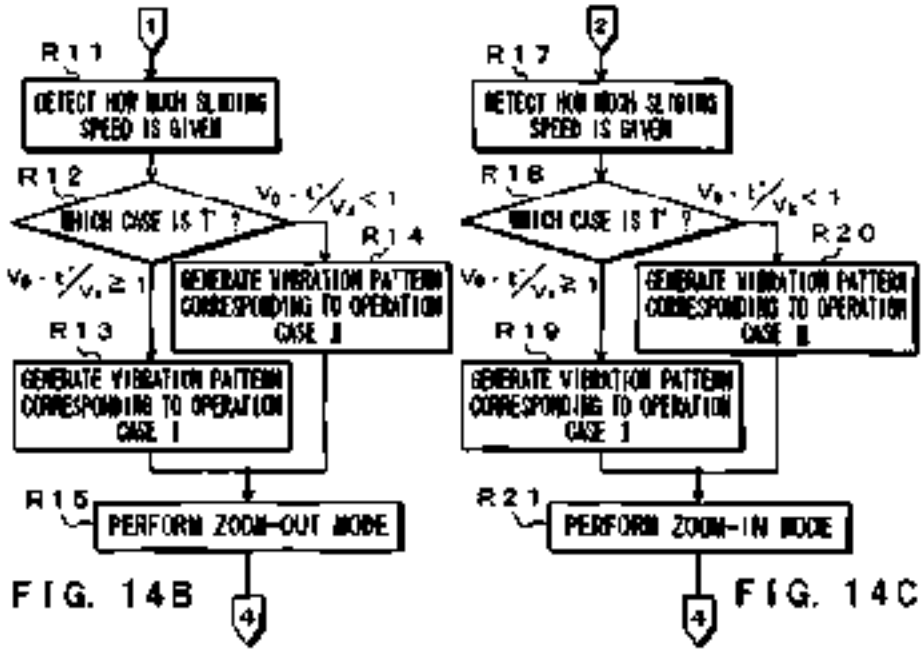


FIG. 14B

FIG. 14C

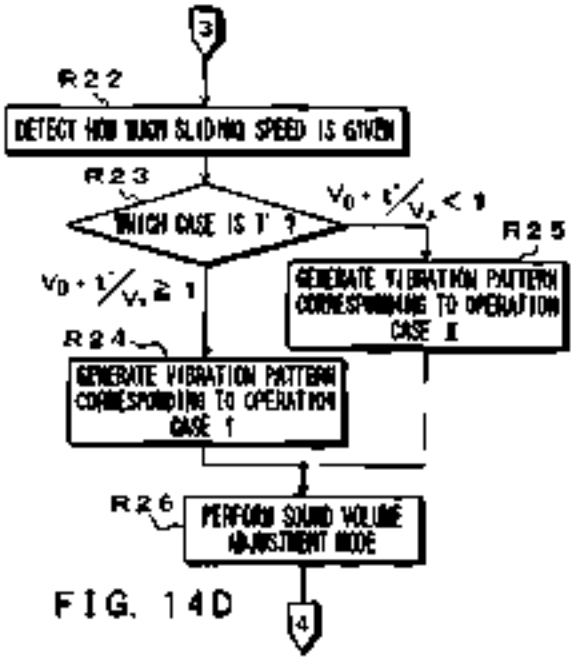
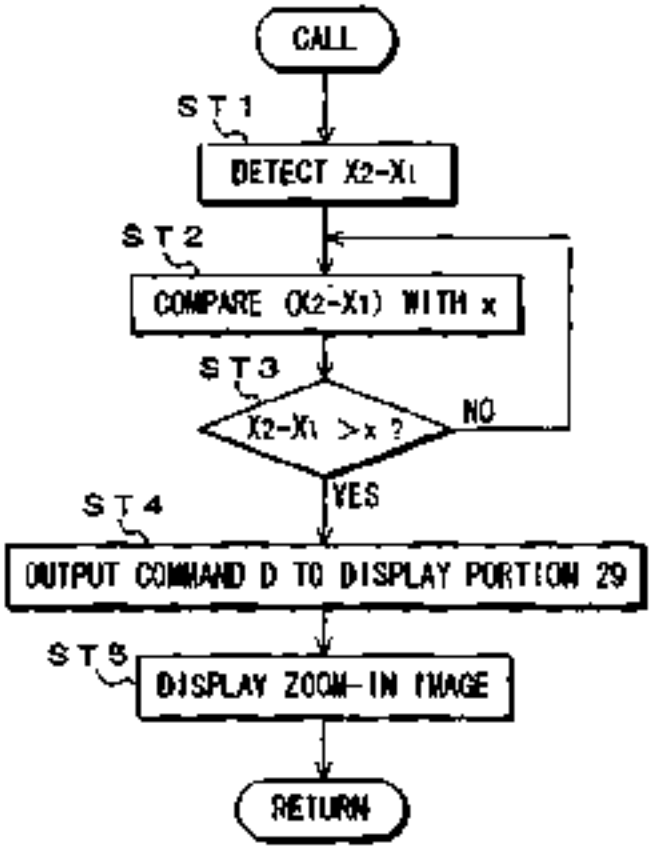


FIG. 14D

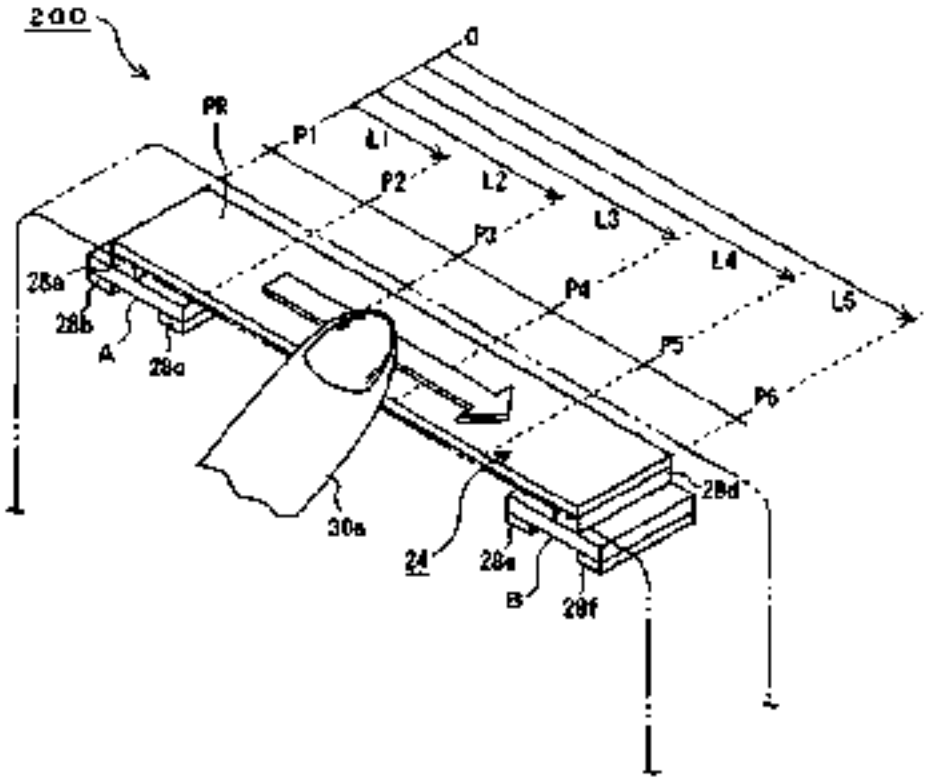
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FIG. 15



FITBIT 1002
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FIG. 16



FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application No
PCT/JP2005/006196

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl' G06F3/01, 3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl' G06F3/01, 3/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2005
Kokai Jitsuyo Shinan Koho 1971-2005 Toroku Jitsuyo Shinan Koho 1994-2005

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 2001-255989 A (Japan Science and Technology Corp.), 21 September, 2001 (21.09.01), Full text; all drawings (Family: none)	1,5,9 2-4,6-8, 10-12
Y	JP 2004-046792 A (Toshiba Corp.), 12 February, 2004 (12.02.04), Par. Nos. [0155] to [0156], [0213] to [0232], Figs. 42 to 46 & US 2003/0227441 A1	2,6,10
Y	JP 2003-296015 A (Casio Computer Co., Ltd.), 17 October, 2003 (17.10.03), Par. Nos. [0131] to [0133]; Figs. 25 to 34 & US 2003/0189561 A1	3-4,7-8, 11-12

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents:
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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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Date of the actual completion of the international search
24 June, 2005 (24.06.05)

Date of mailing of the international search report
05 July, 2005 (05.07.05)

Name and mailing address of the ISA/
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Authorized officer

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Form PCT/ISA/210 (second sheet) (January 2004)

FITBIT 1002
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REFERENCES CITED IN THE DESCRIPTION

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FITBIT 1002
Fitbit v. Immersion

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(54) Abstract Title: Haptic communication in mobile telecommunications networks

(57) A mobile telecommunications network may be provided with mobile terminals including motion sensors 21 and pressure sensors 23. Movement and/or pressure applied to a mobile terminal can be sensed by these sensors 21,23 and converted into an electrical signal. This electrical signal is encoded and transmitted to the network core. The network core generates a message to a recipient mobile terminal having a movement enabler 25 and/or pressure enabler 26. When the message is received by the receiving mobile terminal, the movement and/or pressure enabler generate an approximation of the touch input generated at the sending mobile terminal. The users of mobile terminals are therefore able to communicate with each other by the sense of touch.

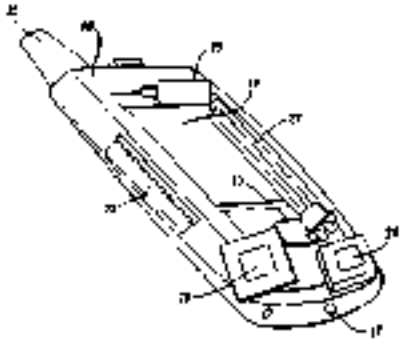


Fig.2

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FITBIT 1002
Fitbit v. Immersion

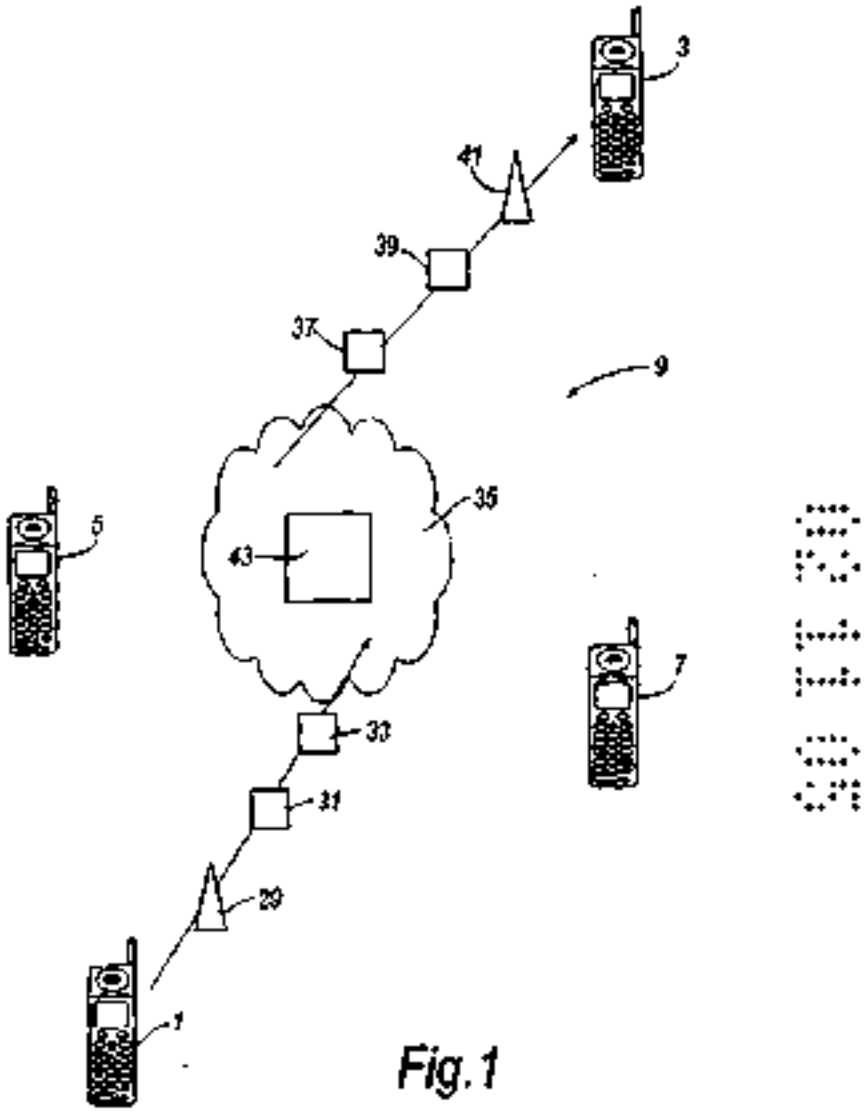


Fig.1

FITBIT 1002
Fitbit v. Immersion

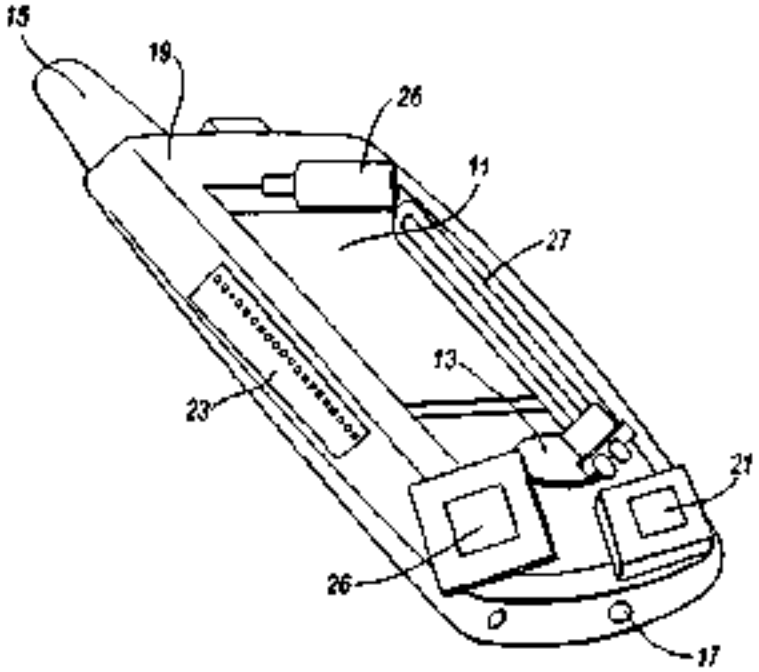


Fig.2

FITBIT 1002
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NEW COMMUNICATION TYPE FOR MOBILE TELECOMMUNICATIONS NETWORKS

The present invention relates to a mobile telecommunications network, to terminals for use with a mobile telecommunications network and to a method of operating a mobile telecommunications network, and in particular to an arrangement in which communications can be enhanced by using the sense of touch.

In addition to voice calls between mobile terminals registered with a mobile telecommunications network, it is possible to send alphanumeric data in the form of an SMS or text message. Recent developments allow the transmission of multimedia messages (MMS) such as drawings, photographs, music and video clips. The present invention seeks to provide an additional type of communication using a mobile telecommunications network.

According to a first aspect of the present invention, there is provided a mobile telecommunications network including a plurality of terminals registered with the network, wherein a first of said terminals includes means for sensing the variation of a touch input with respect to time and generating a signal representative thereof; and including means for generating a message representative of said signal; and means for transmitting the message to a second of said terminals for generating an output in response to the message that is indicative of the touch input.

The message may be generated by the first terminal, the mobile telecommunications network or a separate entity.

The output may be a simulation or approximation of the input - it may stimulate the touch sense of the user of the second terminal to convey the touch

FITBIT 1002
Fitbit v. Immersion

input by the user of the first terminal, allowing the users to communicate by the sense of touch.

Alternatively, the output may be indicative of the touch input but may stimulate a different sense of the user of the second terminal - such as sight or hearing. This arrangement may be used when the second terminal is not capable of generating a touch output.

Particular touch inputs generate particular outputs (whether stimulating touch, sight or hearing). Particular inputs may be mapped to particular outputs. For example, shaking the first terminal may generate a particular audible message at the second terminal. This mapping may be pre-set and/or may be set by the users of the terminals or by a third party.

According to a second aspect of the present invention, there is provided a mobile telecommunications network, including means for receiving a message from a first terminal for delivery to a second terminal and for converting the message between a first type to a second type, wherein at least the first type of message includes data enabling the reproduction of an output by a terminal which output is detectable by the sense of touch and varies with respect to time in dependence upon the content of the message.

The data in the first type of message enabling the reproduction of an output by a terminal may date input from a terminal (which will subsequently be reproduced in some form) or data for generating an output from a terminal.

According to a third aspect of the present invention, there is provided a terminal for use with a mobile telecommunications network, the terminal including means for sensing a variation of a touch input with respect to time and generating a signal representative thereof, a representation of which is for

FITBIT 1002
Fitbit v. Immersion

inclusion in a message for transmission to another terminal for generating an output in response to the message that is indicative of the touch input.

According to a fourth aspect of the present invention, there is provided a terminal for use with a mobile telecommunications network, the terminal including means for receiving a message representative of an input signal generated by another terminal, means for generating an output detectable by the sense of touch and which varies with respect to time in dependence upon the content of the message.

According to a fifth aspect of the present invention, there is provided a method of operating a mobile telecommunications network having a plurality of terminals, the method including generating at a first of said terminals a signal representative of how a touch input varies with respect to time, generating a message representative of the signal, transmitting the message to a second of said terminals, and generating an output at the said second terminal in response to the message that is indicative of the touch input.

According to a sixth aspect of the present invention, there is provided a mobile telecommunication network including means for generating a message containing information for use by the user of a terminal, means for transmitting the message to said mobile terminal, and means for conveying the information to the user of said mobile terminal by stimulating the user's sense of touch.

Humans have five senses: sight, hearing, touch, smell and taste.

Known mobile terminals can detect visual and audible stimuli, convert these into a message and transmit this to another terminal via a mobile telecommunications network. For example, a user of a first mobile terminal may record a video clip (comprising sound and moving pictures) of themselves

FITBIT 1002
Fitbit v. Immersion

and transmit this as a message to a second mobile terminal, where it is reproduced, stimulating the sight and hearing sensors of the recipient. The present invention provides an enhancement to communications by allowing a touch input to be sensed by a mobile terminal and/or a touch output to be reproduced on a mobile terminal.

In the specification the term "touch" means anything that is detectable by the human sense of touch, and includes such stimuli as hearing and vibration.

Some mobile terminals have the facility to vibrate in order to alert the user of an incoming call or message. However, the vibration is simply triggered by a mobile terminal on receipt of an incoming call or message. The vibration does not convey the content of the message.

Conventional mobile telephones are capable of receiving a touch input in the sense that they have buttons and other controls which are depressed. However, the nature of the touch input is not recorded and conveyed as part of a message. The depression of the key may result in data being recorded in a message (for example a letter in an SMS message), but the nature of the touching of the key (or how it varies with time) is not recorded or conveyed.

According to one aspect of the present invention the variation of a touch input with respect to time is sensed. The intensity of the touch input may be sensed.

The term mobile telecommunications "network" used in this specification does not necessarily refer to a single network operated by a particular (legal) entity. The network might comprise a plurality of separately operated networks, or a part of one of such networks.

FITBIT 1002
Fitbit v. Immersion

For a better understanding of the present invention, an embodiment will now be described by way of example, with reference to the accompanying drawings, in which:-

Figure 1 shows schematically principal elements of a mobile telecommunications network; and

Figure 2 shows schematically additional components provided to a mobile telecommunications terminal in accordance with an embodiment of the invention.

As shown in Figure 1, mobile terminals 1,3,5 and 7 are registered with a GSM or UMTS (3G) mobile or cellular telecommunications network 9. The mobile terminals may be hand held mobile telephones, personal digital assistants (PDAs) or laptop computers equipped with a datacard (or, of course, any combination of these). The mobile terminals communicate wirelessly with the mobile telecommunications network 9 via a radio access network comprising base transceiver stations (BTSs) and base station controllers (BSCs). Communications between the mobile terminals and the network 9 are routed from the radio access network via mobile switching centres (MSCs), which may be connected by a fixed (cable) link to the network 9. Of course, in practice, a typical mobile telecommunications network 9 will have many thousands of subscribers, each with one or more terminals.

Each of the mobile terminals 1,3,5,7 is provided with a respective subscriber identity module (SIM). During the manufacturing process of each SIM authentication information is stored thereon under control of the network 9. The network 9 itself stores details of each of the SIMs issued under its control. In operation of the network 9, a mobile terminal is authenticated (for example, when the user activates the terminal in the network with a view to making and

FITBIT 1002
Fitbit v. Immersion

receiving calls) by the network sending a challenge to the mobile terminal. The received challenge is passed to the SIM associated with the mobile terminal and the SIM calculates a reply (dependent on predetermined information held on the SIM - typically an authentication algorithm and a unique key Ki) and transmits it back to the network 9. The network receives the reply from the mobile terminal. Using information pre-stored concerning the content of the relevant SIM and the nature of the challenge sent to the mobile terminal, the network calculates the expected value of the reply from the mobile terminal. If the reply received matches the expected calculated reply, the SIM and the associated mobile terminal are considered to be authenticated.

A mobile terminal in accordance with an embodiment of the invention is shown in Figure 2. In a conventional manner the mobile terminal includes a visual display 11, various buttons and keys 13 and an antenna 15 for communication with the radio access network of the mobile telecommunications network 9. The mobile terminal also includes a microphone 17 for sensing audio input such as speech and a loudspeaker 19 for generating an audio output. The visual display 11 may provide a user interface such as a graphical user interface to facilitate access to functions provided by the mobile terminal and may also display messages received by the mobile terminal - such as alphanumeric text and pictures (moving or still). The mobile terminal also of course includes data processing circuitry (not shown) for allowing the user of the mobile terminal to control the terminal and for allowing wireless communications with the mobile telecommunications network 9. The features of the mobile terminal described thus far are conventional.

According to the embodiment the mobile terminal is provided with a motion sensor 21, such as a micro-accelerometer for detecting movement of the mobile terminal. A pressure sensor 23, such as a piezoelectric strip, is also provided for detecting, for example, squeezing, hitting and/or stroking of the mobile

FITBIT 1002
Fitbit v. Immersion

terminal. The sensors 21 and 23 allow the terminal to sense movement and pressure - for example caused by the user of the mobile terminal shaking the terminal or squeezing the terminal. The mobile terminal may be provided with an elastically deformable outer casing and may be configured to allow the outer casing to be resiliently compressed (for example, by squeezing) such that this is sensed by the pressure sensor 23.

Other sensors may also be provided that allow the mobile terminal to sense touch inputs (that is, inputs that would stimulate the human sense of touch). For example, the mobile terminal may also be provided with a temperature sensor.

The sensors 21 and 23 generate electrical signals in response to a touch input. These are detected by processing circuitry of the mobile terminal and may be stored or converted into a format suitable for transmission in the message to the mobile telecommunications network 9 and onwardly to another mobile terminal. The generation and transmission of such messages will be discussed further below.

In addition to providing sensors for receiving and recording a touch input, the mobile terminal also includes devices for generating a touch output (that is, devices that provide a stimulus to the human sense of touch). Motion output is created using a movement enabler 25 such as an electromagnetic device. Heat is generated using a heating element 27. Additionally, a pressure generation mechanism 26 may be provided for flexing (expanding/contracting) the resiliently deformable case of the mobile terminal. These output types all stimulate the human sense of touch.

If the user of mobile terminal 1 wishes to communicate with the user of mobile terminal 3 using the mobile telecommunications network 9, data relating to the

FITBIT 1002
Fitbit v. Immersion

communication is routed wirelessly between mobile terminal 1 and the local BTS 29. From there the communication data is transmitted to the BSC 31 and to MSC 33 via a fixed or cable link. The mobile telecommunications network core 35 then routes the communication to an appropriate MSC 37 with which the mobile terminal 3 is registered. The communication data is transmitted from MSC 37 to the appropriate BSC 39, and from there to BTS 41. The communication data is transmitted from the BTS 41 wirelessly to the mobile terminal 3.

The communication data may be data representative of the users' voices in a conventional circuit switched voice call. The communication data may also be transmitted during a (packet switched) communication session between the mobile terminal 1 and the mobile terminal 3.

To efficiently facilitate such communication sessions, the third generation partnership project (3GPP) has recently defined a new concept known as IMS (IP-based multimedia subsystem). The aim of IMS is to allow users such as mobile telephone network operators to provide services to their subscribers as efficiently and effectively as possible. For example, the IMS architecture is likely to support the following communication types: voice, video, instant messaging, "presence" (a user's availability for contact), location-based services, email and web. Further communication types are likely to be added in the future. This diverse collection of communication devices requires efficient communication session management due to the number of different applications and services that will be developed to support these communication types. The 3GPP have chosen session initiation protocol (SIP) for managing these sessions.

SIP protocol is a session-based protocol designed to establish IP based communication sessions between two or more points of users. Once the SIP

FITBIT 1002
Fitbit v. Immersion

session has been established, communication between these end points or users can be carried out using a variety of different protocols (for example, those designed for streaming audio and video). These protocols are defined in the SIP session initiation messages.

With IMS, users are no longer restricted to a separate voice call or data session. Sessions can be established between mobile terminals that allow a variety of communication types to be used and media to be exchanged. The sessions are dynamic in nature in that they can be adapted to meet the needs of the end users. For example, two users might start a session with an exchange of instant messages and then decide that they wish to change to a voice call, possibly with video. This is all possible within the IMS framework. If a user wishes to send a file to another user and the users already have a session established between each other (for example, a voice session), the session can be redefined to allow data file exchange to take place. This session redefinition is transparent to the end user.

One application of IMS is push-to-talk over cellular (PoC). PoC allows a communication session to be established between a group of devices such that the user of one of the devices can speak and the users of the or each of the other devices will hear that person speak. During such communication session each device functions like a two-way radio or walkie-talkie in a one-to-one or one-to-many group mode. Full duplex speech communication between the users of the respective devices during the PoC part of the communication is not possible - only one user can speak at a time.

One feature of PoC is that, when the communication is established, there is an "always on" communication in between the terminals. When a user wishes to talk to the or each of the other terminals associated with the communication session, the user issues an appropriate instruction to their device (typically

FITBIT 1002
Fitbit v. Immersion

using a soft key - that is, a key whose function is programmable), and the user's speech is captured by their terminal instantly, or within a relatively short mode of time, is transmitted to the or each of the other terminals and is reproduced on those terminals. There is no requirement for the user inputting the speech data to dial the or each other device, and nor is there any requirement for the users of the devices receiving the speech to take any action to receive the speech data - it is automatically reproduced by the device when it is received (assuming, of course, the device is operating in an appropriate mode for allowing PoC communication).

PoC is described in the document "Push-to-talk over Cellular (PoC) - architecture, draft version 1.0 - 13th February 2004" available from the Open Mobile Alliance Limited (OMA).

In addition to establishing a PoC communication session using IMS, a PoC communication session could be established over existing GSM/GPRS networks by the exchange of data packets but without IMS.

In the embodiment of the present invention, the touch input of mobile terminal 1 is sensed by sensors 21 and/or 23 and a signal representative thereof is generated by the mobile terminal 1. In accordance with a feature of the present embodiment, this touch input is used as a means of communicating with the user of mobile terminal 3. The signal derived from the sensors 21 and/or 23 is encoded and transmitted to the network core 35 via BTS 29, BSC 31 and MSC 33. In the network core 35 a translation server 43 is provided which receives the encoded signal and generates a suitable output message representative of the encoded signal. The output message is transmitted to the mobile terminal 3 via MSC 37, BSC 39 and BTS 41.

FITBIT 1002
Fitbit v. Immersion

The data communicated between the mobile terminal 1 and the mobile terminal 3 may be transmitted by any suitable means. The data may be transmitted in the circuit switched domain, but is preferably transmitted in the packet switched domain. The data may be transmitted as GPRS data, as an SMS message or an MMS message. The data may also be transmitted during a IMS communication session (controlled by SIP) between the mobile terminals 1 and 3 (and possibly other mobile terminals). The data may be transmitted as part of a PoC communication session, so that when the message is received by the mobile terminal 3 an appropriate output is generated (preferably immediately) without requiring any action of the user of the mobile terminal 3. In this regard, although PoC relates to push-to-"talk", in fact any type of data can be communicated during such a session.

In a first example, it will be assumed that both mobile terminal 1 and mobile terminal 3 include the features of the mobile terminal shown in Figure 2. In mobile terminal 1 the touch input signals generated as a result of pressure, movement or heating of the mobile terminal 1 have the electrical signals generated thereby recorded and stored by their mobile terminal 1. How the signals received from the sensors vary with respect to time is recorded. For example, the variation in pressure applied to pressure sensor 23 may be recorded for a predetermined period of, for example, one, two, or five seconds (or of any other duration). Simultaneously, or during a different time period, the signals generated by the movement sensor 21 may be recorded and stored. The data processor of the mobile terminal 1 then encodes the signals in a suitable format such that their data content can be extracted by a receiving device. Typically, the data will be encoded as binary data. Suitable methods for encoding such data will be known to those skilled in the art and will not be described further here.

FITBIT 1002
Fitbit v. Immersion

A communication session (for example, a IMS, SIP controlled, communication session) between mobile terminal 1 and mobile terminal 3 is then initiated in a known manner if not already established. The encoded data is transmitted to the network core 35, where it is passed to translation server 43. In this example the translation server 43 need not take any action because the mobile terminals 1 and 3 are the same type of mobile terminal. The translation server 43 then issues a message comprising the encoded data to the mobile terminal 3. On receipt of the message the mobile terminal 3 decodes the message and applies appropriate electrical signals to movement enabler 25, pressure generation mechanism 26 and any other touch output devices provided. The touch output or outputs generated by the mobile terminal 3 will, if the user is in contact with mobile terminal 3, stimulate the touch sense of the user. The touch output is an approximation of the touch input to mobile terminal 1. For example, the squeezing of mobile terminal 1 will temporarily change the shape of its casing. The touch output of the mobile terminal 3 will cause a corresponding temporary change in the shape of the terminal 3. The users of mobile terminals 1 and 3 can therefore communicate with each other using the sense of touch.

If the user of mobile terminal 3 does not have a mobile terminal of the type illustrated in Figure 2, or at least has a mobile terminal of a different type to the mobile terminal 1, the translation server 43 is operative to process the encoded data received from the mobile terminal 1 to convert it into a suitable message for reproduction by the mobile terminal 3. For example, the user of mobile terminal 3 may not have a movement enabler 25. In such an instance, the translation server may generate the message such that the output produced by the mobile terminal 3 is an audible and/or visible output. That is, data encoded from the motion sensor 21 and/or pressure sensor 23 is detected by the translation server 43 and is converted into an encoded signal for generating a different type of output from the sensed input.

FITBIT 1002
Fitbit v. Immersion

For example, the encoded signals representing the touch input sensed by the motion sensor 21 and the pressure sensor 23 may be analysed by the translation server 43, where it is determined that these signals are indicative of the user of mobile terminal 1 stroking the mobile terminal. The translation server 43 then accesses a look-up table to determine to which type of output this type of input should be mapped. In this example, it is indicated that the output should be mapped to a simulated voice output generating an "oooh" sound. Similarly, if the translation server determines that the signals input to the movement sensor 21 and pressure sensor 23 are indicative of the mobile terminal 1 being squeezed by the user, the look-up table may indicate that the appropriate output is an audio voice simulation output generating the sound "aaah". Further, if it is determined from the sensors 21,23 that the mobile terminal has been shaken, the look-up table may indicate that the appropriate output is the signal to cause the display 11 of the mobile terminal 3 to have a red colour. Furthermore, if the signals derived from the sensor 21,23 indicate that the mobile terminal has been dropped, the appropriate output message may be a signal to cause the display to flash between red and blue colours.

It should of course be understood that these are merely examples of the translation of types of input to types of output. The output may stimulate more than one sense - for example, the output may produce both an audible and a visual stimulus to the user of mobile terminal 3, or a visual output and a touch output.

The mapping of the inputs of mobile terminal 1 to the appropriate output of mobile terminal 3 may be predetermined or preset by the mobile terminal 1, the mobile terminal 3 or the network 9. The mapping may depend upon the functionality of the mobile terminal 1 and/or the mobile terminal 3 - for example, whether the terminal has the facility to detect and/or reproduce movement. The type of message that needs to be generated by the translation

FITBIT 1002
Fitbit v. Immersion

server 43 to cause the receiving mobile terminal 3 to produce the desired output type may depend upon the particular type of mobile terminal 3, and this information may be obtained from the look-up table. If the mobile terminal 3 has a standard operating system, this may not be necessary.

As indicated above, the mapping of particular input stimuli to output stimuli may be predetermined or pre-set. The user of mobile terminal and/or the user of mobile terminal 3 may be able to select which input stimuli are mapped to which output stimuli, for example by appropriate data communication with the translation server 43. For example, the users of mobile terminals 1 and 3 may agree a particular form of communication between themselves. For example, the users may agree that the sensed squeezing of the mobile terminal 1 by pressure sensor 23 will cause heat generation by heating element 27 in mobile terminal 3. This allows the user of mobile terminals 1 and 3 to communicate in a manner that will not disturb others around them and which is only understandable to the users. Even if the heat output at the mobile terminal 3 was detected by the person other than the authorised user of mobile terminal 3, that person would not know what the generation of heat signified. If desired, this allows communications between the users of the mobile terminals 1 and 3 that have an element of secrecy.

The table below shows the entries of the look-up table stored in the translation server 43 in relation to the mobile terminal 1, indicating the appropriate output to receiving mobile terminals A,B,C and D, depending upon the input from mobile terminal 1

Mobile terminal 1				
Input	**Output of Mobile terminal A**	**Output of Mobile terminal B**	**Output of Mobile terminal C**	**Output of Mobile terminal D**
Vertical stroke	Simulation of vertical stroke	Audio. "oooh"	Vibration	MMS image: ☺

FITBIT 1002
Fitbit v. Immersion

Squeeze	Simulation of Squeeze	Audio: "aaah"	Heat generation	MMS image:
Shake	Simulation of Shake	Display colour to red	Audio: "John is fine"	MMS image:
Drop	Simulation of Drop	Display flashes red/blue	Audio: "John is cross"	MMS image:

The mapping of particular input stimuli to output stimuli between any pair of mobile terminals may be set by the users of those terminals, or may be preset in dependence upon the input and output facilities of those terminals.

The mapping may also be set or altered by a third party - i.e. not the mobile terminals or the network. For example, mapping data may be obtained from a website and passed to the translation server 43. Such a website may, by way of illustration, be for users interested in massage. Details of the type of mobile terminals 1 and 3 may be provided to the website. The website may then provide for downloading suitable mapping coding that allows the user of mobile terminal 1 to cause the mobile terminal 3 to produce a touch output for performing a particular type of massage. The user of the mobile terminal 1 may do this by providing as an input a particular touch input, alphanumeric character or sound. The website may download a mean for providing a user interface for the user of mobile terminal 1 that provides a convenient mechanism for the desired touch output for mobile terminal 3 to be selected.

As an alternative, or in addition to, the translation server 43 being provided by the network core 35, the mobile terminal 1 may be provided with a data processing function that generates an appropriately formatted message that produces the desired output stimuli on the mobile terminal 3 when transmitted to that mobile terminal 3 without modification. Alternatively, the receiving mobile terminal 3 may receive encoded signals from the sensors 21 and/or 23 of the sending mobile terminal and may include a data processing function for converting those received data to an appropriate message to generate the

FITBIT 1002
Fitbit v. Immersion

desired output stimuli on the mobile terminal 3. These data processing functions may require a considerable amount of processing power, and at present it is preferred that these are performed by the network core 35, rather than the mobile terminals 1 and 3.

It should be understood that an output corresponding to the input stimuli of the mobile terminal 1 may be transmitted (possibly simultaneously) to a plurality of receiving terminals. The output stimuli generated by each of the receiving terminals may be different, in dependence upon the data in the relevant part of the look-up table accessed by the translation server 43 in respect of the receiving terminal and/or upon the output facilities of the receiving mobile terminal.

The touch output generated by the receiving mobile terminal may be in addition to conventional forms of visual and/audio output. During a single communication session (such as an IMS SIP controlled communication session), voice data, other audio data, picture data and touch data may be transmitted, providing an enriched communications experience between the users of mobile terminals 1 and 3.

FITBIT 1002
Fitbit v. Immersion

CLAIMS

1. A mobile telecommunications network including a plurality of terminals registered with the network, wherein a first of said terminals includes means for sensing the variation of a touch input with respect to time and generating a signal representative thereof; and including means for generating a message representative of said signal; and means for transmitting the message to a second of said terminals for generating an output in response to the message that is indicative of the touch input.

2. The network of claim 1, wherein the message is generated by a data processor of the first terminal.

3. The network of claim 1, wherein the message is generated by a data processor of an entity separate from the first terminal.

4. The network of claim 1, wherein the message is generated by a data processor associated with the mobile telecommunications network.

5. The network of claim 1, wherein the output is generated by a data processor of the second terminal.

FITBIT 1002
Fitbit v. Immersion

6. The network of any one of claims 1 to 5, wherein the output is a simulation or approximation of the touch input.

7. The network of any one of claims 1 to 5, wherein the output is indicative of the touch input but is an audible and/or visible output.

8. The network of any one of claims 1 to 7, including means for mapping selected inputs to generate selected outputs to provide a predetermined relationship therebetween.

9. The network of claim 8, wherein said mapping is determined by the first terminal.

10. The network of claim 8, wherein said mapping is determined by the second terminal.

11. The network of claim 8, wherein said mapping is determined by the mobile telecommunications network.

12. The network of claim 8, wherein said mapping is determined by a third party entity, separate from said terminals and the mobile telecommunications network.

FITBIT 1002
Fitbit v. Immersion

13. The network of any one of claims 1 to 12, wherein the sensing means includes a motion sensor.

14. The network of claim 13, wherein the motion sensor includes a micro-accelerometer.

15. The network of any one of claims 1 to 14, wherein the sensing means includes a pressure sensor.

16. The network of claim 15, wherein the pressure sensor includes a piezoelectric device.

17. The network of any one of claims 1 to 16, wherein the network comprises a GSM mobile telecommunications network.

18. The network of any one of claims 1 to 16, wherein the network comprises a UMTS (3G) mobile telecommunications network.

19. The network of any one of claims 1 to 18, wherein the network comprises a GPRS mobile telecommunications network.

20. The network of any one of claims 1 to 19, wherein the message is transmitted in a push-to-talk over cellular (PoC) communication session.

FITBIT 1002
Fitbit v. Immersion

21. The network of any one of claims 1 to 20, wherein the message is transmitted in a session initiation protocol (SIP) session.

22. The network of any one of claims 1 to 19, wherein the message is an SMS message.

23. The network of any one of claims 1 to 19, wherein the message is an MMS message.

24. A mobile telecommunications network, including means for receiving a message from a first terminal for delivery to a second terminal and for converting the message between a first type to a second type, wherein at least the first type of message includes data enabling the reproduction of an output by a terminal which output is detectable by the sense of touch and varies with respect to time in dependence upon the content of the message.

25. The network of claim 24 wherein the second type of message includes data enabling the production of an output by a terminal detectable by the sense of touch.

26. The network of claim 24, wherein the second type of message includes data enabling the production of an audible output.

FITBIT 1002
Fitbit v. Immersion

27. The network of claim 24, wherein the second type of message includes data enabling the production of a visible output by a terminal.

28. A terminal for use with a mobile telecommunications network, the terminal including means for sensing a variation of a touch input with respect to time and generating a signal representative thereof, a representation of which is for inclusion in a message for transmission to another terminal for generating an output in response to the message that is indicative of the touch input.

29. A terminal for use with a mobile telecommunications network, the terminal including means for receiving a message representative of an input signal generated by another terminal, means for generating an output detectable by the sense of touch and which varies with respect to time in dependence upon the content of the message

30. A method of operating a mobile telecommunications network having a plurality of terminals, the method including generating at a first of said terminals a signal representative of how a touch input varies with respect to time, generating a message representative of the signal, transmitting the message to a second of said terminals, and generating an output at the said second terminal in response to the message that is indicative of the touch input.

FITBIT 1002
Fitbit v. Immersion

31. The method of claim 30, including generating the message at the first terminal.

32. The method of claim 30, including generating the message using a data processor associated with the mobile telecommunications network.

33. The method of claim 30, 31 or 32, wherein the output is a simulation or approximation of the touch input.

34 . The method of claim 30, 31,32 or 33, wherein the output is indicative of the touch input but is an audible and/or visible output.

35. The method of any one of claims 30 to 34, including receiving said signal representative of how a touch input varies with respect to time, generating said message such that said output is produced for stimulating a selected human sense.

36. The method of any one of claims 30 to 35, including transmitting the message in a push-to-talk over cellular (PoC) communication session.

37. The method of any-one of claims 30 to 35, including transmitting the message in a session initiation protocol (SIP) communication session.

FITBIT 1002
Fitbit v. Immersion

38. The method of any one of claims 30 to 35, including transmitting the message as an SMS message.

39. The method of any one of claims 30 to 35, including transmitting the message as an MMS message.

40. The method of any one of claims 30 to 39, wherein the mobile telecommunications network comprises a GSM, GPRS or UMTS (3G) mobile telecommunications network.

41. A mobile telecommunication network including means for generating a message containing information for use by the user of a terminal, means for transmitting the message to said mobile terminal, and means for conveying the information to the user of said mobile terminal by stimulating the user's sense of touch.

42. A mobile telecommunications network substantially as hereinbefore described with reference to and/or substantially as illustrated in any one of or any combination of the accompanying drawings.

43. A terminal for use with a mobile telecommunications network, substantially as hereinbefore described with reference to and/or substantially as illustrated in any one of or any combination of the accompanying drawings.

FITBIT 1002
Fitbit v. Immersion

44. A method of operating a mobile telecommunications network, substantially as hereinbefore described with reference to and/or substantially as illustrated in any one of or any combination of the accompanying drawings.

FITBIT 1002
Fitbit v. Immersion

Application No:	GB 0417469.4	**Examiner:**	Henning Therkelsen
Claims searched:	1-23, 28, 30-40, 42-44	**Date of search:**	25 January 2005

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claim(s)	Identity of document and passage or figure of particular relevance	
X	1 to 26 at least	GB 2398523 A	(NORTHERN TELECOM LTD) Abstract, figure 3 - 7.
X	26 at least	US 2003/0646686 A1	(PHILIPS) see the figures and paragraph 0013
X	26 at least	US 2002/180698 A1	(KAELBLING) see abstract and paragraph 0028
A	-	WO 03/051062 A2	(IMMERSION CORP) Abstract, text e.g. page 3, line 4 - page 4, line 14, page 6, line 17 - page 7, line 14 and page 7, line 29 - page 8, line 33. Figure 1 - 4.
A	-	WO 04/053670 A2	(IMMERSION CORP ET AL.) Abstract, text e.g. page 3, line 24 - page 4, line 34, page 9 line 23 - page 11, line 24. Figure 1 - 6.
A	-	"Mobiles get a sense of touch" BBC News, 21th January 2003 Downloaded from http://news.bbc.co.uk/1/hi/technology/2677813.stm Whole document.	

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of the invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[x]:

Worldwide search of patent documents classified in the following areas of the IPC[7]:

A63H, G03F, H04B, H04M, H04Q

The following online and other databases have been used in the preparation of this search report:

WPI, EPODOC, JAPIO, INSPEC, WWW

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:

KILPATRICK STOCKTON LLP
Attn. Gardner, Spencer
1001 West Fourth Street
Winston-Salem, NC 27101
ETATS-UNIS D'AMERIQUE

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference: IMM312.PCT	Date of mailing (day/month/year): 28/10/2009
International application No.: PCT/US2009/060564	FOR FURTHER ACTION See paragraphs 1 and 4 below
International filing date (day/month/year): 14/07/2009	

Applicant: IMMERSION CORPORATION

1. [x] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statements under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46).

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes, 1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338 82 70

   For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

   Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination may be filed by the applicant who wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later). Otherwise, the applicant must within 20 months from the priority date perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/ISA/201 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Publication.

Name and mailing address of the International Searching Authority: European Patent Office, P.B. 5818 Patentlaan 2, NL-2280 HV Rijswijk, Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer: Marta Comà Costa

Form PCT/ISA/220 (October 2005) (See notes on accompanying sheet)

FITBIT 1002
Fitbit v. Immersion

NOTES TO FORM PCT/ISA/220

These notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article", "Rule" and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g., the applicant wants the right to be published for the purpose of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume IIA, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume IIA, paragraph 256).

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been filed, see below.

How? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. If all claims where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b))

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

Notes to Form PCT/ISA/220 (first sheet) (October 2005)

FITBIT 1002
Fitbit v. Immersion

NOTES TO FORM PCT/IPEA/220 (continued)

The letter should indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (as being unchanged or identical) any changes concerning several claims may be grouped together.

(i) the claim is unchanged;

(ii) the claim is cancelled;

(iii) the claim is new;

(iv) the claim replaces one or more claims as filed;

(v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 49 claims and only amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged, new claims 49 to 51 added."

2. [Where originally there were 15 claims and also amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."

3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged, claims 7 to 13 cancelled; new claims 15, 16 and 17 added" or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."

4. [Where various kinds of amendment are made].
"Claims 1—10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14, claim 17 subdivided and amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with, and does not replace, the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)".

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reasoning to persons, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequences if a demand for international preliminary examination has already been filed

If, at the time of filing any amendments and any accompanying statement under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the time of filing the amendments (and any statement), with the International Bureau, also file with the International Preliminary Examining Authority a copy of such amendments (and of any statement) and, where required, a translation of such amendments for the procedure before that Authority (see Rules 55.3(a) and 62.2, first sentence). For further information, see the Notes to the demand form (PCT/IPEA/401).

If a demand for international preliminary examination is made, the written opinion of the International Searching Authority will normally contain advice which the International Preliminary Examining Authority considers not to be unreasonable with regard to the International Searching Authority and which it has notified the International Bureau under Rule 66.1(e)(ii), be considered as a written opinion of the International Preliminary Examining Authority. If a demand is made, the applicant may submit to the International Preliminary Examining Authority a reply to the written opinion together where appropriate, with amendments before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later (Rule 69(1) 66(1b)).

Consequences with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, upon entry into the selected State(s), a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see the PCT Applicant's Guide, Volume II.

Notes to Form PCT/ISA/220 (second sheet) (October 2005)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference IMM322 PCT	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below
International application no. PCT/US2009/050564	International filing date (day/month/year) 14/07/2009	(Earliest) Priority Date (day/month/year) 15/07/2008

Applicant

IMMERSION CORPORATION

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report

1. Basis of the report
   a. With regard to the language, the international search was carried out on the basis of:
      [X] the international application in the language in which it was filed
      [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. [ ] This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a))
   c. [ ] With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I
2. [ ] Certain claims were found unsearchable (See Box No. II)
3. [ ] Unity of invention is lacking (see Box No. III)
4. With regard to the title,
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established by this Authority to read as follows:
5. With regard to the abstract,
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority
6. With regard to the drawings,
   a. the figure of the drawings to be published with the abstract is Figure No. 5
      [ ] as suggested by the applicant
      [ ] as selected by this Authority, because the applicant failed to suggest a figure
      [X] as selected by this Authority, because this figure better characterizes the invention
   b. [ ] none of the figures is to be published with the abstract

Form PCT/ISA/210 (first sheet) (April 2007)

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application no.
PCT/US2009/050564

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04M1/725 G06F3/01 G06F3/048

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	GB 2 416 962 A (VODAFONE PLC [GB]) 8 February 2006 (2006-02-08) abstract; figures 1,2 page 1, line 17 - page 2, line 13 page 2, line 27 - page 3, line 9 page 3, line 27 - page 4, line 23 page 6, line 12 - page 7, line 27 page 10, line 19 - page 12, line 17 page 13, lines 1-23 page 14, line 22 - page 16, line 19	1-9, 11-23 10
X	EP 1 401 185 A (SAMSUNG ELECTRONICS CO LTD [KR]) 24 March 2004 (2004-03-24) abstract; figures 1-6 paragraphs [0001], [0011], [0012], [0017]	1,2, 11-13, 16,17

-/-

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 October 2009	28/10/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Köhn, Andreas

Form PCT/ISA/210 (second sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/060564

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WILLIAMSON J ET AL: "Shoogle: Excitatory Multimoda Interaction on Mobile Devices" 28 April 2007 (2007-04-28), CHI 2007 PROCEEDINGS - SHAKE, RATTLE & ROLL: NEW FORMS OF INPUT & OUTPUT, SAN JOSE, CA, USA, PAGE(S) 121 - 124 , XP002549378 the whole document	10
A	US 2002/177471 A1 (KAARESOJA TOPI [FI] ET AL) 28 November 2002 (2002-11-28) abstract; figures 1-4 paragraphs [0011], [0017], [0018], [0024], [0030] - [0033], [0035] - [0073], [0040]	1,2,8,9, 11-13, 16-19,23
A	US 2007/066283 A1 (HAAR ROB V D [FI] ET AL) 22 March 2007 (2007-03-22) abstract; figures 1-6 paragraphs [0001], [0010] - [0013], [0016] - [0018], [0027] - [0031], [0034], [0062], [0067], [0068], [0072] - [0076], [0082], [0084], [0085] paragraphs [0088] - [0094]	1-23
A	EP 1 731 993 A (SONY CORP [JP]) 13 December 2006 (2006-12-13) abstract; claim 1; figures 1-16 paragraphs [0016], [0026], [0027], [0029], [0031], [0032], [0037], [0094], [0122] - [0124], [0142]	6,21

Form PCT/ISA/210 (continuation of second sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/060564

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2416962 A	08-02-2006	WO 2006013363 A1	09-02-2006
EP 1401185 A	24-03-2004	KR 20040025398 A	24-03-2004
		US 2004058710 A1	25-03-2004
US 2002177471 A1	28-11-2002	NONE	
US 2007066283 A1	22-03-2007	WO 2007034297 A2	29-03-2007
		JP 2009509260 T	05-03-2009
		KR 20080063345 A	03-07-2008
EP 1731993 A	13-12-2006	CN 1938675 A	28-03-2007
		JP 4046095 B2	13-02-2008
		JP 2005284416 A	13-10-2005
		WO 2005093556 A1	06-10-2005
		KR 20070002026 A	04-01-2007
		US 2008296072 A1	04-12-2008

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2009/050564	14.07.2009	15.07.2008

International Patent Classification (IPC) or both national classification and IPC
INV. H04M1/725 G06F3/01 G06F3/048

Applicant
IMMERSION CORPORATION

1. This opinion contains indications relating to the following items:

- [x] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [x] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [x] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:
European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0
Fax +49 89 2399 - 3465

Date of completion of this opinion
see form PCT/ISA/210

Authorized Officer
Köhn, Andreas
Telephone No. +49 89 2399 5862

Form PCT/ISA/237 (Cover Sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2009/050564

Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of:

   ☑ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form.

      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

FITBIT 1002
Fitbit v. Immersion

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Statement

Novelty (N)	Yes:	Claims	6,10,17-19
	No:	Claims	1-2,11-16,20-23
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-23
Industrial applicability (IA)	Yes:	Claims	1-23
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted

see separate sheet

FITBIT 1002
Fitbit v. Immersion

Re Item V.

1 Prior Art

1.1 Reference is made to the following documents:

D1: GB-A-2 416 962 (VODAFONE PLC [GB]) 8 February 2006 (2006-02-08)
D2: EP-A-1 401 185 (SAMSUNG ELECTRONICS CO LTD [KR]) 24 March 2004 (2004-03-24)
D3: WILLIAMSON J ET AL: "Shoogle: Excitatory Multimodal Interaction on Mobile Devices" 28 April 2007 (2007-04-28), CHI 2007 PROCEEDINGS - SHAKE, RATTLE & ROLL: NEW FORMS OF INPUT & OUTPUT, SAN JOSE, CA, USA, PAGE(S) 121 - 124 , XP002549378
D4: US 2002/177471 A1 (KAARESOJA TOPI [FI] ET AL) 28 November 2002 (2002-11-28)
D5: US 2007/066283 A1 (HAAR ROB V D [FI] ET AL) 22 March 2007 (2007-03-22)
D6: EP-A-1 731 999 (SONY CORP [JP]) 13 December 2006 (2006-12-13)

2 Clarity

2.1 The application does not meet the requirements of Article 6 PCT, because claims 1, 8, 10-12 are not clear as detailed in the following.

2.2 The term "virtual physical parameter" (emphasis added) is unclear and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of claim 1 unclear.
For the analysis of novelty and inventive step, the technical meaning of the above-mentioned term will be interpreted broadly such that any "parameter" will be considered as falling within the scope of said expression.

2.3 Likewise, the objection set out in paragraph 2.2 above applies to independent claims 11 and 12 which use the term "virtual physical property".

2.4 Further, independent claims 1, 11, and 12 are unclear as the term "virtual message

FITBIT 1002
Fitbit v. Immersion

object" (emphasis added) is vague and leaves open to which technical features it refers. However, in light of the description it appears, that a "virtual message object" refers to the representation of a message which may be created by a messaging device (cf. description at page 3, lines 16-17 or page 5, lines 1-3). Hence, for the assessment of novelty and inventive step, any representation of a message object will be considered as falling within the scope of the term "virtual message object".

2.5 Dependent **claims 8 and 10** use the expression "the virtual physical property" (emphasis added) which lacks an antecedent since the term was not introduced by claim 1 to which claims 8 and 10 refer.

2.6 The expression "receive a sensor signal from a sensor configured to sense an interaction with a messaging device" renders independent **claim 12** is unclear as it appears that neither the sensor nor the messaging device form part of the claimed system. However, in light of the description and drawings (cf. page 6, line 23 - page 7, line 15 with Fig. 1) it appears that said sensor and messaging device are essential for reaching the technical effect of this application.

2.7 The above-mentioned lack of clarity notwithstanding, and for the sake of efficiency of the procedure, a preliminary opinion regarding novelty and inventive step is given for all claims.

3 Novelty - Independent Claims

3.1 The present application does not meet the requirements of Article 33(1) PCT because the subject-matter of independent **claims 1, 11, and 12** (interpreted broadly and in the light of the description) is not new within the meaning of Article 33(2) PCT.

3.2 Document D1 discloses the subject-matter of **claim 1** as follows (the references in parentheses applying to this document):

"A method comprising:
receiving a sensor signal from a sensor configured to sense an interaction with a messaging device (see page 6, line 27 - page 7, line 3 and page 11, lines 15 - 23 with Fig. 2);

FITBIT 1002
Fitbit v. Immersion

determining a virtual physical parameter of a virtual message object based at least in part on the sensor signal (see page 1, lines 17-24 and page 11, lines 24-26 as well as page 12, lines 3-7; *as disclosed in D1 the encoded data, representative of the received sensor signal, is transmitted together with a corresponding electronic representation of a message, and hence (following the interpretation according to paragraphs 2.2 and 2.4 above) can be considered as a "virtual physical parameter" of a "virtual message object");*
determining a haptic effect based at least in part on the virtual physical parameter; and generating a haptic signal configured to cause an actuator to output the haptic effect (see page 12, lines 7-13)."

3.3 Claims 11 and 12 are of the category "computer program product claim" or "system claim", respectively, and correspond to the method claimed in claim 1, therefore mutatis mutandis the same novelty objections arise as for claim 1.

4 Novelty - Dependent Claims

4.1 Dependent claims 2-7, 13-16, and 20-23 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (Article 33(2) PCT), and therefore the criteria of Article 33(1) PCT are not fulfilled.

4.2 Document D1 discloses all features of dependent claims 2-7, 13-16, and 20-23 as follows:
- claim 2: see D1 page 7, lines 20-27 and page 12, lines 7-12 with Fig. 2
- claims 3, 4, 14, and 15: see D1 page 6, line 27 - page 7, line 1
- claims 5-7 and 20-22: see D1 page 7, lines 1-3; *pressure applied to pressure sensor 23 is considered as falling within the scope of a "two dimensional gesture comprising a finger position or a finger gesture"*
- claim 13: see D1 page 11, lines 15-26
- claim 16: see D1 page 6, lines 13-15 with Fig. 2
- claim 23: see D1 page 6, lines 16-17 and page 13, lines 20-23

5 Inventive Step - Independent Claims

FITBIT 1002
Fitbit v. Immersion

5.1 For the sake of completeness and irrespective of the novelty objection set out in paragraph 3 above, it is pointed out that **claims 1, 11, and 12** would also lack an inventive step (Article 33(3) PCT) vis-à-vis **D1** if the vague term "virtual physical parameter" or "virtual physical property", respectively (cf. paragraphs 2.2 and 2.3) was interpreted in light of a passage in the description (cf. page 4, lines 26-30), according to which it appears that this term could refer to a parameter determining the (e.g. haptic) feedback of a "virtual message object" such that it models a physical metaphor. In this case, claim 1 differs from **D1**, which discloses a possibility for generating messages with arbitrarily customized haptic effects by means of gesture input (see passages cited in paragraph 3.2 above), in that it associates the haptic effect with a physical metaphor such that the content of the haptically presented information is easily interpretable by a human whose mind is familiar with corresponding auditory signals from his physical environment. However, this differentiating subject-matter apparently has no technical character as it is directed towards the presentation of information characterized solely by the content of the information. Therefore, this subject-matter is not considered to support the solution of a technical problem, and hence cannot contribute to an inventive step over closest prior art D1 (cf. PCT Guidelines Appendix A13.08.1 to Chapter 13). In consequence, the criteria of Article 33(1) PCT are not met.

6 Inventive Step - Dependent Claims

6.1 Dependent **claims 8-10 and 17-19** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Article 33(3) PCT), and therefore the criteria of Article 33(1) PCT are not fulfilled.

6.2 In light of the reasoning provided in paragraph 5.1 above, it appears that the additional subject-matter of **claims 8, 9, 18, and 19** refers to the mere presentation of information and therefore is not considered to contribute to an inventive step over **D1**.

6.3 The additional subject-matter of **claim 10** is directed toward the determination of the haptic effect based at least in part on e.g. the length of a message. This feature is not disclosed in closest prior art **D1**. However, the distinguishing feature is known from

FITBIT 1002
Fitbit v. Immersion

D3 as providing the same advantages as in the present application (see D3 column 2, line 39 - column 3, line 5 and column 5, line 43 - column 6, line 14 with Figs. 3 and 4). Therefore, it would have been obvious for the skilled person to incorporate this teaching of D3 into the disclosure of D1, thereby arriving at the subject-matter of claim 10 without exercise of an inventive activity.

6.4 The additional subject-matter of claim 17 is considered to refer to a minor, well-known implementation detail and therefore does not contribute to an inventive step over D1.

Re Item VII

7 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D6 is not mentioned in the description, nor are these documents identified therein.

7.1 Independent claims 1, 11, and 12 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

7.2 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

FITBIT 1002
Fitbit v. Immersion

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
Filing a demand for international preliminary examination	In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT). If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).
Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).
Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

FITBIT 1002
Fitbit v. Immersion

Bitte beachten Sie, dass angeführte Nichtpatentliteratur (wie z. B. wissenschaftliche oder technische Dokumente) je nach geltendem Recht dem Urheberrechtsschutz und/oder anderen Schutzarten für schriftliche Werke unterliegen könnte. Die Vervielfältigung urheberrechtlich geschützter Texte, ihre Verwendung in anderen elektronischen oder gedruckten Publikationen und ihre Weitergabe an Dritte ist ohne ausdrückliche Zustimmung des Rechtsinhabers nicht gestattet.

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XS CPRINFRDS

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
IMM319.PCT		
International application No.	International filing date (day/month/year)	(Earliest) Priority Date (day/month/year)
PCT/US2009/050574	14/07/2009	15/07/2008

Applicant

IMMERSION CORPORATION

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 5 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the language, the international search was carried out on the basis of:

[X] the international application in the language in which it was filed

[ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. [ ] This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. [ ] With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No III)

4. With regard to the title,

[X] the text is approved as submitted by the applicant

[ ] the text has been established by this Authority to read as follows:

5. With regard to the abstract,

[X] the text is approved as submitted by the applicant

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the drawings,

a. the figure of the drawings to be published with the abstract is Figure No. 2

[ ] as suggested by the applicant

[ ] as selected by this Authority, because the applicant failed to suggest a figure

[X] as selected by this Authority, because this figure better characterizes the invention

b [ ] none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/050574

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06F3/01 G06F3/048 H04M1/725

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	TOPI KAARESOJA, LORNA M. BROWN, JUKKA LINJAMA: "Snap-Crackle-Pop: Tactile feedback for Mobile Touch Screens" [INTERNET ARTICLE, [Online] July 2006 (2006-07), XP002551465 Proceedings of the Eurohaptics 2006, July 2006 Retrieved from the Internet: URL:http://lsc.univ-evry.fr/~eurohaptics/upload/cd/papers/f80.pdf> [retrieved on 2009-10-20]	1-8, 10-21
Y	the whole document	9

-/--

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
20 October 2009	29/10/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax (+31-70) 340-3016	Köhn, Andreas

Form PCT/ISA/210 (second sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2001/035854 A1 (ROSENBERG LOUIS B [US] ET AL) 1 November 2001 (2001-11-01) abstract; figures 1-8b paragraphs [0006] - [0009], [0055] - [0057], [0059], [0060], [0062], [0064]	9
A	WILLIAMSON J ET AL: "Shoogle: Excitatory Multimoda Interaction on Mobile Devices" 28 April 2007 (2007-04-28), PROCEEDINGS OF THE SIGCHI CONFERENCE ON HUMAN FACTORS IN COMPUTING SYSTEMS 2007, CHI 2007 2007 ASSOCIATION FOR COMPUTING MACHINERY US; [CONFERENCE ON HUMAN FACTORS IN COMPUTING SYSTEMS], NEW YORK, NY : ACM, PAGE(S) 121 - 124 , XP002549378 ISBN: 978-1-59593-593-9 the whole document	1-21
A	ANNA DE WITT: "Designing Sonification of User Data in Affective Interaction" MASTER OF SCIENCE THESIS STOCKHOLM, SWEDEN 2007, [Online] 2007, XP002551466 Retrieved from the Internet: URL:http://w3.nada.kth.se/utbildning/grukth/exjobb/rapportlistor/2007/rapporter07/de_witt_anna_07142.pdf> [retrieved on 2009-10-20] abstract; figure 3.2 pages 13-15 page 21 page 25 pages 67-68	1-21
A	YUICHIRO SEKIGUCHI, KOICHI HIROTA, MICHITAKA HIROSE: "Haptic Interface Using "Estimation of Box Contents" Metaphor" INTERNET ARTICLE, [Online] 3 December 2003 (2003-12-03), XP002551467 Proceedings of ICAT 2003, December 3-5, Tokyo, Japan Retrieved from the Internet: URL:http://www.vrsj.org/ic-at/papers/2003/00947_00000.pdf> [retrieved on 2009-10-20] abstract; figures 1-7 column 2, line 31 - column 4, line 15 column 5, line 22 - column 6, line 11 column 9, lines 1-30	1-21
A	US 2006/061545 A1 (HUGHES STEPHEN [IE] ET AL) 23 March 2006 (2006-03-23) abstract; figure 1 paragraphs [0004], [0009] - [0011], [0025], [0047], [0048], [0050] - [0055]	6-11

-/--

FITBIT 1002
Fitbit v. Immersion

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
L	BIET M ET AL: "Discrimination of Virtual Square Gratings by Dynamic Touch on Friction Based Tactile Displays" 13 March 2009 (2009-03-13), HAPTIC INTERFACES FOR VIRTUAL ENVIRONMENT AND TELEOPERATOR SYSTEMS, 2009. HAPTICS 2009. SYMPOSIUM ON, IEEE, PISCATAWAY, NJ, USA, PAGE(S) 41 - 48 , XP031339918 ISBN: 978-1-4244-2005-6 abstract column 7, line 35 - column 8, line 4 column 14, lines 10,11	1-21

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application no
PCT/US2009/050574

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2001035854 A1	01-11-2001	NONE	
US 2006061545 A1	23-03-2006	NONE	

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
IMM314.PCT		
International application No.	International filing date (day/month/year)	(Earliest) Priority Date (day/month/year)
PCT/US2009/050587	14/07/2009	15/07/2008

Applicant

IMMERSION CORPORATION

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

a. With regard to the language, the international search was carried out on the basis of:

[X] the international application in the language in which it was filed

[ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. [ ] This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. [ ] With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2 [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No. III)

4. With regard to the **title**,

[X] the text is approved as submitted by the applicant

[ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

[X] the text is approved as submitted by the applicant

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the **drawings**,

a. The figure of the drawings to be published with the abstract is Figure No. 5a + 5b ____

[ ] as suggested by the applicant

[ ] as selected by this Authority, because the applicant failed to suggest a figure

[X] as selected by this Authority, because this figure better characterizes the invention

b. [ ] none of the figures is to be published with the abstract

Form PCT/ISA/210 (first sheet) (April 2007)

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/050587

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04M1/725 G06F3/01 G06F3/048

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	IAN OAKLEY, SILE O' MODHRAIN: "Contact IM: Exploring Asynchronous Touch Over Distance" INTERNET ARTICLE, [Online] 16 November 2002 (2002-11-16), XP007910188 Retrieved from the Internet: URL:http://people.cs.vt.edu/~wangr06/touch%20review%20organization/Oak002.pdf> [retrieved on 2009-10-20]	1-6, 8-18, 20
Y	the whole document	7, 19

-/—

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 October 2009	29/10/2009

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax (+31-70) 340-3016	Köhn, Andreas

Form PCT/ISA/210 (second sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

C(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	ROYERS A F ET AL: "HIM: A Framework for Haptic Instant Messaging" CHI 2004; [CHI CONFERENCE PROCEEDINGS. HUMAN FACTORS IN COMPUTING SYSTEMS], VIENNA, AUSTRIA. 29 April 2004 (2004-04-29), pages 1313-1316, XP002464573 ISBN: 978-1-58113-702-6	1-6, 8-18,20
L	abstract; figures 1-3 columns 1-5	1-20
Y	US 2006/061545 A1 (HUGHES STEPHEN [IE] ET AL) 23 March 2006 (2006-03-23) abstract; figure 1 paragraphs [0004], [0009] - [0011], [0025], [0047] - [0050], [0052] - [0055]	7,19
L		1-20
A	EP 0 899 650 A (XEROX CORP [US]) 3 March 1999 (1999-03-03) abstract; figure 24 paragraph [0072]	7,19
A	WO 2004/075169 A (KONINKL PHILIPS ELECTRONICS NV [NL]; PHILIPS CORP [US]; VAN DE SLUIS B) 2 September 2004 (2004-09-02) abstract; figures 1-14L page 10, line 27 - page 11, line 1 page 13, lines 7-31	7,19

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2009/050587

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2006061545 A1	23-03-2006	NONE	
EP 0899650 A	03-03-1999	JP 4149574 B2	10-09-2008
		JP 11143606 A	28-05-1999
WO 2004075169 A	02-09-2004	EP 1597895 A2	23-11-2005
		JP 2006518507 T	10-08-2006
		KR 20050104382 A	02-11-2005

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To

KILPATRICK STOCKTON LLP
Acpp. Gardner, Steven
1001 West Fourth Street
Winston-Salem, NC 27101
ATTN: DOCKETING WINSTON

PCT

INVITATION TO PAY ADDITIONAL FEES AND, WHERE APPLICABLE, PROTEST FEE

(PCT Article 17(3)(a) and Rule 40.1 and 40.2(a))

EINSCHREIBEN

Applicant's or agent's file reference: 71841S1.PCT	Date of mailing (day/month/year): 09/11/2009
International application No: PCT/US2009/050569	PAYMENT DUE within ONE [1] month from the above date of mailing
Applicant: IMMERSION CORPORATION	International filing date (day/month/year): 14/07/2009

1. The International Searching Authority

(i) considers that there are 3 (number of) inventions claimed in the international application covered by the claims indicated on an extra sheet;

(ii) therefore considers that the international application does not comply with the requirements of unity of invention (Rules 13.1, 13.2 and 13.3) for the reasons indicated on an extra sheet;

(iii) [X] has carried out a partial international search (see Annex) [ ] will establish the international search report on those parts of the international application which relate to the invention first mentioned in claims Nos.:

see extra sheet

(iv) will establish the international search report on the other parts of the international application only if, and to the extent to which, additional fees are paid.

2. Consequently, the applicant is hereby invited to pay, within the time limit indicated above, the amount indicated below.

EUR 1 700,00 x 2 = EUR 3 400 _____
Fee per additional invention | number of additional inventions | corresponding total amount of additional fees

3. The applicant is informed that, according to Rule 40.2(c), the payment of any additional fee may be made under protest, i.e., a reasoned statement to the effect that the international application complies with the requirement of unity of invention or that the amount of the required additional fee is excessive, where applicable, subject to the payment of a protest fee.

Where the applicant pays additional fees under protest, the applicant is hereby invited, within the time limit indicated above, to pay a protest fee (Rule 40.2(e)) in the amount of EUR 750,00 (corresponding amount)

Where the applicant has not, within the time limit indicated above, paid the required protest fee, the protest will be considered not to have been made and the International Searching Authority will so decide.

4. [ ] Claim(s) Nos. _____ have been found to be unsearchable under Article 17(2)(a) because of defects under Article 17(3)(a) and therefore have not been included in any invention

Name and mailing address of the International Searching Authority: European Patent Office, P.B. 5818 Patentlaan 2, NL-2280 HV Rijswijk, Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer: Katrin Sommermeyer

Form PCT/ISA/206 (July 2005)

FITBIT 1002
Fitbit v. Immersion

INVITATION TO PAY ADDITIONAL FEES

International application No.
PCT/US2009/050569

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-14

Invention 1 (claims 1-14) directed towards a method of displaying a message in a user interface of a mobile device (essentially) comprising:
(i) receiving a sensor signal from a sensor of a mobile device, the sensor signal associated with a movement of the mobile device; and
(ii) determining a message to be displayed in a user interface based on the sensor signal and causing the message to be displayed.

2. claims: 15-26

Invention 2 (claims 15-26) directed towards a method of movement-based communication between mobile devices (essentially) comprising:
(i) receiving a sensor signal from a sensor of a first mobile device, the sensor signal associated with a movement of the first mobile device; and
(iii) transmitting a data signal to a second mobile device; the data signal comprising data associated with the movement of the first mobile device.

3. claims: 27-31

Invention 3 (claims 27-31) directed towards a system of visually and haptically supported collaboration with mobile devices (essentially) comprising:
(i) receiving a first sensor signal from a first sensor of a first mobile device, the first sensor signal associated with a movement of the first mobile device;
(iv) determining a change in a display signal based on a second sensor signal associated with an interaction with the first mobile device and a first data signal received from a second mobile device, and determining a haptic effect based on the first data signal.

The so-called inventions 1-3 have in common the technical feature (i). However, this feature is already known from prior art document D5, which discloses an intuitive motion-based user interface for controlling a hand-held device (see D5 [0008] and [0024]-[0030] with Fig. 3).
The additional features (ii)-(iv) contained in inventions 1-3 are special technical features representing the contribution over the prior art of D5.
No technical relationship can be found between these additional technical features contained in each of said inventions. Moreover, the features (ii)-(iv) are directed towards solving different problems, namely:

FITBIT 1002
Fitbit v. Immersion

starting from D5 the problem to be solved by invention 1 is to enhance the hand-held device of D5 by an intuitive message selection function. The problem to be solved by the second invention is to enhance the teaching of D5 by motion-based communication between hand-held devices, whilst the third invention aims to improve the functionality of the hand-held device of D5 by the possibility of synchronous collaboration with other hand-held devices.

Following the reasoning above regarding inventions 1-3, there is no single general inventive concept underlying the entire group of claims of the present application as required Rule 13(1) PCT.

Accordingly, the International search report considers only claims 1-14.

FITBIT 1002
Fitbit v. Immersion

Annex to Form PCT/ISA/206
COMMUNICATION RELATING TO THE RESULTS OF THE PARTIAL INTERNATIONAL SEARCH

International application No.
PCT/US2009/050569

1. The present communication is an Annex to the invitation to pay additional fees (Form PCT/ISA/206). It shows the results of the international search established on the parts of the international application which relate to the invention (see) mentioned in claims Nos.
see 'Invitation to pay additional fees'
2. This communication is not the international search report which will be established according to Article 18 and Rule 43.

3. If the applicant does not pay any additional search fees, the information appearing in this communication will be considered as the result of the international search and will be included as such in the international search report.

4. If the applicant pays additional fees, the international search report will contain both the information appearing in this communication and the results of the international search on other parts of the international application for which such fees will have been paid.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 416 962 A (VODAFONE PLC [GB]) 8 February 2006 (2006-02-08) abstract; figures 1,2 page 1, line 17 - page 2, line 13 page 2, line 27 - page 3, line 9 page 3, lines 27-29 page 6, line 12 - page 7, line 27 page 10, lines 19-23 page 11, line 1 - page 16, line 19	1-14
A	US 2003/063128 A1 (SALMIMAA MARJA [FI] ET AL SALMIMAA MARJA [FI] ET AL) 3 April 2003 (2003-04-03) abstract; figures 1-7 paragraphs [0001], [0023], [0026], [0030], [0031], [0034], [0043], [0044], [0049], [0050]	1,5,6,14
A	US 2007/066283 A1 (HAAR ROB V D [FI] ET AL) 22 March 2007 (2007-03-22) abstract; figures 1-6 paragraphs [0001], [0010] - [0013], [0017], [0018], [0027] - [0031], [0034], [0062], [0067], [0072] - [0076], [0082], [0084], [0085], [0088] - [0094]	1,5,6,9, 14

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[X] Further documents are listed in the continuation of Box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Form PCT/ISA/206 (annex - last sheet) (July 1998) (April 2005)

FITBIT 1002
Fitbit v. Immersion

Annex to Form PCT/ISA/206
COMMUNICATION RELATING TO THE RESULTS OF THE PARTIAL INTERNATIONAL SEARCH

International Application No
PCT/US2009/050569

C(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2005/103863 A (FUJITSU LTD [JP], NAVIT DAVID L [US]; ADLER B THOMAS [US]; MATSUMOTO) 3 November 2005 (2005-11-03) abstract; figures 1-23 page 5, lines 2-22 page 17, lines 6-32 page 19, line 10 - page 20, line 19 page 21, lines 21-26 page 32, line 29 - page 33, line 11 page 42, line 17 - page 43, line 27 page 45, lines 15-32 page 47, line 10 - page 48, line 25 page 52, lines 1-5 page 53, lines 14-25 page 54, lines 3-5	1-14
A	US 2006/181510 A1 (FAITH JOE [US]) 17 August 2006 (2006-08-17) abstract; figures 1-10 paragraphs [0008], [0024] - [0030], [0062] - [0064], [0066], [0067], [0069]	1-9,11

3

Form PCT/ISA/210 (second sheet) (July 1998) (reprint January 2004)

FITBIT 1002
Fitbit v. Immersion

Patent Family Annex

International application No
PCT/US2009/050569

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 2416962 A	08-02-2006	WO 2006013363 A1	09-02-2006
US 2003063128 A1	03-04-2003	CN 1556944 A	22-12-2004
		EP 1430384 A1	23-06-2004
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		JP 2009509260 T	05-03-2009
		KR 20080063345 A	03-07-2008
WO 2006103863 A	05-11-2006	EP 1728142 A2	06-12-2006
		JP 2007531113 T	01-11-2007
		JP 2008299866 A	11-12-2008
		KR 20060134119 A	27-12-2006
US 2006181510 A1	17-09-2006	GB 2424055 A	13-09-2006

Form PCT/ISA/210 (patent family annex) (April 2005)

FITBIT 1002
Fitbit v. Immersion

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FITBIT 1002
Fitbit v. Immersion

European Patent Organisation

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Fitbit v. Immersion

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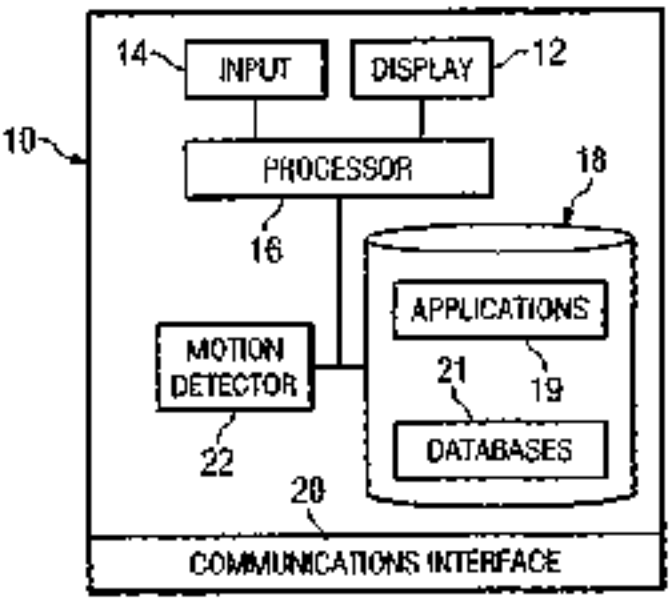
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(Continued on next page)

(54) Title: DISTINGUISHING TILT AND TRANSLATION MOTION COMPONENTS IN HANDHELD DEVICES



(57) Abstract: A motion controlled handheld device includes a first accelerometer operable to detect acceleration along a first axis and a second accelerometer operable to detect acceleration along a second axis. The second axis is perpendicular to the first axis. The device includes a tilt detection component operable to detect motion having a component around at least one of the first axis and the second axis and a display operable to present a current image. The device includes a motion tracking module operable to track motion of the device in three dimensions using the first accelerometer, the second accelerometer and the tilt detection component. The device also includes a controller operable to generate the current image and to modify the current image in response to the motion of the device.

WO 2005/103863 A2

FITBIT 1002
Fitbit v. Immersion

PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

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FITBIT 1002
Fitbit v. Immersion

DISTINGUISHING TILT AND TRANSLATION MOTION COMPONENTS IN HANDHELD DEVICES

TECHNICAL FIELD

The present invention relates generally to portable devices and, more particularly, to portable devices with a motion interface.

BACKGROUND

The use of computing devices, such as cellular phones and personal digital assistants (PDAs) has grown rapidly. Such devices provide many different functions to users through different types of interfaces, such as keypads and displays. Some computing devices utilize motion as an interface by detecting tilt of the device by a user. Some implementations of a motion interface involve tethering a computing device with fishing lines or carrying large magnetic tracking units that require large amounts of power.

SUMMARY

In accordance with the present invention, a handheld device with motion a motion interface is provided.

In accordance with a particular embodiment, a motion controlled handheld device includes a first accelerometer operable to detect acceleration along a first axis and a second accelerometer operable to detect acceleration along a second axis. The second axis is perpendicular to the first axis. The device includes a tilt detection component operable to detect rotation having a component around at least one of the first axis and the second axis and a display operable to present a current image. The device includes a motion tracking module operable to track motion of the device in

FITBIT 1002
Fitbit v. Immersion

three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component. The device also includes a controller operable to generate the current image and to modify the current image in response to the motion of the device.

The display may comprise a viewable surface, and the first axis and the second axis may be substantially parallel to the viewable surface. The tilt detection component may comprise a third accelerometer operable to detect acceleration along a third axis, where the third axis is perpendicular to the first axis and perpendicular to the second axis. The motion tracking module may be further operable to distinguish translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer. The tilt detection component may comprise a third accelerometer operable to detect acceleration along a third axis, where the third axis is perpendicular to the first axis and perpendicular to the second axis. The tilt detection component may also comprise a camera operable to generate a video stream and a video analysis module operable to detect a direction of motion based on the video stream.

In accordance with another embodiment, a method for controlling a handheld device comprises detecting acceleration along a first axis using a first accelerometer and detecting acceleration along a second axis using a second accelerometer. The second axis is perpendicular to the first axis. The method also includes detecting rotation having a component around at least one of the first axis and the second axis using a tilt detection component and tracking motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component. The method includes displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

Technical advantages of particular embodiments of the present invention include a handheld device with motion detection components capable of distinguishing between tilt and translation of the device and a plane of translation. Accordingly, the device can recognize a larger number of motions to serve as input thus increasing the device's functionality. In some embodiments, a number of

FITBIT 1002
Fitbit v. Immersion

different types of motion detection components may be combined and utilized thus allowing a manufacturer to design the device using the most suitable components depending on the functionalities desired for the device.

Other technical advantages will be readily apparent to one skilled in the art from the following figures, descriptions and claims. Moreover, while specific advantages have been enumerated above, various embodiments may include all, some or none of the enumerated advantages.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of particular embodiments of the invention and their advantages, reference is now made to the following descriptions, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 illustrates a handheld device with motion interface capability, in accordance with a particular embodiment;

FIGURE 2 illustrates a motion detector of the handheld device of FIGURE 1, in accordance with a particular embodiment;

FIGURE 3 illustrates the use of motion detector components of the handheld device of FIGURE 1, in accordance with a particular embodiment;

FIGURE 4 illustrates an example handheld device with motion detection capability, in accordance with a particular embodiment;

FIGURE 5 illustrates an example of selection and amplification of a dominant motion of a handheld device, in accordance with a particular embodiment;

FIGURE 6 is a flowchart illustrating preferred motion selection, in accordance with a particular embodiment;

FIGURE 7 is a flowchart illustrating the setting of a zero-point for a handheld device, in accordance with a particular embodiment;

FIGURE 8 illustrates an example of scrubbing functionality with a handheld device for virtual desktop navigation, in accordance with a particular embodiment;

FIGURE 9 is a flowchart illustrating the scrubbing process of FIGURE 8, in accordance with a particular embodiment;

FIGURE 10A illustrates an example of menu navigation using gesture input, in accordance with a particular embodiment;

FITBIT 1002
Fitbit v. Immersion

FIGURE 10B illustrates example gestures which may be used to perform various functions at a handheld device, in accordance with a particular embodiment;

FIGURE 11 illustrates an example of map navigation using motion input, in accordance with a particular embodiment;

FIGURE 12A illustrates a form of motion input cursor navigation, in accordance with a particular embodiment;

FIGURE 12B illustrates another form of motion input cursor navigation, in accordance with a particular embodiment;

FIGURE 13 is a flowchart illustrating a process for utilizing feedback in response to motion input, in accordance with a particular embodiment;

FIGURE 14 illustrates an example system utilizing spatial signatures with a handheld device, in accordance with a particular embodiment;

FIGURE 15 illustrates an example system in which motion input of a handheld device controls multiple other devices, in accordance with a particular embodiment;

FIGURE 16 is a flowchart illustrating an environmental modeling process of a handheld device, in accordance with a particular embodiment;

FIGURE 17 illustrates example gestures which may be mapped to different functions of a handheld device, in accordance with a particular embodiment;

FIGURE 18 is a flowchart illustrating the utilization of a preexisting symbol gesture, in accordance with a particular embodiment;

FIGURE 19 is a flowchart illustrating the use of context-based gesture mapping, in accordance with a particular embodiment;

FIGURE 20 is a flowchart illustrating the use of user-based gesture mapping, in accordance with a particular embodiment;

FIGURE 21 is a flowchart illustrating the assignment process for user-created gestures, in accordance with a particular embodiment;

FIGURE 22 illustrates three gestures input using a handheld device with varying levels of precision, in accordance with a particular embodiment; and

FIGURE 23 is a flowchart illustrating a gesture recognition process utilizing a number of features, in accordance with a particular embodiment.

FITBIT 1002
Fitbit v. Immersion

DETAILED DESCRIPTION

FIGURE 1 illustrates a handheld device 10 with motion interface capability, in accordance with a particular embodiment of the present invention. Handheld device 10 can recognize movement of the device and can perform various functions corresponding to such movement. Thus, movement of the device operates as a form of input for the device. Such movement input may directly alter what is being displayed on a device display or may perform other functions. Handheld device 10 may comprise a mobile phone, personal digital assistant (PDA), still camera, video camera, pocket calculator, portable radio or other music or video player, digital thermometer, game device, portable electronic device, watch or any other device capable of being held or worn by a user. As indicated in the examples listed above, handheld device 10 may include wearable portable devices such as watches as well. A watch may include any computing device worn around a user's wrist.

Handheld device 10 includes a display 12, input 14, processor 16, memory 18, communications interface 20 and motion detector 22. Display 12 presents visual output of the device and may comprise a liquid crystal display (LCD), a light emitting diode (LED) or any other type of display for communicating output to a user. Input 14 provides an interface for a user to communicate input to the device. Input 14 may comprise a keyboard, keypad, track wheel, knob, touchpad, stencil or any other component through which a user may communicate an input to device 10. In particular embodiments, display 12 and input 14 may be combined into the same component, such as a touchscreen.

Processor 16 may be a microprocessor, controller or any other suitable computing device or resource. Processor 16 is adapted to execute various types of computer instructions in various computer languages for implementing functions available within system handheld device 10. Processor 16 may include any suitable controllers for controlling the management and operation of handheld device 10

Memory 18 may be any form of volatile or nonvolatile memory including, without limitation, magnetic media, optical media, random access memory (RAM), read only memory (ROM), removable media or any other suitable local or remote memory component. Memory 18 includes components, logic modules or software executable by processor 16. Memory 18 may include various applications 19 with

FITBIT 1002
Fitbit v. Immersion

user interfaces utilizing motion input, such as mapping, calendar and file management applications, as further discussed below. Memory 18 may also include various databases, such as gesture databases and function or gesture mapping databases, as further discussed below. Components of memory 18 may be combined and/or divided for processing according to particular needs or desires within the scope of the present invention. Communications interface 20 supports wireless or wireline communication of data and information with other devices, such as other handheld devices, or components.

Motion detector 22 tracks movement of handheld device 10 which may be used as a form of input to perform certain functions. Such input movement may result from a user moving the device in a desired fashion to perform desired tasks, as further discussed below.

It should be understood that handheld device 10 in accordance with particular embodiments may include any suitable processing and/or memory modules for performing the functions as described herein, such as a control module, a motion tracking module, a video analysis module, a motion response module, a display control module and a signature detection module.

In particular embodiments, input movement may be in the form of translation and/or gestures. Translation-based input focuses on a beginning point and endpoint of a motion and differences between such beginning points and endpoints. Gesture-based input focuses on an actual path traveled by the device and is a holistic view of a set of points traversed. As an example, when navigating a map using translation-based input, motion in the form of an "O" may change the display during the movement but may ultimately yield no change between the information displayed prior to the movement and the information displayed at the end of the movement since the device presumably will be in the same point as it started when the motion ends. However, in a gesture input mode the device will recognize that it has traveled in the form of an "O" because in gesture-based input the device focuses on the path traveled during the motion or movement between a beginning point and an endpoint of the gesture (e.g., even though the beginning and endpoints may be the same). This gesture "O" movement may be mapped to particular functions such that when the device recognizes it has traveled along a path to constitute an "O" gesture, it may

FITBIT 1002
Fitbit v. Immersion

perform the functions, as further elaborated upon below. In particular embodiments, movement of the device intended as a gesture may be recognized as by the device as a gesture by matching a series, sequence or pattern of accelerations of the movement to those defining gestures of a gesture database.

Handheld devices in accordance with other embodiments may not include some of the components of the device illustrated in FIGURE 1. For example, some embodiments may include a handheld device 10 without an input 14 separate from a motion detector such that motion of the device provides the sole or primary input for the device. It should be noted that handheld devices in accordance with other embodiments may include additional components not specifically illustrated with respect to device 10.

FIGURE 2 illustrates motion detector 22 of FIGURE 1, in accordance with a particular embodiment of the present invention. In this embodiment, motion detector 22 includes accelerometers 24a, 24b and 24c; cameras 26a, 26b and 26c; gyros 28a, 28b and 28c; rangefinders 30a, 30b and 30c; and a processor 32.

Accelerometers 24a, 24b and 24c detect movement of the device by detecting acceleration along a respective sensing axis. A particular movement of the device may comprise a series, sequence or pattern of accelerations detected by the accelerometers. When the handheld device is tilted along a sensing axis of a particular accelerometer, the gravitational acceleration along the sensing axis changes. This change in gravitational acceleration is detected by the accelerometer and reflects the tilt of the device. Similarly, translation of the handheld device, or movement of the device without rotation or tilt also produces a change in acceleration along a sensing axis which is also detected by the accelerometers.

In the illustrated embodiment, accelerometer 24a comprises an x-axis accelerometer that detects movement of the device along an x-axis, accelerometer 24b comprises a y-axis accelerometer that detects movement of the device along a y-axis and accelerometer 24c comprises a z-axis accelerometer that detects movement of the device along a z-axis. In combination, accelerometers 24a, 24b and 24c are able to detect rotation and translation of device 10. As indicated above, rotation and/or translation of device 10 may serve as an input from a user to operate the device.

FITBIT 1002
Fitbit v. Immersion

The use of three accelerometers for motion detection provides certain advantages. For example, if only two accelerometers were used, the motion detector may not be able to disambiguate translation of the handheld device from tilt in the plane of translation. However, using a third, z-axis accelerometer (an accelerometer with a sensing axis at least approximately perpendicular to the sensing axes of the other two accelerometers) enables many cases of tilt to be disambiguated from many cases of translation.

It should be understood that some unique movements may exist that may not be discernible from each other by accelerometers 24a, 24b and 24c. For example, movement comprising a certain rotation and a certain translation may appear to accelerometers 24a, 24b and 24c as the same movement as a different movement that comprises a different particular rotation and a different particular translation. If a motion detector 22 merely included three accelerometers to detect movement (without any additional components to ensure greater accuracy), some unique, undiscernible movements may be mapped to the same function or may not be mapped to a function to avoid confusion.

As indicated above, motion detector 22 also includes cameras 26a, 26b and 26c, which may comprise charge coupled device (CCD) cameras or other optical sensors. Cameras 26a, 26b and 26c provide another way to detect movement of the handheld device (both tilt and translation). If only one camera were installed on a device for movement detection, tilt of the device may be indistinguishable from translation (without using other motion detection components, such as accelerometers). However, by using at least two cameras, tilt and translation may be distinguished from each other. For example, if two cameras were installed on handheld device 10 (one on the top of the device and one on the bottom of the device), each camera would see the world moving to the right when the device was translated to the left. If the device is lying horizontally and is rotated by lifting its left edge while lowering its right edge, the camera on the bottom will perceive the world as moving to the right while the camera on the top will perceive the world as moving to the left. Thus, when a device is translated, cameras on opposite surfaces will see the world move in the same direction (left in the example given). When a device is rotated, cameras on opposite surfaces will see the world move in opposite directions

FITBIT 1002
Fitbit v. Immersion

This deductive process can be reversed. If both cameras see the world moving in the same direction, then the motion detector knows that the device is being translated. If both cameras see the world moving in opposite directions, then the motion detector knows that the device is being rotated.

When the device is rotated, the magnitude of the movement of the world to the cameras is directly related to the magnitude of the rotation of the device. Thus, the amount of the rotation can accurately be determined based on such movement of the world to the cameras. However, when the device is translated, the magnitude of the translation is related to both the magnitude of the movement of the world to the cameras and to the distance to the objects in the field of view of the cameras. Therefore, to accurately determine amount of translation using cameras alone, some form of information concerning the distance to objects in the camera fields of view must be obtained. However, in some embodiments cameras with rangefinding capability may be used.

It should be understood that even without distance information, optical information can be of significant value when correlated against the information from accelerometers or other sensors. For example, optical camera input may be used to inform the device that no significant motion is taking place. This could provide a solution to problems of drift which may be inherent in using acceleration data to determine absolute position information for certain device functions.

As discussed above, distance information may be useful to determine amount of translation when cameras are being used to detect movement. In the illustrated embodiment, such distance information is provided by rangefinders 30a, 30b and 30c. Rangefinders 30a, 30b and 30c may comprise ultrasound rangefinders, laser rangefinders or any other suitable distance measuring component. Other components may also be used to determine distance information. For example, cameras with rangefinding capability may be used, and multiple cameras may be utilized on the same side of the device to function as a range-finder using stereopsis. Determined distance information allows for accurate and explicit computation of the portion of any apparent translation that is due to translation and the portion that is due to rotation.

FITBIT 1002
Fitbit v. Immersion

As indicated above, motion detector 22 additionally includes gyros 28a, 28b and 28c. Gyros 28a, 28b and 28c are used in combination with the other components of motion detector 22 to provide increased accuracy in detecting movement of device 10.

Processor 32 processes data from accelerometers 24, cameras 26, gyros 28 and rangefinders 30 to produce an output indicative of the motion of device 10. Processor 32 may comprise a microprocessor, controller or any other suitable computing device or resource, such as a video analysis module for receiving a video stream from each camera. In some embodiments, the processing described herein with respect to processor 32 of motion detector 22 may be performed by processor 16 of handheld device 10 or any other suitable processor, including processors located remote to the device.

As discussed above, motion detector 22 includes three accelerometers, three cameras, three gyros and three rangefinders. Motion detectors in accordance with other embodiments may include fewer or different components than motion detector 22. For example, some embodiments may include a motion detector with three accelerometers and no cameras, gyros or rangefinders; two or three accelerometers and one or more gyros; two or three accelerometers and one or more cameras; or two or three accelerometers and one or more rangefinders. In addition, the location of the motion detection components on the device may vary on different embodiments. For example, some embodiments may include cameras on different surfaces of a device while other embodiments may include two cameras on the same surface (e.g., to add rangefinding functionality).

Altering the type, number and location of components of motion detector 22 may affect the ability of motion detector to detect or accurately measure various types of movement. As indicated above, the type and number of components of motion detectors may vary in different embodiments in order to fulfill particular needs. Fewer or less accurate components may be used in particular embodiments when it is desired to sacrifice accuracy to reduce manufacturing cost of a handheld device with motion detection capabilities. For example, some handheld devices may only need to detect that the device has been translated and may not need to detect exact amount of such translation to perform desired functions of the device. Such handheld devices

FITBIT 1002
Fitbit v. Immersion

may thus include a motion detector with cameras and without any sort of rangefinder or other component providing distance information. In particular embodiments, components described above, such as cameras and rangefinders, may also be used for other purposes by the device than those described above relating to motion detection functionality.

FIGURE 3 is a diagram illustrating the use of the motion detector components of handheld device 10 of FIGURE 1. Raw data from motion detection components is processed at processor 32. Such raw data includes x-axis accelerometer raw data 23a, y-axis accelerometer raw data 23b and z-axis accelerometer raw data 23c from accelerometers 24a, 24b and 24c, respectfully; camera raw data 25a, camera raw data 25b and camera raw data 25c from cameras 26a, 26b and 26c, respectfully; gyro raw data 27a, gyro raw data 27b and gyro raw data 27c from gyros 28a, 28b and 28c; and rangefinder raw data 29a, rangefinder raw data 29b and rangefinder 29c from rangefinders 30a, 30b and 30c, respectively. If the handheld device includes more, fewer or different motion detection components as may be the case in some embodiments, the raw data may correspond to the components included.

The raw data is processed at processor 32 to produce motion detector output 34 identifying movement of device 10. In the illustrated embodiment, motion detector output 34 comprises translation along x, y and z axes and rotation with respect to the x, y and z axes. The motion detector output is communicated to a processor 16 of the handheld device which identifies the operation, function or task the device should perform (i.e., device behavior 36) based on the device motion. The performance of certain operations, functions or tasks based on particular movements is further discussed below.

FIGURE 4 is an isometric illustration of an example handheld device 31 with motion detection capability, in accordance with particular embodiments. Handheld device 31 includes an x-axis accelerometer 33, a y-axis accelerometer 35 and a camera 37 oriented towards the z-axis. X-axis 38, y-axis 39 and z-axis 40 are also illustrated with respect to device 31 for reference. Handheld device 31 may detect movement, including tilt and translation in various directions, using accelerometers 33 and 35 and camera 37. Handheld device 31 may also include other components, such as components illustrated and described above with respect to handheld device 10,

FITBIT 1002
Fitbit v. Immersion

such as display 12, input 14, processor 16, memory 18 and communications interface 20. As indicated above, particular embodiments may include handheld devices having various types of motion detection components (including accelerometers, gyros, cameras, rangefinders or other suitable components) in any combination and positioned or oriented in any suitable manner upon the devices.

In particular embodiments, a user interface function may utilize input motion along one axis of motion at a time. For example, a device application may allow a user to scroll through a list displayed on the handheld device by moving the device along a particular axis (e.g., in one direction or in two opposite directions). It may be very difficult for a user to constrain the motion of the device to that particular axis as desired. In other words, some user generated device rotation or movement along another axis may be difficult to avoid. To counter this problem, the device may include preferred motion selection including the selection and amplification of a dominant motion and the minimization of movement in other directions or axes.

FIGURE 5 illustrates an example of selection and amplification of a dominant motion and minimization of movement in another direction as discussed above. In the illustrated example, actual motion 41 represents movement of a handheld device. Actual motion 41 comprises movement 42 along one axis 44 and movement 46 along another axis 48 perpendicular to axis 44. Since the amount of movement 42 is greater than the amount of movement 46, the handheld device may select movement 42 as the dominant motion. The handheld device may then amplify this dominant motion and minimize movement 46 (the other motion) such that actual motion 41 is treated by the device as represented motion 50. The amount or size of amplification of the dominant motion may vary in various embodiments according to particular factors, such as the particular application being run on the device at the time. Moreover, amplification of a dominant motion may also be based on magnitude of acceleration, speed of motion, ratio of a motion in one direction (e.g., movement 42) to motion in another direction (e.g., movement 46), size of underlying desktop being navigated or user preferences. In some embodiments, a handheld device may implement preferred motion selection only when certain motion characteristics occur. For example, in some cases the handheld device may select and amplify a dominant motion if motion in one axis is

FITBIT 1002
Fitbit v. Immersion

more than two times greater than any other motion. The other, smaller motion may then be minimized.

The selection and amplification of the dominant motion and minimization of other motion may further expand a user's ability to take advantage of motion user interfaces and may also allow the handheld device, or applications running on the device, to filter out undesired, user-induced noise. With this capability, the user may be able to, for example, move the device left to pick a list to examine, then scroll that list by moving up and down. Motion along inappropriate axes may be ignored or substantially reduced by the device.

In particular embodiments, the selection and amplification of a dominant motion and minimization of other motion may also be applied to rotational motion of the device. Dominant motion around an axis may be selected and amplified in the same manner as motion along an axis as described above with respect to translational motion. Moreover, rotation around another axis (that is not dominant rotation) may be minimized.

FIGURE 6 illustrates a preferred motion selection flowchart 60, in accordance with a particular embodiment of the present invention. In flowchart 60, raw data corresponding to movement of a handheld device is received. In the illustrated embodiment, the movement raw data includes x-acceleration data 62a, y-acceleration data 62b and z-acceleration data 62c that is processed at step 64 to yield an output indicating movement of the device. Other embodiments may include other types of movement raw data, such as optical or camera data, gyro data and/or rangefinder data. After the processing of the raw acceleration data 62, a dominant axis of motion is selected at step 66. If the selected dominant axis of motion is the x-axis, then the movement along the x-axis is augmented at step 68a. If the selected dominant axis of motion is the y-axis, then the movement along the y-axis is augmented at step 68b. If the selected dominant axis of motion is the z-axis, then the movement along the z-axis is augmented at step 68c. The amount of augmentation of movement in the dominant axis of motion may vary in different embodiments according to the application being utilized or other characteristics. In some embodiments, user preferences 69 may be utilized to determine type or amount of movement augmentation. Movement along axes other than the dominant axis of motion may be minimized as discussed above,

FITBIT 1002
Fitbit v. Immersion

such that such movement is ignored by a particular application in use. At step 70, the augmented movement is processed to yield device behavior 72. This processing step may include accessing an application being used to determine the particular device behavior to perform based on the augmented movement. Augmented movement may yield any of a number of types of device behavior according to the application in use, a particular user or otherwise.

For particular user interfaces utilizing motion input, there may be value in having the position of a virtual display, or the information displayed at display 12 of handheld device 10, linked to the position of the device. For example, in particular embodiments using translation-based input such as for navigating a map displayed at the device, the position of the handheld device may directly determine the portion of the map displayed at display 12. However, if device position information is kept in absolute terms (e.g., as with global positioning satellite (GPS) based systems) the utility for many tasks such as map or menu navigation may be impaired. Thus, it is beneficial in certain circumstances to define a "zero point," or an origin in a local context, that may be used to determine the behavior of the device. For example, if a zero point is defined when the device is at a point A, then motion between point A and a point B may be used as input. Particularly useful applications of setting a zero point may include external behaviors such as moving the virtual display or locating applications in the space around a user's body. Setting a zero point also addresses internal behaviors such as instructing the device to ignore the gravitational acceleration at the current orientation to allow the device to act only on additional, and presumably user generated, accelerations.

Handheld devices according to particular embodiments may include application user interfaces that utilize motion input only at certain times. At other times, for example, the motion of the device may not be utilized as input, and it may be useful to disengage or "turn off" motion sensitivity or the motion detection capability of the device. Disengagement of motion sensitivity may comprise, for example, deactivation of motion detector 22 of device 10 or other component, such as a motion response module of the device. Particular embodiments thus allow for the selective engagement and disengagement of the motion sensitivity of the device.

FITBIT 1002
Fitbit v. Immersion

As an example, a motion response module which modifies display 12 based on motion detected at motion detector 22, may have a mode of operation in which it awaits a trigger for switching to another mode of operation in which motion sensitivity is enabled. When motion sensitivity is not enabled, any motion of the device may be disregarded. The trigger may also set a zero-point for the device. When the zero-point is set, the motion response module may measure a baseline orientation of the device based on measurement from motion detection components. The baseline orientation may comprise the position of the device (determined from information from motion detector components) when the trigger is received. Future movement of the device will be compared against the baseline orientation to determine the functions to perform or the modifications which should be made at display 12 based on the user's motion of the device.

Particular embodiments provide for any number of user-initiated actions to act as a single trigger for zero-point selection and selective engagement/disengagement of the motion sensitivity of the device. Such actions may include, for example, the pressing of a key on input 14, moving device 10 in a particular way (e.g., movement corresponding to a particular gesture), and tapping display 12. It should be understood that any user-initiated action may set a zero-point and engage motion sensitivity of the device at the same time.

In some embodiments, a period of inactivity or minimal activity (i.e., relative stillness) may also set a zero-point and engage or disengage motion sensitivity. FIGURE 7 illustrates a flowchart 80 for the passive setting of a zero-point for a handheld device. Change in acceleration with respect to an x-axis is detected at step 82a, change in acceleration with respect to a y-axis is detected at step 82b and change in acceleration with respect to a z-axis is detected at step 82c. At steps 84a, 84b and 84c, it is determined whether any acceleration change detected is greater than a particular respective threshold. If detected acceleration change along each of the three axes is not greater than a set threshold, then the device may be considered at rest, and at step 86 a zero-point will be set. An at rest position may be determined, for example, from stabilization of the raw data or motion components of components of motion detector 22. However, if detected acceleration change along any of the three axes is greater than a set threshold, then the process returns to acceleration change

FITBIT 1002
Fitbit v. Immersion

detection at steps 82. Thus, this method of passively setting a zero-point may ensure that when the handheld device is at rest, a zero point will be set. Moreover, if a device is in constant motion but not being moved by a user at a particular time (e.g., resting in a train moving at a constant speed), a zero-point will be set since there will be no detected change in acceleration. The use of thresholds to determine whether an acceleration change is high enough so as not to trigger the setting of a zero-point enables a user to hold the device still to passively set the zero-point. Otherwise, this may be difficult since a device with highly sensitive accelerometers may detect acceleration change as a result of very minor unintended, user-initiated movement. It should be understood that similar methods may be used in connection with motion detectors with components other than accelerometers. Thresholds may also be used in such similar methods to account for small, unintended movements that may otherwise prevent setting of a zero point.

Particular embodiments of the present invention include the ability to allow a user to repeatedly selectively engage and disengage the motion sensitivity of the handheld device in order to allow greater movement through a virtual desktop (or information space) using motion input in a limited amount of physical space. This process can be analogized to "scrubbing" with a mouse controlling a cursor, or lifting the mouse off of a surface and replacing the mouse on the surface at a different location to allow greater movement of the cursor. Lifting the mouse breaks the connection between the motion of the mouse and the motion of the cursor. Similarly, a user may be able to engage and disengage the connection between the motion of a handheld device, such as device 10, and the operations, functions or actions based on movement of the device.

FIGURE 8 illustrates an example of the use of scrubbing functionality to navigate across a virtual desktop, or information space, larger than the display of a handheld device. In the illustrated example, a handheld device is used to navigate through virtual desktop 90. Virtual desktop 90 is illustrated as a grid map and may represent any suitable information through which a user may desire to navigate. Information of virtual desktop displayed at the handheld device is represented by box 92. In this embodiment, translation of the handheld device is used to navigate through virtual desktop 90. For example, a user may move the handheld device from right to

FITBIT 1002
Fitbit v. Immersion

left to navigate from right to left through information of virtual desktop 90. It should be understood that while the example illustrated describes moving the device to the right to implement the scrubbing process, it should be understood that handheld devices of particular embodiments may be moved in any suitable manner to implement the scrubbing process.

As indicated above, box 92 represents the information of virtual desktop 90 currently displayed at the device. If a user desired to view information represented at box 94, the user may move the handheld device from left to right. For purposes of this example, imagine that the user moves the device to the right, and the information of virtual desktop 90 contained in box 94 is displayed at the device. Also imagine that the user's arm is now outstretched to the user's right such that the user must walk or otherwise move further right in order to view at the display of the device information of virtual desktop 90 that is to the right of box 94. If this were the case, and the user could not, or did not desire to, walk or otherwise move further to the right so that the device would be moved further to the right, then the user could selectively disengage the motion sensitivity of the handheld device, move the device back to the left, selectively reengage the motion sensitivity of the device and move the device back to the right to display information to the right of box 94. In this manner, the user could display information of virtual desktop 90 contained in box 96, and this process could be repeated to display information contained in box 98, which is further to the right of box 96.

The selective disengagement and reengagement of the motion sensitivity of the device in order to allow greater movement within a virtual desktop in a limited amount of physical space may be enabled in any of a variety of ways, such as by a key on an input of the device, moving the device according to a particular gesture or movement (e.g., an arc movement) or tapping the device display. Any other user-initiated action may be used to disengage and reengage motion sensitivity for this purpose. Particular embodiments may allow multiple actions to disengage and reengage motion sensitivity of the device. Moreover, a user action that disengages motion sensitivity of the device may be different from a user action that reengages motion sensitivity. This scrubbing process may be performed in any suitable application, such as map navigation, menu navigation and scrolling through a list.

FITBIT 1002
Fitbit v. Immersion

FIGURE 9 is a flowchart illustrating the steps of the scrubbing process described above with respect to FIGURE 8, in accordance with a particular embodiment. The flowchart begins at step 100, where the handheld device is moved to the right to go from displaying information of box 92 of virtual display 90 to information of box 94. As indicated above, the user may desire to display information further to the right of box 94 but may have run out of physical space to move the device further to the right. Thus, the user disengages the motion sensitivity of the device at step 102. Any suitable user action may perform such disengagement, such as the pressing of a button on the device or moving the device according to a particular gesture. At step 104, the user moves the device to the left so that the user will have more physical space through which the user may move the device to the right when motion sensitivity is reengaged.

At step 106, the user reengages motion sensitivity of the device. Again, such reengagement may be performed by any suitable user action, and such user action may be different from the user action performed to disengage motion sensitivity in step 102. Since motion sensitivity has been reengaged, the user moves the device to the right at step 108 in order to change the information being displayed at the device from the information of box 94 to the information of box 96. At step 110, it is determined whether further movement of the device to the right is needed. If further movement is needed (e.g., to display the information of virtual display 90 in box 98), then the process returns to step 102 where motion sensitivity of the device is again disengaged. If no further movement is needed, then the process ends. As indicated above, this scrubbing process may be utilized in any suitable application of the device that supports motion input, and the device may be moved in any suitable manner in order to implement this functionality.

As indicated above, a particular movement of the device (e.g., a particular gesture) may be utilized in the scrubbing process to signal to the device not to change the information presented on the display during such movement. This allows the user to return the device to a position from which the user may move the device to further change the information presented on the display. For example, the device may be at a base reference position from which movement of the device changes the information displayed. A particular predetermined movement (e.g., an arc movement) may be

FITBIT 1002
Fitbit v. Immersion

used which may signal to the device not to change the information displayed based on motion until the movement is completed. Once the predetermined movement is completed, the base reference position may be reset such that future movement of the device from the base reference position further changes the information displayed. The base reference position may identify a baseline orientation of the device represented by baseline components of the motion data received by the motion detection components of the device. In particular embodiments, gestures may be received, as determined by movement from the base reference position, to perform particular commands which change the information displayed at the device.

As discussed with respect to various embodiments described above, handheld devices in accordance with particular embodiments may utilize multiples types or modes of input to operate the device. Such input modes include motion input modes, such as a translation input mode and a gesture input mode. While multiple input modes may sometimes be used in combination with each other, in some cases the handheld device may be set to recognize a certain mode type at one time. In some situations, the handheld device may be set to function based on multiple types of non-motion input and only one type of motion input (e.g., translation or gesture) at a particular time.

To facilitate this flexibility of the handheld device in recognizing multiple input modes, in particular embodiments a certain trigger may be used to switch between input modes. For example, a user may press a particular key or may move the device in a certain manner (e.g., a particular gesture) to switch input modes. In some cases where an application of the device recognizes and functions based upon multiple types of motion input, a particular key may be pressed or a particular gesture may be formed using the device to switch between a translation motion input mode and a gesture motion input mode. The trigger may also comprise the mere switch from one application to another or the switch from one displayed image to another. In some situations, the trigger may switch between a non-motion input mode and a motion input mode. Any particular user-action may be implemented to act as a trigger to switch between different input modes, such as between different motion input modes. In some embodiments, a voice command or physical action upon the device (e.g., a device or screen tap) may be utilized to switch input modes.

FITBIT 1002
Fitbit v. Immersion

In particular embodiments, a user action that reengages motion sensitivity of a device may also contain other information that might otherwise affect device behavior. For example, if a user makes one motion to reengage translation sensitivity, it may render the device more sensitive to motion than if the user makes a different motion to reengage motion sensitivity. A reengaging motion may comprise a gesture that indicates the user's identity or context, thereby engaging a variety of operational settings, such as user preferences.

As indicated above, particular embodiments include the ability to receive motion input to control various functions, tasks and operations of a handheld device and may be used to alter information displayed at the device in the process. In some cases, such motion input may be in the form of gestures, as opposed to mere translation-based input. Gesture input may be used to navigate through a multidimensional menu or grid in some applications. For example, as discussed above with respect to the scrubbing process, a display of a handheld device may be smaller than the amount of information (e.g., menu options, map information) that can be presented on the display. This may lead to a menu structure that is narrow and deep. In many cases, broad, shallow menu structures may be preferred over a narrow, deep menu structure because a user is not required to remember as much information concerning where functionalities are located.

FIGURE 10A illustrates an example of menu navigation using gesture input, in accordance with a particular embodiment. In the illustrated embodiment, a handheld device is used to navigate through virtual desktop 120. Virtual desktop 120 includes a menu tree with menu categories 122 for selection. Each menu category 122 may include respective sub-categories for selection. In some embodiments, menu categories 122 may comprise categories of functions, while sub-categories of each menu selection may include the actual functions under each such category. In other embodiments, menu categories may comprise nouns (e.g., "folder," "document," "picture"), while sub-categories comprise verbs (e.g., "move," "paste," "cut"). If the handheld device comprised a cellular phone, menu categories 122 may include "calls," "phone book," "messages," "planner," "sounds," "setup" or other items. Each menu category 122 may include functions which may be accessed once a menu category 122 is selected. While two menu levels are illustrated in FIGURE 10A, it

FITBIT 1002
Fitbit v. Immersion

should be understood that a multidimensional desktop or display of information for motion interface navigation may include any number of selections (e.g., menus) utilizing any number of levels.

In the illustrated example, menu category 122c has been selected, and sub-categories 124 of menu category 122c are displayed as available for selection. Boxes 126 and 128 represent information displayed at the handheld device for the user. As illustrated, virtual desktop 120 includes more information, or menus, which can be displayed at the device at one time. A user may move the device according to particular gestures to navigate across or through the virtual desktop. Gestures may also be used to navigate through different menu levels and to make menu selections. As an example, a user may move device 10 in the form of a clockwise circle 130 to navigate a predetermined amount to the right across virtual desktop 120 (e.g., moving from information of box 126 to information of box 128). A particular menu category 122 may be selected by an away gesture 132, or a downward gesture (e.g., to select menu category 122c), and thus display sub-categories 124 for selection. Similarly, to move to the left across virtual desktop 120, a user may move device 10 in the form of a counterclockwise circle 134. In some cases, navigation may be accomplished through four gestures: a forward gesture, a backward gesture, a left gesture and a right gesture. In some embodiments, gestures comprising motion vectors in perpendicular directions may be used for navigation.

In particular embodiments, gestures may be used that are mirror images of other used gestures to execute opposite functions from those accomplished by the other gestures. For example, a motion toward a user might zoom in while an opposite motion, a motion away from the user, may zoom out. Using mirror image or reciprocal gestures mapped to opposite functions may make a motion user interface for a device easier to learn and to use.

In some cases, the menu item at the center of the display may be highlighted for selection, while in other cases a particular gesture may indicate which menu selection of a plurality of displayed selections a user desires to select. It should be understood that the menus or other information through which a user may navigate using gestures may be presented at the handheld device in any number of ways. In some embodiments, only one level of information (i.e., one menu level) may be

FITBIT 1002
Fitbit v. Immersion

displayed at once, while sub-levels or higher levels are not displayed until they are available for selection.

FIGURE 10B illustrates example gestures which may be utilized to perform various functions, such as functions enabling a user to navigate through a virtual desktop. The illustrated example gestures include an "up" gesture 133 to navigate in an upward direction through the desktop, a "down" gesture 135 to navigate down, a "left" gesture 136 to navigate left, a "right" gesture 137 to navigate right, an "in" gesture 138 to navigate in a direction towards the user and an "out" gesture 139 to navigate away from the user. It should be understood that these are mere example gestures and commands for particular embodiments, and other embodiments may include different gestures or similar gestures mapped to different commands for navigating through a desktop or performing other functions with a handheld device.

FIGURE 11 illustrates another example of map navigation using motion input, in accordance with a particular embodiment of the present invention. FIGURE 11 includes a virtual desktop 140 representing an information grid divided into sixteen portions, each referenced by a respective letter (A, B, C, . . . P). Portions of virtual desktop 140 are identified using reference letters only for purposes of describing particular embodiments, and portions of virtual desktops in accordance with other embodiments may or may not be identified in a device application by a reference character or otherwise. Virtual desktop 140 includes more information that can be displayed at a particular handheld device at one time. Virtual desktop 140 may represent any suitable information through which a user may desire to navigate using a handheld device, such as a street map. A user may desire to navigate across virtual desktop 140 to display different portions of information on the handheld device display and may also desire to zoom in (and out of) virtual desktop 140 (i.e., change the granularity of the information displayed) to more clearly view certain portions of the information of virtual desktop 140.

In the illustrated example, box 142 represents information currently displayed at handheld device 10. Box 142 includes portions A, B, E and F of virtual desktop 140. In particular embodiments, if a user desires to change the information of desktop 140 displayed at the device to, for example, information of boxes C, D, G and H, then the user can use motion input to move box 142 representing the display of the device

FITBIT 1002
Fitbit v. Immersion

to the right the necessary amount (two portions to the right in the illustrated example). Such motion input may comprise translation input (moving the handheld device 10 to the right an applicable amount to change the information displayed) or a gesture input (moving the handheld device 10 according to a particular gesture mapped to this function). As an example, one gesture may be mapped to moving the display one portion to the right, while another gesture may be mapped to moving the display two portions to the right. Thus, using translation input or gesture input, the user may navigate across desktop 140.

The handheld device 10 may also allow the user to zoom in on certain information displayed for a clearer view of such information, for example, through translation input or gesture input. As an example using gesture input, if the information displayed at the device included four of the sixteen portions (e.g., box 142 displaying portions A, D, E and F), then a user may use one of four gestures, each mapped to zoom in on a particular portion, to zoom in on one of the four displayed portions. If the user moved the handheld device according to the gesture mapped to zoom in on portion B, then the device may display information represented by box 144 (portions B1, B2, B3, B4, B5, B6, B7, B8 and B9) collectively forming the information of portion B of virtual desktop 140 in an enlarged view. Thus, the information of portion B may be more largely and clearly displayed. When viewing the information of box 144 on the device, the user may zoom out or zoom in again on a particular portion currently displayed using appropriately mapped gestures. If the user moved the handheld device according to a gesture mapped as zooming in on portion B2 (this could be the same gesture as that used to zoom in on portion B when information of box 142 was displayed), then the device may display information of box 146 (portions B2a, B2b, B2c, B2d, B2e, B2f, B2g, B2h and B2i). The user may also be able to navigate across the virtual desktop when zoomed in on a particular portion. For example, when zoomed in on portion B (viewing information of box 144), the user may use translation or gesture input to move across the virtual desktop to view enlarged views of portions other than portion B. As an example, when viewing information of box 144 the user may make a gesture that moves the information displayed to the right such that the entire display shows only information of portion C of virtual desktop 140 (i.e., zoomed in on portion C showing portions C1,

FITBIT 1002
Fitbit v. Immersion

C2, C3, C4, C5, C6, C7, C8 and C9). It should be understood that a user may navigate through the information of virtual desktop 140 (both navigating across and zooming in and out) in any suitable manner using motion input.

As indicated above, any suitable gestures may be used to both navigate across a virtual desktop (or across a particular level) and to navigate between or through different levels or dimensions of a multidimensional desktop. Moreover, in some embodiments motion, such as gestures, may be used to navigate across the multidimensional desktop, and non-motion actions may be used to select or navigate between dimensions. Such non-motion actions may include the pressing of a key in a device input. Thus, a combination of motion and non-motion actions may be used for multidimensional virtual desktop or menu navigation in particular embodiments.

Particular embodiments may allow gesture-based navigation through any suitable application, such as a multidimensional grid, menu, calendar or other hierarchical application. For example, in a calendar application certain gestures may be used to navigate within one level, such as months, while other gestures may be used to navigate between levels, such as between years, months, days, hours and events. Moreover, different applications implemented in the handheld device that use such gesture navigation may use different gestures. Thus, the particular navigation gestures may change according to the particular application in use. In some embodiments, translation-based interfaces may be used to navigation through multidimensional information of a virtual desktop, as opposed to merely using gesture-based movements. For example, movement along x and y-axes may be used to travel within a level of a hierarchy, while movement along a z-axis may be used to travel between levels of the hierarchy.

Another example might involve using a telephone directory with institutions, letters of the alphabet, names, contact details (e.g., office, cellular and home phone numbers, email) and action to initiate contact all along different levels of a hierarchy. In this example, the hierarchy may contain information (nouns) and actions (verbs). One could map this example onto only two axes with, for example, a y-axis being used to select within a level of hierarchy and an x-axis being used to move between levels. A z-axis could be used to confirm the actions and help prevent inadvertent execution of actions.

FITBIT 1002
Fitbit v. Immersion

In some cases, the number of levels traversed may depend on the magnitude of the motion, particular in translation-based navigation. Moving the device a small amount may navigate one level at a time, while moving the device a large amount may navigate multiple levels at a time. The greater the magnitude of motion, the more levels may be navigated at once. As applied to gesture-based motion inputs, different gestures may be used to navigate different numbers of levels in the hierarchy at once. These gestures may be different magnitudes of the same motion or entirely different motions.

The use of motion interface navigation through a multidimensional desktop or information display increases may allow menus to be flattened since a user may more easily navigate across a particular menu or dimension of a virtual desktop too large to fit on a device's display. As a result of the menu flattening, the user may be required to memorize less information thus increasing functionality and capability of the device for the user.

As discussed above, handheld devices in particular embodiments allow a user to navigate across a virtual desktop using motion input. In some cases, a user may utilize a cursor to navigate across information displayed at the handheld device. For example, certain information may be displayed at the device, and the user may utilize motion input to move the cursor around the device display and to select particular items displayed to perform certain functions. In some cases, motion input may be utilized to move a cursor, while a non-motion action (such as pressing a button) may be used to select an item currently indicated by the cursor. It should be understood that both gesture and translation motion input may be utilized in various embodiments of cursor navigation.

In particular embodiments, information displayed may be fixed with respect to the device, and the cursor may remain fixed in space such that movement of the device is used to navigate the cursor across the information. FIGURE 12A illustrates an example utilizing this form of motion input cursor navigation. Display 147 represents a display of a handheld device. In order to describe this cursor navigation example, display has been divided into a grid to show information being displayed. The grid includes portions A-P. Display 147 includes a cursor 148 between portions C, D, G and H. As stated above, in this embodiment the information displayed

FITBIT 1002
Fitbit v. Immersion

remains fixed with respect to the device when the device is moved, and the cursor remains fixed in space. However, the cursor's position with respect to the information displayed changes according to motion input. When the device is translated to the right, according to right movement 149, the cursor is translated according to a motion opposite to the translation of the device.

Display 150 represents a possible display after the device is moved according to right movement 149, with cursor 148 now between portions A, B, E and F. It should be understood that since this example involves translation-based input, the magnitude of the movement of the device (e.g., to the right in this example) may directly affect the magnitude of the movement of the cursor with respect to the information displayed. Display 152 represents another display after the handheld device has been moved according to up movement 151, with cursor 148 now between portions I, J, M and N. As evident, the cursor will have moved down with respect to information displayed since it remains fixed in space. Display 154 represents another display after the handheld device has been moved according to left movement 153, with cursor 148 now between portions K, L, O and P. As evidence, the cursor will have moved to the right with respect to information displayed. Thus, in this form of cursor navigation, motion of the device changes the position of the cursor on the information. In this manner for example, the handheld device may be moved instead of using a stylus to point to certain portions of information displayed.

At any point in the cursor navigation process, a user may utilize any form of input (e.g., gesture, key press, etc.) to select or otherwise perform a function according to the information currently indicated at the cursor. For example, with respect to display 152, a user may use a particular gesture or press a button to zoom in, select or perform some other function based on information between portions I, J, M and N currently indicated by cursor 148.

As described above with respect to FIGURE 12A, particular embodiments may translate the cursor in a motion opposite from the motion of the device to move the cursor across the information displayed. In one example of implementation, input motion of the device may be divided into motion along each of three axes, two of which are parallel to the device display (e.g., an x-axis and a y-axis). While motion of the device in the x-axis and y-axis plane changes information displayed at the device

FITBIT 1002
Fitbit v. Immersion

based on such motion, the cursor may be moved at the same time according to a translation vector that is opposite to the sum of movement in the x-axis direction and the y-axis direction to substantially maintain the position of the cursor in space. In some cases, when the cursor would move past a display edge off of the display according to the translation vector, the vector may be reduced in order to keep the cursor within the display. Such reduction may include reducing one or more components of the translation vector to maintain the cursor within a certain distance from the display edge.

It should be understood that the division of information displayed into portions A-P is done only for illustrating and describing the embodiments described above, and information displayed at handheld devices of particular embodiments may not include such a division or other type of reference information.

FIGURE 12B illustrates another form of motion input cursor navigation, in accordance with a particular embodiment. In this example, the cursor remains in a fixed position with respect to the display while motion input is used to navigate across a virtual desktop larger than the device display. FIGURE 12B includes virtual desktop 158 which comprises information through which a user may navigate using motion input at a handheld device, such as a street map. Virtual desktop 158 includes more information that can be displayed at a particular handheld device at one time. In order to describe this cursor navigation example, virtual desktop 158 has been divided into a grid to differentiate between information presented at the desktop. The grid includes 6 rows (A-F) and 7 columns (1-7). Portions of the grid may be identified herein for this example using their row letter and column number (e.g., portion B7 or D2). It should be understood that the division of virtual desktop 158 into portions referenced by row and column number is done only for illustrating and describing the embodiments described above, and the virtual desktops of particular embodiments may not include such a division or other type of reference information.

Box 160 represents information of virtual desktop 158 currently displayed at a handheld device. Display 161 represents the display of a handheld device showing information of box 160. Display 161 also includes a cursor 159 positioned at the intersection of portions B2, B3, C2 and C3. As indicated above, as a user utilizes motion input to move around the virtual desktop (i.e., to change the information

FITBIT 1002
Fitbit v. Immersion

displayed at the device), the cursor remains in a fixed position with respect to the display. However, the cursor's position changes with respect to the information of the virtual desktop displayed at the handheld device. For example, a user may utilize motion input to change the information displayed at the device to that represented at box 162. The information displayed at the device changes (to portions B5, B6, C5 and C6); and cursor 159 will remain fixed at the device display (e.g., in this case at the center of the display) such that its position changes with respect to the information of virtual desktop 158, as illustrated at display 163. If the user desired to use motion input to change the information displayed at the device to that represented at box 164, the information displayed at the device changes to portions E3, E4, F3 and F4, as illustrated at display 165. Cursor 159 is positioned between these illustrated portions in the center of the display since its position relative to the display remains fixed in this embodiment.

Thus, according to the form of cursor navigation illustrated with respect to FIGURE 12B, the cursor will remain at a position fixed with respect to the device display, while its position with respect to the information of a virtual desktop changes. As discussed above with respect to the embodiment described and illustrated with respect to FIGURE 12A, at any point in the navigation process, a user may utilize any form of input (e.g., gesture, key press, etc.) to select or otherwise perform a function according to the information currently indicated at the cursor. For example, with respect to display 163, a user may use a particular gesture or press a button to zoom in, select or perform some other function based on information between portions B5, B6, C5 and C6 currently indicated by cursor 159.

It should be understood that any particular input, such as a gesture or key press, may be used to switch cursor navigation modes at the device. For example, a user may switch between the translation-controlled cursor mode of FIGURE 12A and the fixed cursor mode of FIGURE 12B.

As discussed above, particular embodiments allow a user to move handheld device 10 according to a gesture to perform particular functions or operations. In some cases however, a user may not move the device according to the particular gesture intended, and the device may, as a result, not be able to recognize the movement as the intended gesture. In order to indicate that a particular movement of

FITBIT 1002
Fitbit v. Immersion

the device by a user is recognized as a particular gesture, handheld devices in some embodiments provide feedback to notify the user that the movement was in fact recognized as a gesture.

This feedback may comprise an audio format, such as speech, a beep, a tone or music, a visual format, such as an indication on the device display, a vibratory format or any other suitable feedback format. Audio feedback may be provided through a user interface speaker or headphone jack of device 10, and vibratory feedback may be provided through a user interface vibration generation module of device 10. Audio, visual and vibratory feedback may be varied to provide capability for multiple feedback indicators. As an example, vibratory feedback may be varied in duration, frequency and amplitude, singly or in different combinations over time. The richness and complexity of the feedback may be expanded by using feedback of different types in combination with one another, such as by using vibratory feedback in combination with audio feedback. In some cases, the feedback may be gesture-specific, such that one or more recognized gestures have their own respective feedback. For example, when a certain gesture is recognized the device may beep in a particular tone or a particular number of times, while when one or more other gestures are recognized the beep tones or number of beeps may change. The use of audio feedback may be especially valuable for gestures that do not have an immediately visible on-screen manifestation or function, such as calling a certain number with a cellular phone. Different types of feedback may also be context or application specific in some embodiments. Different contexts might include device state, such as what application is in focus or use, battery level, and available memory, as well as states defined by the user, such as quiet or silent mode. For example, a handheld device may utilize vibratory feedback in response to gesture input while in silent mode when audio feedback would otherwise be used. This feedback process may also be utilized by a handheld motion input device of a computer or other component.

Similar to the feedback relating to gesture recognition described above, handheld devices in particular embodiments may also provide feedback for the user in the event that a particular user movement was not recognized as a gesture when the device is in a gesture input mode. For example, if a motion appears intended to be a gesture, but cannot be assigned to a particular gesture that is known to the device, it

FITBIT 1002
Fitbit v. Immersion

may play a sound indicating failure. This notifies the user that the user must make another attempt at moving the device according to the intended gesture for the device to perform the operation or function desired. The feedback notifying the user that a movement was not recognized may also comprise an audio, visual, vibratory or other suitable format and may be a different feedback than that communicated when a particular movement is recognized by the device as a particular gesture. In order to determine whether a user's intent was to input a gesture, handheld device 10 may look at certain characteristics of the movement that imply that the motion was intended to be a gesture. Such characteristics may include, for example, the amplitude of the motion, the time course of the above-threshold motion and the number and spacing of accelerations. If a particular gesture is unrecognized by the device, a system of gestural feedback may be used to determine the gesture intended. For example, audio feedback may indicate possibilities determined by the handheld device, and the user may utilize gestures to navigate an auditory menu to select the intended gesture.

In particular embodiments, a system of audio or vibratory feedback may be used such that a user could operate handheld device 10 without having to resort to viewing display 12. For example, handheld devices in some embodiments may provide audio, visual or vibratory feedback to a user navigating a menu or other information of a virtual desktop. In effect, this device feedback combined with the motion input of a user could act as a type of "conversation" between the user and the device. As indicated above, multiple types and complexities of feedback may be utilized. The feedback process could be particularly advantageous in environments where it may be inconvenient, unsafe or impractical to look at the device display (e.g., while driving or while in a dark environment).

It should be understood that feedback, such as audio, visual and vibratory feedback, may also be used in some embodiments in connection with translation motion input. For example, a feedback indicator may be given when a user reached a limit or edge of a virtual desktop using translation input.

FIGURE 13 is a flowchart 170 illustrating a process for utilizing feedback in response to motion input, in accordance with a particular embodiment. At step 172 of the process raw motion data is received at handheld device 10. As described above, the raw motion data may be received by any combination of accelerometers, gyros,

FITBIT 1002
Fitbit v. Immersion

cameras, rangefinders or any other suitable motion detection components. At step 174, the raw motion data is processed to produce a motion detector output indicative of the motion of the device. Such processing may include various filtering techniques and fusion of data from multiple detection components.

At step 176, the device state may be checked, because in some embodiments the feedback for a particular motion depends on the state of the device when the motion is received. As indicated above, example device states may include the particular application in focus or use, battery level, available memory and a particular mode, such as a silent mode. At step 178, the motion detector output is analyzed with respect to the device state. At step 180, it is determined whether the motion indicated by the motion detector output is meaningful or otherwise recognizable given the particular device state. For example, a particular gesture may perform a certain function in one application (e.g., a calendar application) while the gesture serves no function in another application. If the gesture is recognizable or meaningful give the state of the handheld device, then at step 182 feedback is provided. As indicated above, in particular embodiments feedback may be in an audio, visual or vibratory format. In some cases the feedback may merely be an indication that the device recognizes the gesture given the state of the device. In other cases, the feedback may be a further query for additional input, for example if the user was utilizing a particular application of the device that provided for a series of inputs to perform one or more functions. At step 184, the device behaves according to the motion input and device state, and the process may return to step 172 where additional raw motion data is received.

If it is determined at step 180 that the motion indicated by the motion detector output is not meaningful or recognizable given the particular device state, then the process proceeds to step 186. At step 186, it is determined whether the motion is above a particular threshold. This determination may be made to determine whether particular motion input was, for example, intended to be a gesture. As indicated above, threshold characteristics for this determination may include the amplitude of the motion input, the time course of the motion input and the number and spacing of accelerations of the motion. If it is determined that the motion input was not above a particular threshold, then the process may return to step 172 where additional raw

FITBIT 1002
Fitbit v. Immersion

motion data is received. If, however, the motion input was above a threshold such that a gesture may have been intended but was not recognized or meaningful given the device state, feedback is provided at step 188. The feedback may include audio, visual and/or vibratory feedback and may indicate that the gesture was not recognizable or meaningful. In particular embodiments, the feedback may also provide a query regarding the intended gesture or may otherwise provide the user with a number of potentially intended gestures from which the user may select the particular gesture intended by the motion. It should be understood that particular embodiments may not include some of the steps described (e.g., some embodiments may not include the threshold determination of step 186), while other embodiments may include additional steps or the same steps in a different order. As suggested above, particular embodiments may utilize motion input feedback (e.g., including feedback "conversations") in any of a number of applications and ways and the type and complexity of feedback systems may vary greatly in different embodiments.

As indicated above, handheld devices according to particular embodiments may receive gesture motion input to control any number of functions of any number of applications running at the device. Some applications that utilize gesture involve may comprise mobile commerce (mCommerce) applications in which a mobile device, such as handheld device 10, is used to conduct various transactions, such as commercial or consumer purchases. Many mCommerce applications utilize some form of authentication to authenticate a user, such as personal identification numbers (PINs), credit card information and/or possession of the mobile device. However, many forms of authentication can be "leaked." They can be shared intentionally or inadvertently. Another form of authentication is a user's written signature, which does not suffer from such leaking problems since forgery is typically difficult to accomplish and may be easy to detect. Particular embodiments may utilize motion input to receive a user's signature as a form of authentication in mCommerce or other transactions through the handheld device.

A written signature may be considered a two dimensional record of a gesture. When utilizing a handheld device with motion input, a user's signature may be in three dimensions and may thus comprise a "spatial signature." Moreover, when combined with other forms of input received at the device, a user's signature can take

FITBIT 1002
Fitbit v. Immersion

on any number of dimensions (e.g., four, five or even more dimensions). For example, a three-dimensional gesture "written" in space using the device and detected at motion detector 22 may be combined with key-presses or other inputs to increase the number of dimensions of the signature.

These spatial signatures can be tracked, recorded, and analyzed by motion detectors 22 of handheld devices. They can be recorded with varying degrees of precision with varying numbers of motion detector components to serve as an effective form of authentication. A user's spatial signature may take comprise a three-dimensional form based on the user's traditional two-dimensional written signature or may comprise any other suitable gesture which the user records at the handheld device as his or her signature.

In some embodiments, the process for recognizing a spatial signature may involve pattern recognition and learning algorithms. The process may analyze relative timings of key accelerations associated with the signature. These may correspond to starts and stops of motions, curves in motions and other motion characteristics. In some cases, some hash of a data set of a points of a signature motion may be stored, and subsequent signatures may be compared against the hash for recognition. This may further verify if the signature was genuine by determining whether it was unique. For example, in particular embodiments, a signature may be detected (e.g., by a signature detection module of device 10) by comparing a particular movement of the device with respect to an initial or reference position. Such comparison may be made by comparing a sequence of accelerations of the movement with a predetermined sequence of accelerations of a stored spatial signature. This determination may be made regardless of the scale of the user's input motion signature.

In some embodiments, the device can detect whether motion of the device matches the signature by determining whether positions of the device in motion relative to an initial position match the spatial signature.

FIGURE 14 illustrates an example system 200 utilizing spatial signatures as authentication for mCommerce transactions. System 200 includes handheld device 10, mCommerce application 202, authenticator 204 and communication network 206. mCommerce application 202 may comprise any suitable application for transacting

FITBIT 1002
Fitbit v. Immersion

business with a handheld device of a user. Such transactions may include consumer purchases, such as products or services of a business or other user from a website, online bill paying, account management or any other commercial transaction. Authenticator 204 authenticates, or verifies, a spatial signature input by the user at handheld device 10 to complete an mCommerce transaction. Authenticator 204 may store one or more spatial signatures of one or more users for authentication in an mCommerce transaction. In some embodiments, authenticator may be located within handheld device 10, within mCommerce application 202 or at any other suitable location. Communication network 206 is capable of transmitting information or data between components of system 200 and may include one or more wide area networks (WANs), public switched telephone networks (PSTNs), local area networks (LANs), the Internet and/or global distributed networks such as intranets, extranets or other form of wireless or wireline communication networks. Communication network 206 may include any suitable combination of routers, hubs, switches, gateways or other hardware, software or embedded logic implementing any number of communication protocols that allow for the exchange of information or data in system 200.

In operation, when a user utilizes handheld device 10 to conduct a transaction with mCommerce application 202, the user may utilize motion input to communicate an authentication signature, for example by moving the device according to the user's three-dimensional signature. As an example, a user might use their cellular phone at a point-of purchase (e.g., store) instead of a credit card. Instead of signing a paper document that then needs to be shipped and processed, the user could simply move device 10 according to the user's spatial signature. As indicated above, the user's signature may include more than three dimensions in some embodiments. The signature may have been previously recorded by the user using handheld device 10 or another mobile device, and the recorded signature may be stored at handheld device 10, mCommerce application 202, authenticator 204 or other suitable location such as a signature storage database for signatures of multiple mCommerce users.

The motion of handheld device 10 may be processed at the device, and motion output indicative of the motion may be transmitted to mCommerce application 202. mCommerce application 202 may communicate the motion output to authenticator 204 for verification that the motion input received at device 10 was in fact the

FITBIT 1002
Fitbit v. Immersion

signature of the user attempting to transact mCommerce. If authenticator 204 verifies the user's signature, then mCommerce application may complete the transaction with the user. As indicated above, authenticator 204 may be located within handheld device 10 or at mCommerce application 202 in particular embodiments and may access signatures for verification stored at device 10, mCommerce application 202 or any other suitable location.

Authentication may also be used by handheld devices in a non-mCommerce application, for example when electronic security is desired to perform functions such as sending private or secure data using the device. A user desiring to transmit data or other information using handheld device 10 may use their spatial signature in the encryption process. Spatial signatures may be used in any of a variety of ways to secure data for communication through a network and may be utilized in connection with public/private key encryption systems. For example, in some embodiments handheld device 10 may authenticate a user's signature received through motion input and then use its own private key to encrypt data for transmission. In other cases, data may be communicated to handheld device 10 such that an intended recipient must input their spatial signature to receive the decrypted data. In some embodiments, data may be communicated to a computer wirelessly connected to handheld device 10, and the intended recipient must use handheld device 10 as a way to communicate the user's signature to the computer for data decryption. Moreover, in particular embodiments, a user's spatial signature itself may represent an encryption key such that motion of the device generates the encryption key instead of the signature motion merely being used for authentication. In some cases a device may recognize a combination of accelerations as a signature by converting the signature into the equivalent of a private key. The handheld device may then use the private key as part of an authentication process for a transaction.

In particular embodiments, a spatial signature may be used to manage physical access to a building or event. For example, the signature input by a user at a device may be checked against a list of people allowed to enter as IDs are checked at "will call" for an event.

In particular embodiments, a user may utilize motion input for handheld device 10 to control other devices, such as audio/video equipment, home appliances

FITBIT 1002
Fitbit v. Immersion

and devices, computing devices or any other device capable of being controlled by a handheld device. Devices may be controlled by handheld device 10 through communications interface 20 of device 10 utilizing any of a number of wireless or wireline protocols, including cellular, Bluetooth and 802.11 protocols. In some embodiments, device 10 may receive motion input to control, through wireless or wireline communication, other devices through a network. Thus, devices controlled through motion input of device 10 may be at any location with respect to device 10, such as in the same room or across a country. Moreover, control of the other device may be implemented through any number of intermediate devices (e.g., through a network).

As an example, if handheld 10 device were a Bluetooth-enabled cellular phone, then particular gestures or other motion of the cellular phone may wirelessly communicate commands to control another device, such as a laptop across a room to drive a PowerPoint presentation. Other devices which may be controlled through motion input of handheld device 10 may include televisions, radios, stereo equipment, satellite receivers, cable boxes, DVD players, digital video recorders, lights, air conditioners, heaters, thermostats, security systems, kitchen appliances (e.g., ovens, refrigerators, freezers, microwaves, coffee makers, bread makers, toasters), PDAs, desktop and laptop PCs, computer peripheral equipment, projectors, radio controlled cars, boats and planes and any other device. As another example, a commuter may shake their cellular phone in a certain manner to tell their heater at home to turn on before the commuter arrives at home. In some embodiments, a handheld device may receive and process raw motion data to determine commands or intended functions for communication to other devices. In other embodiments, a motion detector of a handheld device may output raw data received from its motion detection components for communication to one or more devices controlled by device 10 through the motion of device 10. As a result, different devices controlled by device 10 may treat the same raw motion data of device 10 differently. For example, a particular gesture of device 10 may perform different functions of different devices controlled by device 10.

FIGURE 15 illustrates an example system 220 in which handheld device 10 controls multiple other devices through motion input of device 10. System 220 includes handheld device 10, laptop 222 and remote device 224 connected, through

FITBIT 1002
Fitbit v. Immersion

wireless or wireline links, to handheld device 10 through communication network 226. Handheld device 10 receives raw motion data of a particular motion of the device through motion detection components, such as accelerometers, cameras, rangefinders and/or gyros. The raw motion data is processed at the handheld device. Particular databases, such as gesture and gesture mapping databases, may be accessed to determine a matching gesture and intended function based on motion tracked by a control module of the device. The intended function may be for another device to be controlled by handheld device 10, such as laptop 222 or remote device 224. Thus, the motion input is the interface for the underlying operational signal communicated from device 10 to the controlled device. In other embodiments, the raw motion data or other data merely indicating a particular motion input for device 10 may be directly sent to laptop 222 and/or remote device 224 without determining a function at device 10. In these embodiments, laptop 222 and/or remote device 224 may themselves process the raw motion data received from handheld device 10 to determine one or more intended functions or operations they should perform based on the raw motion data. In some embodiments, a user of device 10 may indicate to device 10 through motion or otherwise the other devices that handheld device 10 should communicate raw motion data or intended functions of such other devices, as applicable. While two devices controlled by handheld device 10 are illustrated, it should be understood that particular embodiments may include any number of devices of varying types to be controlled by handheld device 10 through motion input as discussed above.

As indicated above, particular embodiments include the ability to control other devices, such as other local or remote devices, through motion input of handheld device 10. In some embodiments a user of handheld device 10 selects the other device that a particular motion input of device 10 is intended to control. For example, a user may use input 14 of handheld device 10 (e.g., by pressing a button or moving a trackwheel) to select a local or remote device to control before moving device 10 according to a particular motion mapped to a function or operation desired for the other device. In particular embodiments however, a user may move handheld device 10 according to a particular gesture in order to select the other device (e.g., other local or remote device) to be controlled at the time through motion input of device 10.

FITBIT 1002
Fitbit v. Immersion

Thus, particular embodiments provide gesture motion selection of other devices to be controlled by handheld device 10.

Handheld device 10 may include a device selection module operable to detect a device selection gesture which indicates that a user desires to control a particular device. Each controllable device may include its own gesture command maps which correlate gestures to be input using device 10 and commands of the controllable device. A control module of the handheld device may select a particular command map corresponding to the controllable device selected for control. In some embodiments, device 10 may include a device locator operable to detect, for each of a plurality of remote devices, a direction from the handheld device to each remote device. In this case, the user may move handheld device 10 in the direction of a particular remote device the user desires to control in order to select that remote device for control.

While motion input for device 10 may be used for such control of the other devices, other types of input (e.g., utilizing input 14) may also be used to control other local or remote devices selected for control by gesture input. In some embodiments different gestures may be each mapped to control a different device. In other embodiments, device 10 may display possible other devices for control and particular gesture(s) to utilize to indicate a user's selection as to which other device the user desires to presently control through device 10. Handheld devices according to the present invention may utilize any particular manner of gesture selection of one or more local or remote devices to be controlled by the handheld devices.

As discussed above, particular embodiments include handheld devices 10 capable of detecting motion of the device through a motion detector 22 to modify the behavior of the device in some way according to the motion detected. Handheld devices 10 in some embodiments are capable of modeling their particular environment and subsequently modifying their behavior based on such environment. One distinction between modeling an environment of a handheld device and detecting a particular motion of the device is that in the former case there may be reasoning involved and in the latter case there may be no such reasoning. As an example, if a handheld device changes its behavior when moved according to a particular gesture, that may be considered sensing or detecting a particular motion and reacting based on

FITBIT 1002
Fitbit v. Immersion

the motion detected. If, on the other hand, the handheld device determines that it is sitting face down on a table and reacts accordingly, that may be considered modeling its environment. As another example, if a handheld device moves to the left and changes its behavior based on such movement, that may be considered detecting motion and reacting. If the handheld device finds itself in free fall and powers-down so as to survive an impending collision with the ground, that may be considered modeling its environment. A further distinction may be that environmental modeling may not require an immediate response to a user input, while detecting an event, such as a particular motion, generally does require such an immediate response. Modeling an environment may thus involve sensing or detecting a pattern of motion (or lack thereof), matching it to a predefined set of environmental conditions and modifying the behavior of the device based on the modeled environment. The behavior implemented based on the environment modeled may also change based on a particular application in use or in focus. In some cases, the device may change its sensitivity to particular motions based on the environment modeled.

As an example, a handheld device may recognize, through accelerometers or other motion detection components, that it is at rest on an approximately horizontal surface. Such recognition may result from a determination that the device is not moving, or still, with a static 1g of acceleration orthogonal to a surface. The device may be able to differentiate resting on a table from resting in a user's hand, for example, because a user's hand typically will not be able to hold the device perfectly still. The device may, as a result, behave in a certain manner according to the recognition that it is at rest on an approximately horizontal surface. For example, if handheld device 10 recognized that it was lying at rest on a table, it may power off after lying in such position for a certain amount of time. As another example, a cellular phone in a vibrate mode may vibrate more gently if it recognizes it is on a table upon receipt of a call or upon any other event that may trigger vibration of the phone. In some embodiments, the device may recognize its orientation while lying on a table such that it may behave in one manner when lying in a "face down" position (e.g., it may power off) while it may behave in a different manner when lying in a non-face down position. If handheld device 10 comprised a cellular phone, it may enter a speaker mode when it is on a call and recognizes that it is placed by a user in a

FITBIT 1002
Fitbit v. Immersion

"face up" position on a table while on the call. If, on the other hand, the cellular phone is on a call and is placed face down on the table, it may enter a mute mode.

As another example, handheld device 10 may recognize through a brief period of approximately 0g that it is in free-fall and then may behave to reduce damage due to impending impact with the ground or another surface. Such behavior may include, for example, powering down chips and/or hard drives, retracting lenses, applying covers or any other device behavior. In particular embodiments, non-hand-held devices or devices that do not otherwise detect motion for input may also be able to model their environment and to behave based on the environment modeled. As an additional example, acceleration patterns may be detected to recognize that a handheld device 10 is in a moving environment (e.g., being held by a user in a car or on a train) and may adjust various sensitivities, threshold and/or other characteristics to enable better performance of the device in that environment.

In other embodiments, handheld device 10 may comprise a digital camera. Through its motion detection components, the camera may determine whether it is on a tripod or is being held by a user when a picture is taken. The camera may set a shutter speed for the picture based on that determination (e.g., slow shutter speed if on a tripod or fast shutter speed if being held by a user).

If handheld device 10 comprised a device that utilized a cradle for syncing up with another device, such as a PC, then device 10 may recognize that it is in the cradle based on its stillness (or supported state) and its particular orientation. The device may then operate or function according to its state of being in the cradle (e.g., it may then sync up with its associated PC).

FIGURE 16 is a flowchart 230 illustrating an environmental modeling process, in accordance with a particular embodiment. At step 232, raw motion data is received at handheld device 10. As described above, the raw motion data may be received by any combination of accelerometers, gyros, cameras, rangefinders or any other suitable motion detection components. At step 234, the raw motion data is processed to produce a motion detector output from which motion and orientation of the device is determined at step 236. Boxes 237 represent example motions and orientations of the device, such as rotating around the z-axis in box 237a, translating along the x-axis in box 237b, oriented at particular angles α, θ, ω in box 237c and still

FITBIT 1002
Fitbit v. Immersion

in box 237n. These are mere example motions and orientations of the device, and any number of motions may be utilized that are determined at step 236. In some embodiments, the determined orientations may comprise an orientation of the device with respect to gravity.

At step 238, handheld device 10 determines its environment based on the motion and orientation determined at step 236. Boxes 239 represent example environments of the device, such as face down on a table in box 239a, falling in box 239b, on a train in box 239c and held in hand at box 239n. Any number of environments may be determined based on motions and orientations determined at step 236. In particular embodiments, the environmental determination may also be based on a history of the device, such as a motion/orientation history. For example, when implementing a speaker mode function of a cellular phone, the device may detect a quite period when horizontal in the middle of a call after a short jarring is detected (e.g., the short jarring caused by a user placing the phone face up on a table). The phone can detect that it was jarred so that stillness and a perpendicular position relative to gravity may take on a different meaning than had the jarring not occurred. Thus, the determination of the environment may be based on the motion and orientation of the device and its history. The history may comprise a previous motion/orientation of the device or any other information relating to a device's history.

At step 240, the determined environment is mapped to a particular behavior. The mapped behavior may depend on any number of factors in addition to the determined environment, such as desired characteristics of the particular user using the device at the time or the particular application in use or focus at the time. For example, the behavior according to a particular modeled environment may include engaging a mute function of the handheld device in box 241a, powering down chips of the device to survive an impact in box 241b and increasing a motion activation threshold of the device in box 241n. The mute behavior indicated in box 241a may be implemented when a cell phone's environment comprises laying face down on a table while on a call. The powering down chips behavior in box 241b may be implemented when the environment of handheld device 10 comprises a free fall of the device. The increasing a motion activation threshold behavior of box 241n may be implemented

FITBIT 1002
Fitbit v. Immersion

when a handheld device's environment comprises being in a car or train where bumpiness may require a greater movement threshold for a user's motion input to register as an intended input. Particular embodiments may include any number of behaviors mapped to one or more modeled environments. At step 242, the handheld device behaves according to the behavior to which its environment is mapped at step 240.

As indicated above, users may move handheld devices according to particular gestures to cause the devices to perform desired functions, operations or tasks. In particular embodiments, gestures used as motion input for the device may comprise pre-existing symbols, such as letters of the alphabet, picture symbols or any other alphanumeric character or pictographic symbol or representation. For example, gestures used as motion input may mimic upper and lower case members of an alphabet in any language, Arabic and Roman numerals and shorthand symbols. Preexisting gestures may be used for handheld input devices for other local and remote devices as well. Using preexisting gestures for handheld device input may facilitate the learning process for users with respect to gesture motion interfaces.

FIGURE 17 illustrates example gestures which may be mapped to particular functions. For example, if handheld device 10 comprised a cellular phone, a user may move device 10 in the form of heart 250 to call the user's girlfriend, boyfriend or spouse or house 252 to call the user's home. As another example, if handheld device 10 were a PDA or other device running an application managing files or data, moving the device in the form of C-gesture 254 may be a command for copying data, O-gesture 256 may be a command for opening a file, D-gesture 258 may be a command for deleting data and X-gesture 260 may be an exit command for a file or application. The logical connection between gestures and their intended functions or operations (e.g., "O" for opening a file) further facilitates user interaction and learning.

Any number of pre-existing symbols may be used as gestures for motion input as commands for performing any number of functions, operations or tasks of a handheld device. Many preexisting gestures typically exist in two dimensions. Handheld device 10 may recognize such gestures. In some cases, for example, handheld device 10 may disable receipt of a particular dimension so that any movement in a third dimension when a user is attempting to input a two-dimensional

FITBIT 1002
Fitbit v. Immersion

gesture is not received or detected in order to facilitate recognition of the two-dimensional gesture. In some embodiments, handheld device 10 may receive three-dimensional gestures that may be based on preexisting two-dimensional gestures. Receiving and detecting three-dimensional gestures increases the capabilities of the device by, for example, increasing the number and types of gestures which may be used as motion input.

FIGURE 18 is a flowchart 270 illustrating the utilization of a preexisting symbol gesture, the letter "O," as motion input. As illustrated in step 272, a user moves handheld device 10 in the form of the letter "O." At step 274, handheld device 10 receives raw motion data of the "O" movement from motion detection components and process such raw motion data at step 276 to determine the actual motion of the device. At step 278, handheld device 10 accesses a gesture database 280 which may include a plurality of gestures recognizable by the device to map the motion to the gesture "O." The plurality of gestures of the gesture database may each be defined by a series of accelerations of a movement. The actual motion of the device may be matched to a series of accelerations of one of the gestures of the gesture database. At step 282, handheld device 10 maps the gesture "O" to a particular function by accessing a function database 284 (or a gesture mapping database) which may include a plurality of functions that may be performed by one or more applications running on the device. In particular embodiments, the gesture and function databases may be comprised in memory 18 of the device. The particular function mapped to the gesture "O" may depend on a particular application in focus or being used by the user at the time. For example, in some applications "O" be compose a command to open a file, while in other applications it may comprise a command to call a certain number. In some cases, one gesture may be mapped to the same function for all applications of the device. At step 286, the device behaves according to the mapped function, such as opening a file.

As indicated above, gestures used as motion input for handheld device 10 may have different meanings (e.g., functions, operations, tasks) based on a particular context, such as a particular application in use or in focus, a particular device state with respect to an application or otherwise, a particular modeled environment or any combination of these or any other context. For example, a particular gesture may be

FITBIT 1002
Fitbit v. Immersion

mapped as a command to scroll a page up when running a web browser at the device, while the gesture may be mapped as a command to examine a different date when running a calendar program. The ability for particular gestures to be mapped to different commands depending on the context, such as the application in use, increases the functionality of the device.

Handheld devices in some embodiments may be able to utilize simpler motion detection components if gestures are mapped to different commands depending on the context. As an example, a handheld device may include particular motion detection components such that the handheld device may only be able to recognize and distinguish between twenty different gestures. If each gesture is mapped to a different function for each of four different applications, then the ability to only recognize twenty unique gestures still provides eighty different functions on the device (twenty for each application). If each gesture were mapped to its own function, no matter what application was in focus, then the overall capability of the device would be reduced, and some gestures would likely not be used in some applications. The ability to use less complex components that are able to recognize and distinguish between fewer gestures as a result of mapping gestures to a plurality of functions depending on the context can lead to reduced costs in the components utilized in the device and can also simplify the task of physically learning gestures required to control the device. As indicated above, gestures may be mapped to different functions, operations or tasks depending on the application in use, device state, modeled environment or other context. In some cases, gestures may be mapped to different functions depending on the state of a particular application. For example, in the case of a word processing program, some gestures may have some functions when in one state of the program (e.g., a menu state) while the same gestures may have different functions when in another state of the word processing program (e.g., a document editing state). In this case, a command map associated with the gesture function mappings may include gesture mappings for each such state.

FIGURE 19 is a flowchart 290 illustrating the use of context-based gesture mapping, in accordance with a particular embodiments. In the illustrated embodiment, a gesture has different functions assigned based on the application in focus. At step 292, handheld device 10 receives raw motion data of a particular

FITBIT 1002
Fitbit v. Immersion

gesture movement and process such raw motion data at step 294 to determine the actual motion of the device. At step 296, handheld device 10 maps the motion to a gesture, for example, by accessing a gesture database. At step 298, handheld device 10 determines which application is in focus. For example, if the device were capable of running four different applications, then it would determine which of the four was in focus or was being used at the time. The device then performs the function mapped to the gesture according to the application in focus. The identification of such function may be accomplished in some embodiments by accessing a function database which may also be referred to as a gesture mapping database since it correlates gestures of a gesture database to functions. In the illustrated embodiment, if Application 1 is in focus, then the device performs Function 1 at step 300a; if Application 2 is in focus, then the device performs Function 2 at step 300b; if Application 3 is in focus, then the device performs Function 3 at step 300c; and if Application 4 is in focus, then the device performs Function 4 at step 300d.

As a further example of context-based gesture mapping, a handheld device with phone and PDA capabilities may run four applications: a phone application, a calendar application, a file management application and an e-mail application. A gesture input mimicking the letter "S" may have different functions depending on the application in focus. For example, if the phone application is in focus, then receiving the gesture input "S" may be a command for calling a particular number designated to the "S" gesture. If the calendar application is in focus, then receiving the gesture input "S" may be a command for scrolling to the month of September in the calendar. If the file management application is in focus, then receiving the gesture input "S" may be a command for saving a file. If the e-mail application is in focus, then receiving the gesture input "S" may be a command for sending an e-mail. Particular embodiments contemplate great flexibility in the ability to map gestures to different functions depending on the context.

As discussed above, gestures may have different functions depending on a particular context at the time. In particular embodiments, handheld devices may be customizable to allow users to assign device functions to pre-defined gestures. The functions may be context-based such that some gestures may have different functions depending on an application in use, a device state or a modeled environment.

FITBIT 1002
Fitbit v. Immersion

Handheld devices in some embodiments may allow different users of the same device to assign different functions to the same gesture, and such functions may also be context-based as discussed above.

For example, a handheld device 10 may be utilized by a number of different users at different times. Each user may assign different functions for the same gestures. When the handheld device receives a gesture input, it must thus know which user is using the device at the time to determine which function the user intends the device to perform. The device may determine the user in any of a variety of ways. In some embodiments, users may log into the device prior to use by using a username and password or otherwise. In other embodiments, the handheld device may be able to identify the user based on the manner in which the user moves the device for motion input, such as the way the user forms a gesture using the device. As indicated above, each user may also assign commands to gestures based on context, such as based on the application in focus at the device. The ability for the handheld device to map functions to gestures based on particular users further increases the device's capabilities and flexibility, particularly if the device is able to recognize and distinguish only a particular number of gestures.

FIGURE 20 is a flowchart 310 illustrating the use of user-based gesture mapping, in accordance with a particular embodiment. In the illustrated embodiment, a gesture has different functions assigned based on the user using the device. At step 312, handheld device 10 receives raw motion data of a particular gesture movement and process such raw motion data at step 314 to determine the actual motion of the device. At step 316, handheld device 10 maps the motion to a gesture, for example, by accessing a gesture database. At step 318, handheld device 10 determines which user is using the device. Such determination may be made, for example, through a log in system in which users log into the device prior to use. Handheld device 10 may determine the current user through other suitable methods as well. At steps 320, the device performs the functions assigned to the gesture input based on the user using the device. In the illustrated embodiment describing the process with four possible users, if User 1 is using the device, then the device performs Function 1 at step 320a; if User 2 is using the device, then the device performs Function 2 at step 320b; if User 3 is

FITBIT 1002
Fitbit v. Immersion

using the device, then the device performs Function 3 at step 320c; and if User 4 is using the device, then the device performs Function 4 at step 320d.

As indicated above, in some embodiments, gestures may be assigned different functions based on both users using the device and a context. In this situation, the illustrated flowchart 310 described above may have an additional step to determine the context at the time (e.g., step 298 of flowchart 290 determining the application in focus). The particular function desired for performance by a certain gesture thus depends on both the user using the device at the time and the context, such as the particular application in focus at the time.

As previously discussed, some embodiments include handheld devices with the ability to receive preexisting symbols as gestures for motion input. Some of those embodiments as well as other embodiments may include the ability for user's to create their own gestures for mapping to functions and/or keys. The gestures may comprise any user-created symbol or other motion that the user desires to utilize as motion input for one or more particular functions, operations or tasks that the device is able to perform. Users may be able to create motions with some personal significance so they may more easily remember the motion's command or intended function.

FIGURE 21 is a flowchart 330 illustrating the assignment process for user-created gestures, in accordance with a particular embodiments. At step 332, an indication is received from a user for gesture creation. The indication may be received in any of a variety of ways using any suitable input format (e.g., keys, trackwheel, motion, etc.). The user may move the device according to the user-created gesture such that raw motion data for the user-created gesture is received at the handheld device at step 334. The raw motion data may comprise a sequence of accelerations of a movement after stabilization of the device from a base reference position until an indication is received to stop recording the reference positions. Indications to start and stop recording a user-created gesture may include motion or non-motion indications (e.g., key presses and key releases). The raw motion data is processed at step 336. At step 338, the motion is stored as a gesture, for example, at a gesture database. In particular embodiments, the indication for gesture creation may be received after the user moves the device according to the user-created gesture. For example, the user may move the device according to a user-created gesture that is

FITBIT 1002
Fitbit v. Immersion

currently unrecognizable by the device. The device may query the user to determine if the user desires to store the unrecognized gesture for a particular function. The user may respond in the affirmative so that the user may utilize the gesture as motion input in the future.

At step 340, function mapping information for the gesture is received from the user. The function mapping information may comprise functions, operations or tasks of the device that the user desires the user-created gesture to command. In particular embodiments, such function mapping information may comprise a series of functions (e.g., a macro) that one gesture may command. The user may assign different functions for a gesture according to an application in focus. In some cases, a user may desire to map different gestures to different keys or keystrokes of the device. One examples of mapping a series of functions to a gesture may include mapping a long string of characters to a gesture (e.g., telephone numbers including pauses, where appropriate). At step 342, the function mapping information is stored, for example, at a function database or gesture mapping database.

As indicated above, it may be difficult for a user to move handheld device 10 in the same precise manner for one or more gestures each time those gestures are used as input. Particular embodiments thus allow for varying levels of precision in gesture input. Precision describes how accurately a gesture must be executed in order to constitute a match to a gesture recognized by the device, such as a gesture included in a gesture database accessed by the device. The closer a user generated motion must match a gesture in a gesture database, the harder it will be to successfully execute such gesture motion. As discussed above, in particular embodiments movements may be matched to gestures of a gesture database by matching a detected series of accelerations of the movements to those of the gestures of the gesture database.

As the precision of gestures required for recognition increases, one may have more gestures (at the same level of complexity) that can be distinctly recognized. As an example, if the precision required was zero, then the device could only recognize a single gesture but it would recognize it easily because anything the user did would be recognized as that gesture. If, however, the precision required was infinite then it would be virtually impossible for a user to form a gesture that was recognized by the device, but the device could support an infinite number of gestures with only

FITBIT 1002
Fitbit v. Immersion

infinitesimal differences between them. One area in which the precision requirement is especially applicable is in the area of spatial signatures. With spatial signatures, the level of precision correlates well with the level of security.

In particular embodiments, the precision required by handheld device 10 for gesture input may be varied. Different levels of precision may be required for different users, different regions of the "gesture space" (e.g., similar gestures may need more precise execution for recognition while gestures that are very unique may not need as much precision in execution), different individual gestures, such as signatures, and different functions mapped to certain gestures (e.g., more critical functions may require greater precision for their respective gesture inputs to be recognized). Moreover, in some embodiments users may be able to set the level(s) of precision required for some or all gestures or gestures of one or more gesture spaces. As an example, a user may set the precision required for spatial signatures higher than for other gestures for the user thus increasing security for spatial signature input.

As indicated above, in particular embodiments gestures may be recognized by detecting a series of accelerations of the device as the device is moved along a path by a user according to an intended gesture. Recognition occurs when the series of accelerations is matched by the device to a gesture of a gesture database.

In some embodiments, each gesture recognizable by handheld device 10, or each gesture of a gesture database, includes a matrix of three-dimensional points. In addition, a user movement intended as a gesture input includes a matrix of three-dimensional points. Handheld device 10 may compare the matrix of the movement with the matrices of each recognizable gesture (or each gesture in the gesture database) to determine the intended gesture. If a user moves the device such that the movement's matrix correlates to each point of an intended gesture's matrix, then the user may be deemed to have input the intended gesture with perfect precision. As the precision required for gesture input is reduced, then the greater the allowable differences between a user gesture movement and an intended gesture of a gesture database for gesture recognition.

FIGURE 22 illustrates three gestures input using a handheld device with varying levels of precision. In the illustrated embodiment, the intended gesture comprises an "O." Gesture movement 350 is input as a perfect "O," or with 100%

FITBIT 1002
Fitbit v. Immersion

precision for the intended gesture. Gesture movement 352 is input with less than 100% precision as it does not form a perfect "O." Gesture movement 354 is input with less precision than gesture movement 352. The precision requirement for the input of gesture "O" may be set at handheld device to accept varying levels of precision. For example, the precision level may be set such that only gesture movement 350 is recognized as gesture "O," gesture movements 350 and 352 are both recognized as gesture "O" or gesture movements 350, 352 and 354 are all recognized as gesture "O." As indicated above, the higher the precision requirement, then the more space available for additional recognizable gestures. For example, if the precision level for handheld device 10 were set such that only gesture movement 350 was recognized as gesture "O," then gesture movements 352 and 354 may be recognized as other, distinct gestures.

In particular embodiments, handheld devices may alter gestures recognized for performing particular functions based on a user's personal precision. In this manner, a handheld device may have dynamic learning capability of gesture mappings. For example, if a particular gesture of a gesture database is mapped to a particular function, and a user's repeated attempts to input the gesture lack precision in a consistent manner, then the handheld device may alter the gesture in the gesture database to match the consistent gesture movement of the user such that the user's consistent gesture motion input will be mapped to the particular function.

As an example, if a particular gesture comprises a square motion and a user's motion intended for the gesture comprises more of a triangular motion on a consistent basis (e.g., on multiple consecutive times), then the handheld device may be able to recognize this consistent difference in an intended gesture and the actual user motion to change the intended gesture (e.g., a square) in the gesture database mapped to the function intended to the user's actual consistent motion (e.g., triangle). Thus, after such change is made, any time the user inputs the triangle gesture then the function previously mapped to the square gesture will be commanded. The device may determine the gesture intended in any of a variety of ways, such as through two-way communication with the user through any form of input. In particular embodiments, this dynamic learning of users' input characteristics may be applied on a user-specific

FITBIT 1002
Fitbit v. Immersion

basis. For example, in the example described above another user may still input the square gesture using the same handheld device to command the same function.

As indicated above, as the precision of user motion with respect to intended gestures increases, then the number of gestures available for mapping to functions increases. In some embodiments, handheld devices may recognize that a user's precision increases over time and the devices may, as a result, increase the gestures available for use. Increasing gestures available for input may also increase the functions capable of being commanded through gesture input.

As an example, a user's personal precision for inputting gestures may be such that the user is only able to input a certain number of gestures that will be recognized by the handheld device. However, over time, the user's personal precision may increase. This increase may be recognized by the handheld device and, as a result, the device may enable additional gestures that the user may use as gesture input. In some embodiments, the enabling of additional gestures may occur when the user's precision increases over a particular precision threshold, or a certain precision level. Since the user's precision has increased, the handheld device will be able to recognize when the user attempts to input these additional gestures As indicated above, providing additional gestures for input by a user may also increase the number of functions that the user is able to command through gesture input, since each gesture may be mapped to command a different function.

Handheld devices in particular embodiments may also allow users to set and vary noise thresholds of the device. Noise thresholds are the magnitude of motion of the device that must be detected in order to be considered intended motion input (e.g., an intended gesture) of the user. For example, if noise thresholds are set low, then minimal motion of the device may be considered by the device as motion input. However, if noise thresholds are set high, then greater movement of the device would be required before the motion is considered intended input from the user. If, for example, a user is travelling in a car on a bumpy road, the user may desired to set the noise threshold higher so that when the device moves as a result of bumps in the road then such movement may not be considered by the device to be intended motion input.

FITBIT 1002
Fitbit v. Immersion

In particular embodiments, noise thresholds may automatically change at the device based on a modeled environment. For example, if a device determines that the environment comprises traveling in a car, then the device may automatically increase the noise threshold so that minimal movements resulting from the car will not register as user-intended motion.

FIGURE 23 is a flowchart 370 illustrating a gesture recognition process utilizing a number of features described herein, in accordance with a particular embodiment. At step 372, raw motion data of a particular gesture movement is received. The raw motion data is processed at step 374 where the actual motion of the device is determined. Such processing may include various filtering techniques and fusion of data from multiple detection or sensing components. At step 376, the actual motion is mapped to a gesture. Mapping the actual motion to a gesture may include accessing a user settings database 378, which may include user data 379 comprising, for example, user precision and noise characteristics or thresholds, user-created gestures and any other user-specific data or information including user identities 381. User-specific information may be important, for example, because different users of the handheld device may have different settings and motion input characteristics. For example, an older user may have less precision than a younger user when inputting gestures such that the older person may have fewer gestures available. Moreover, a more experienced user may have more device functionality available through gesture input.

User settings database 378 may also include environmental model information 380 which may factor in determining the gesture applicable at the time. As discussed above, through environmental modeling, the device can internally represent its environment and the effect that environment is likely to have on gesture recognition. For example, if the user is on a train, then the device may automatically raise the noise threshold level. The device may also reduce the precision required, depending upon how crowded the gesture space is near the gesture under consideration. Mapping the actual motion to a gesture may also include accessing gesture database 382.

At step 384, the gesture is mapped to a function for the device. This step may include accessing a function mapping database 386 which may include correlation

FITBIT 1002
Fitbit v. Immersion

between gestures and functions. Different users may have different mappings of gestures to functions and different user-created functions. Thus, function mapping database 386 may also include user-specific mapping instructions or characteristics, user-created functions (e.g., macros and/or phone numbers) and any other function information which may be applicable to mapping a particular gesture to one or more functions. In some embodiments, gestures may be mapped to individual keystrokes. User identities 381 may also be accessed in this step. In addition, device context information 388 may also be accessed and utilized in mapping the gesture, which may include environmental model information 389, application in focus information 390 and device state information 391, such as time and date information, location information, battery condition and mode information (e.g., silent mode). At steps 392, the device performs the appropriately-mapped one or more function(s), such as Function 1 at step 392a, Function 2 at step 392b or Function 3 at step 392c.

As discussed above, in particular embodiments handheld device 10 may comprise a cellular phone with many of the capabilities described herein. For example, cellular phones with motion input capabilities may use motion input to flatten menus as discussed above. The cellular phone may detect device states and environments, such as free fall or the cellular phone being face down or face up to map to behaviors such as mute, speaker phone and power-off. Other detection of device states may include detecting that the phone is being held to disengage mute or speakerphone states. The cellular phone may utilize gestures to control dialing (e.g., through gestural speed dial) or to lock/unlock a keypad of the device. For example, the device may be moved in a clockwise circle to dial home, a counterclockwise circle to dial work and in the shape of a heart to dial a significant other. Users may also be able to program the cellular phone to customized gestural mappings.

In particular embodiments handheld device 10 may comprise a digital camera utilizing motion input for at least some of the functions described herein. For example, digital cameras with motion input capabilities may use motion input to flatten menus as discussed above. Motion may also be used to allow a user to zoom in (and back out) on still photos or video to examine it more closely for smoother and more intuitive functionality. Motion may be used to zoom in and out of a number of thumbnails of photographs or video clips so that it is easy to select one or more to

FITBIT 1002
Fitbit v. Immersion

review. Virtual desktops may be used to review many thumbnails of many digital photos or video clips or to review many digital photos or video clips by translating the camera or using gestural input. Gestures and simple motions may be used alone or in combination with other interface mechanisms to modify various settings on digital still and video cameras, such as flash settings, type of focus and light sensing mode. Moreover, free fall may be detected to induce the camera to protect itself in some way from damage in an impending collision. Such protection may include dropping power from some or all parts of the camera, closing the lens cover and retracting the lens.

In particular embodiments handheld device 10 may comprise a digital watch utilizing motion input for at least some of the functions described herein. For example, digital watches with motion input capabilities may use motion input to flatten menus as discussed above. In some embodiments, the tapping of the watch or particular gestures may be used to silence the watch. Other functions may also be accessed through taps, rotations, translations and other more complex gestures. These functions may include changing time zones, setting the watch (e.g., setting the time and other adjustable settings), changing modes (e.g., timers, alarms, stopwatch), activating the backlight, using a stopwatch (e.g., starting, stopping and splitting the stopwatch) and starting and stopping other timers.

In some embodiments, motion detection may be separate from a display. For example, a display may be worn on glasses or contacts, and other parts of the handheld device may be dispersed across a user's body such that the display may not be part of the same physically component as the motion input device or component.

As discussed above, particular figures illustrate various methods, flowcharts and processes which may be performed in particular embodiments. It should be understood that steps may be performed in any order, and steps from a particular method, flowchart or process may be combined with other methods, flowcharts or processes or other steps from the same method, flowchart or process in various embodiments without departing from the scope of the invention.

Although the present invention has been described in detail with reference to particular embodiments, it should be understood that various other changes, substitutions, and alterations may be made hereto without departing from the spirit and scope of the present invention. For example, although the present invention has

FITBIT 1002
Fitbit v. Immersion

been described with reference to a number of elements included within handheld device 10, these elements may be combined, rearranged or positioned in order to accommodate particular architectures or needs. In addition, any of these elements may be provided as separate external elements to each other where appropriate. The present invention contemplates great flexibility in the arrangement of these elements as well as their internal components.

Numerous other changes, substitutions, variations, alterations and modifications may be ascertained by those skilled in the art and it is intended that the present invention encompass all such changes, substitutions, variations, alterations and modifications as falling within the spirit and scope of the appended claims.

FITBIT 1002
Fitbit v. Immersion

WHAT IS CLAIMED IS:

1. A motion controlled handheld device comprising:

a first accelerometer operable to detect acceleration along a first axis;

a second accelerometer operable to detect acceleration along a second axis, the second axis perpendicular to the first axis;

a tilt detection component operable to detect rotation having a component around at least one of the first axis and the second axis;

a display operable to present a current image;

a motion tracking module operable to track motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component; and

a controller operable to generate the current image and to modify the current image in response to the motion of the device.

2. The motion controlled handheld device of Claim 1, wherein:

the display comprises a viewable surface, and

the first axis and the second axis are substantially parallel to the viewable surface.

3. The motion controlled handheld device of Claim 1, wherein:

the tilt detection component comprises a third accelerometer operable to detect acceleration along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis; and wherein:

the motion tracking module is further operable to distinguish translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer.

FITBIT 1002
Fitbit v. Immersion

4. The motion controlled handheld device of Claim 1, wherein the tilt detection component comprises:

a third accelerometer operable to detect acceleration along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

a camera operable to generate a video stream; and

a video analysis module operable to detect a direction of motion based on the video stream.

5. The motion controlled handheld device of Claim 4, wherein the tilt detection component further comprises:

a range finder operable to determine distance information including a distance between the device and an object in the video stream; and wherein:

the video analysis module is further operable to determine a magnitude of translation of the device using the distance.

6. The motion controlled handheld device of Claim 1, wherein the tilt detection component comprises:

a first camera operable to generate a first video stream, the first camera aligned to focus in a first direction along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

a second camera operable to generate a second video stream, the second camera aligned to focus in a second direction along the third axis, the second direction opposite the first direction; and

a video analysis module operable to detect a direction of motion of the device based on the first video stream and the second video stream.

7. The motion controlled handheld device of Claim 6, wherein the tilt detection component further comprises a third accelerometer operable to detect acceleration along the third axis.

FITBIT 1002
Fitbit v. Immersion

8. The motion controlled handheld device of Claim 6, wherein the video analysis module is further operable to:

detect first edges of objects in the first video stream;

detect second edges of objects in the second video stream;

identify movement of the first edges and the second edges;

determine a differential between the movement of the first edges and the movement of the second edges; and

determine tilt components and translation components based on the differential.

9. The motion controlled handheld device of Claim 1, further comprising:

a gesture database comprising a plurality of gestures, each gesture defined by a motion of the device with respect to a first position of the device; and

a gesture mapping database mapping each of the gestures to a corresponding command; and wherein

the controller is further operable to compare the tracked motion of the device against the gestures to determine a received gesture, to identify the corresponding command mapped to the received gesture, and to execute the identified command to modify the current image.

10. The motion controlled handheld device of Claim 1, wherein:

the motion tracking module is further operable to identify translation of the device within a plane formed by the first axis and the second axis based upon motion of the device;

the current image displays a subsection of a larger image; and

the controller is further operable to continuously modify the current image to display another subsection of the larger image based on a resulting position of the device resulting from the translation.

11. The motion controlled handheld device of Claim 1, wherein the motion tracking module is further operable to disregard acceleration detected by the first

FITBIT 1002
Fitbit v. Immersion

accelerometer and acceleration detected by the second accelerometer that register below a noise threshold

12. A method for controlling a handheld device comprising:

detecting acceleration along a first axis using a first accelerometer;

detecting acceleration along a second axis using a second accelerometer, the second axis perpendicular to the first axis;

detecting rotation having a component around at least one of the first axis and the second axis using a tilt detection component;

tracking motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component; and

displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

13. The method of Claim 12, wherein:

the display comprises a viewable surface, and

the first axis and the second axis are substantially parallel to the viewable surface.

14. The method of Claim 12, further comprising:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

distinguishing translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer.

FITBIT 1002
Fitbit v. Immersion

15. The method of Claim 12, further comprising:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

monitoring a video stream generated by a camera of the device; and

detecting a direction of motion based on the video stream.

16. The method of Claim 15, further comprising:

determining distance information including a distance between the device and an object in the video stream; and

determining a magnitude of translation of the device using the distance.

17. The method of Claim 12, further comprising:

monitoring a first video stream generated by a first camera of the device, the first camera aligned to focus in a first direction along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

monitoring a second video stream generated by a second camera of the device, the second camera aligned to focus in a second direction along the third axis, the second direction opposite the first direction; and

detecting a direction of motion of the device based on the first video stream and the second video stream.

18. The method of Claim 17, further comprising:

detecting first edges of objects in the first video stream;

detecting second edges of objects in the second video stream;

identifying movement of the first edges and the second edges;

determining a differential between the movement of the first edges and the movement of the second edges; and

determining tilt components and translation components based on the differential

FITBIT 1002
Fitbit v. Immersion

19. The method of Claim 12, further comprising:

comparing the tracked motion of the device against a gesture database, the gesture database comprising a plurality of gestures with each gesture defined by a motion of the device with respect to a first position of the device;

identifying a command mapped to the received gesture; and

executing the identified command to modify the current image.

20. Logic for controlling a handheld device, the logic embodied in a computer readable medium and operable when executed to perform the steps of:

detecting acceleration along a first axis using a first accelerometer;

detecting acceleration along a second axis using a second accelerometer, the second axis perpendicular to the first axis;

detecting rotation having a component around at least one of the first axis and the second axis using a tilt detection component;

tracking motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component; and

displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

21. The logic of Claim 20, further operable when executed to perform the steps of:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

distinguishing translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer.

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22. The logic of Claim 20, further operable when executed to perform the steps of:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

monitoring a video stream generated by a camera of the device; and

detecting a direction of motion based on the video stream.

23. The logic of Claim 20, further operable when executed to perform the steps of:

determining distance information including a distance between the device and an object in the video stream; and

determining a magnitude of translation of the device using the distance.

24. The logic of Claim 20, further operable when executed to perform the steps of:

monitoring a first video stream generated by a first camera of the device, the first camera aligned to focus in a first direction along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

monitoring a second video stream generated by a second camera of the device, the second camera aligned to focus in a second direction along the third axis, the second direction opposite the first direction; and

detecting a direction of motion of the device based on the first video stream and the second video stream.

FITBIT 1002
Fitbit v. Immersion

25. The logic of Claim 24, further operable when executed to perform the steps of:

detecting first edges of objects in the first video stream;

detecting second edges of objects in the second video stream;

identifying movement of the first edges and the second edges;

determining a differential between the movement of the first edges and the movement of the second edges; and

determining tilt components and translation components based on the differential.

26. The logic of Claim 20, further operable when executed to perform the steps of:

comparing the tracked motion of the device against a gesture database, the gesture database comprising a plurality of gestures with each gesture defined by a motion of the device with respect to a first position of the device;

identifying a command mapped to the received gesture; and

executing the identified command to modify the current image.

27. A motion controlled handheld device comprising:

means for detecting acceleration along a first axis;

means for detecting acceleration along a second axis, the second axis perpendicular to the first axis;

means for detecting rotation having a component around at least one of the first axis and the second axis;

means for tracking motion of the device in three dimensions based upon the acceleration along the first axis, the acceleration along the second axis, and the rotation; and

means for displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

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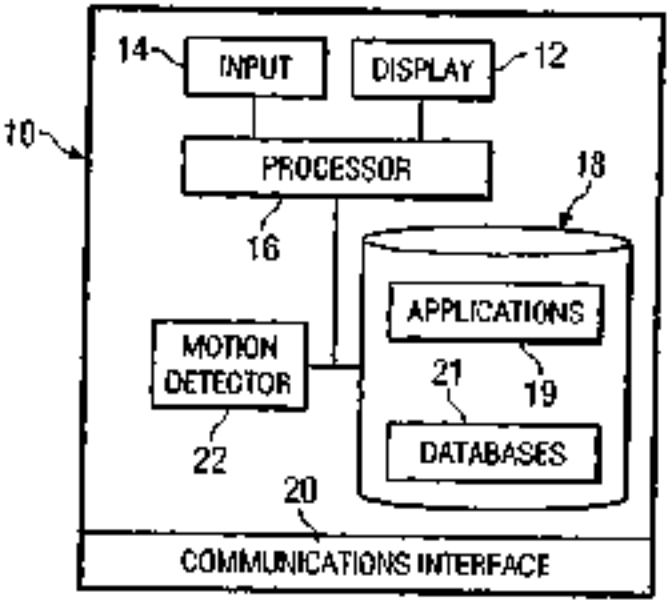


FIG. 1

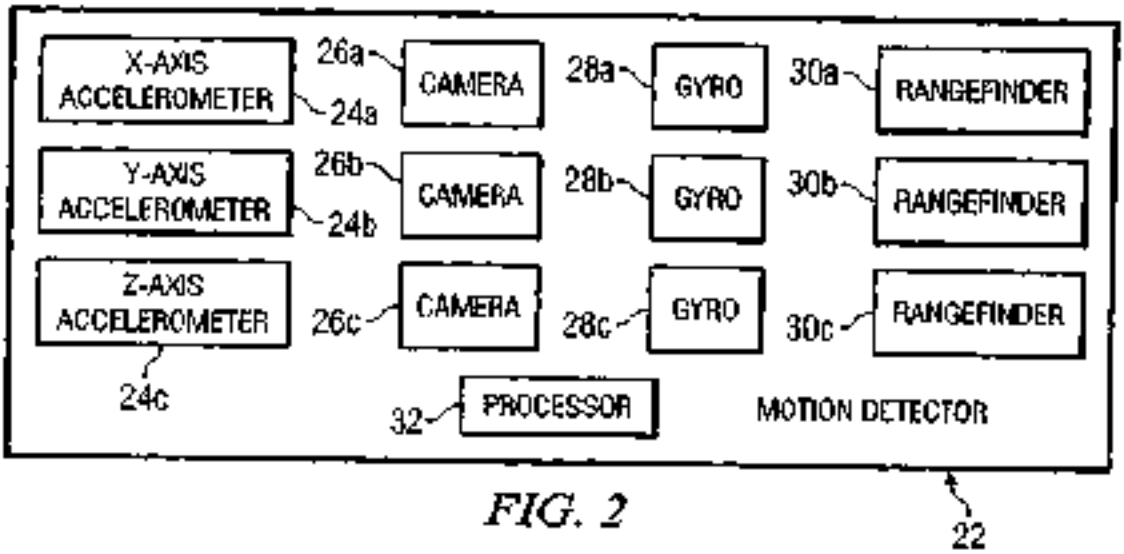


FIG. 2

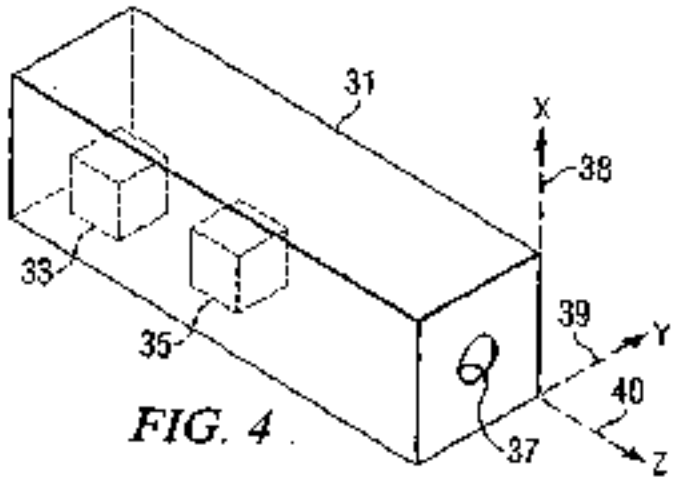


FIG. 4

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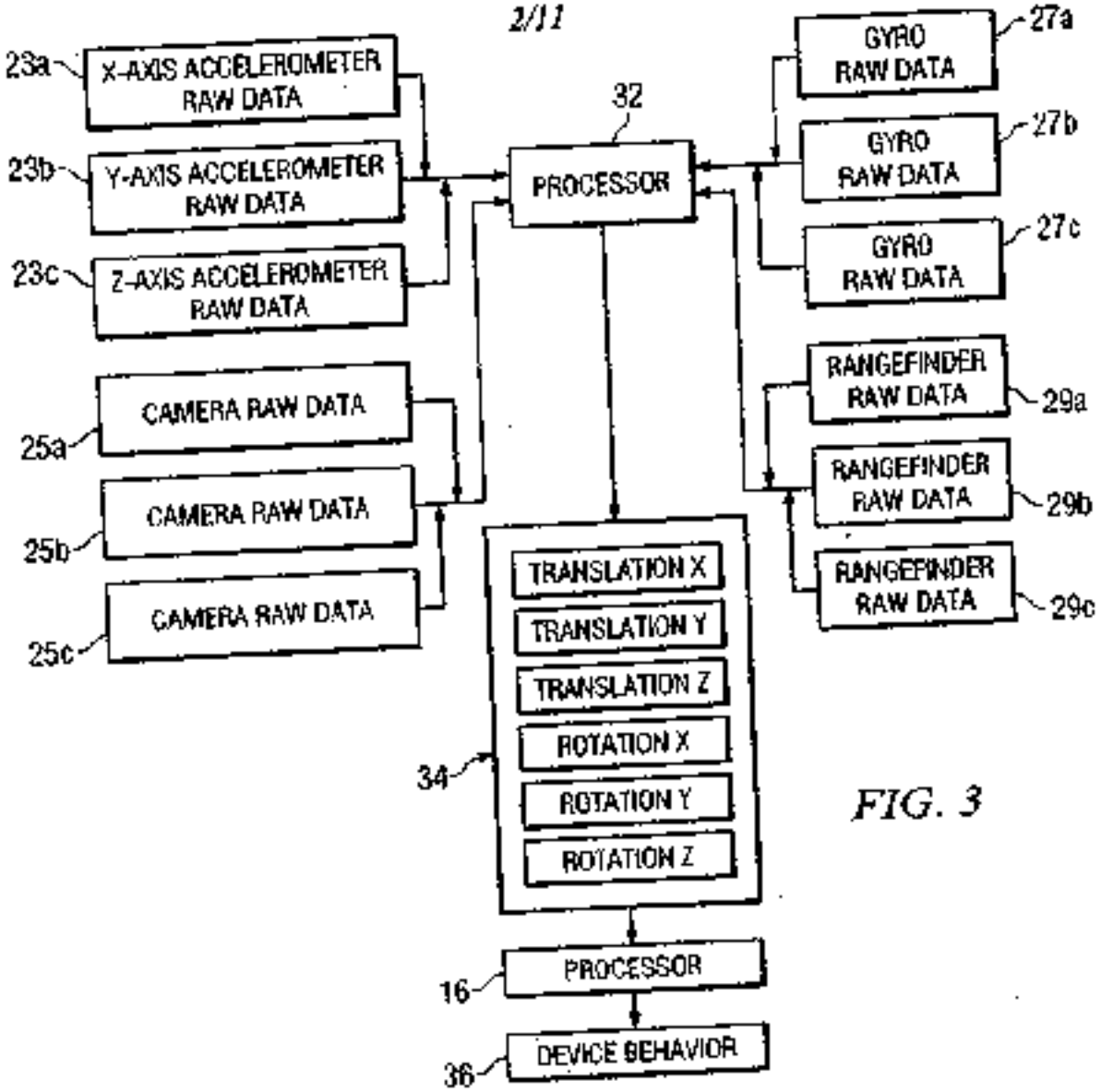


FIG. 3

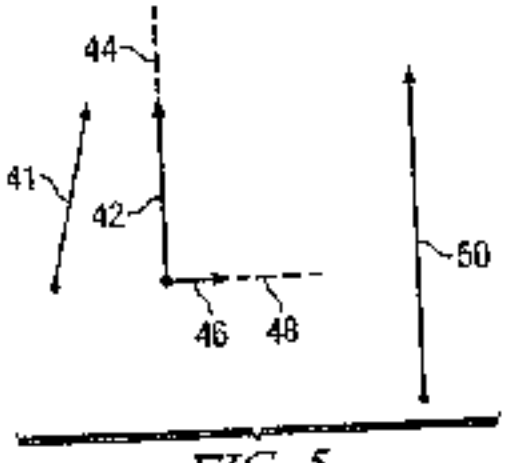


FIG. 5

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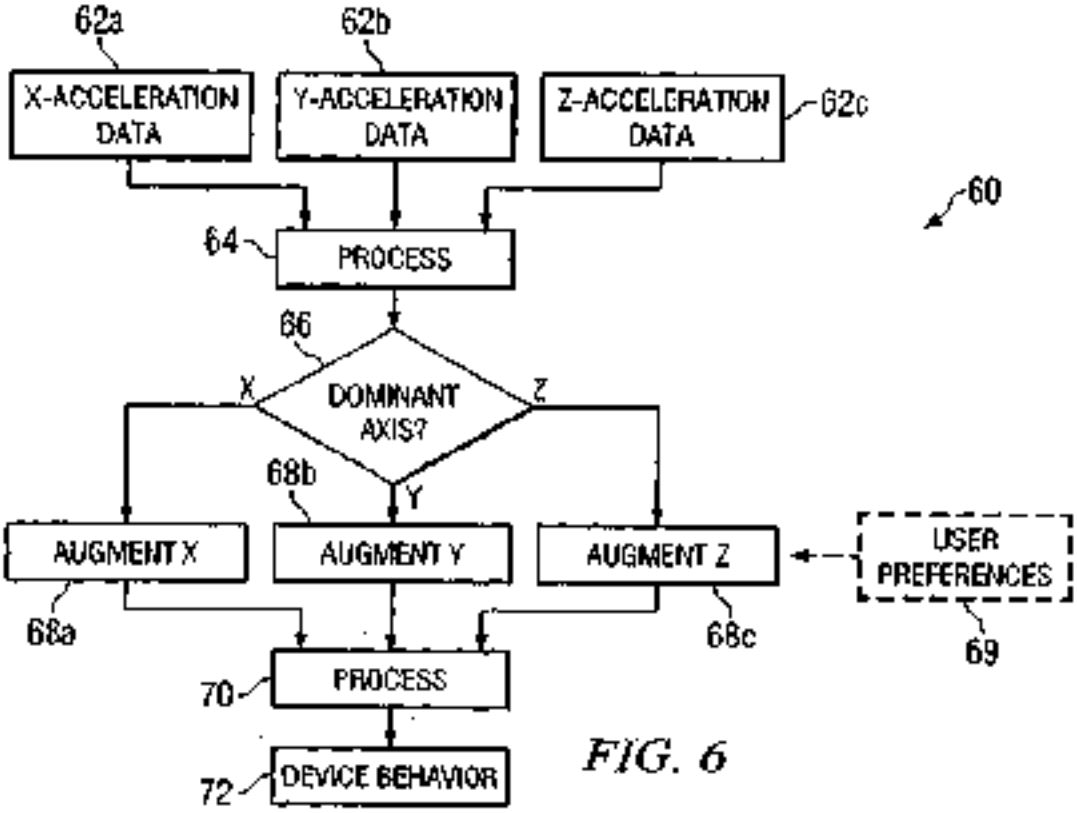


FIG. 6

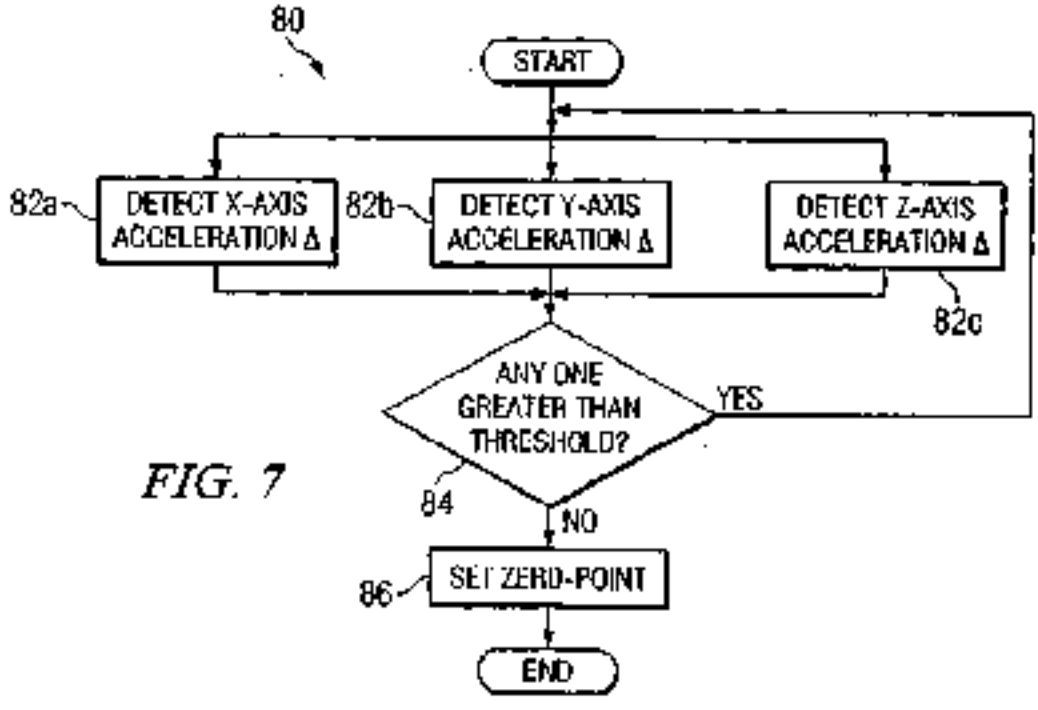


FIG. 7

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FIG. 8

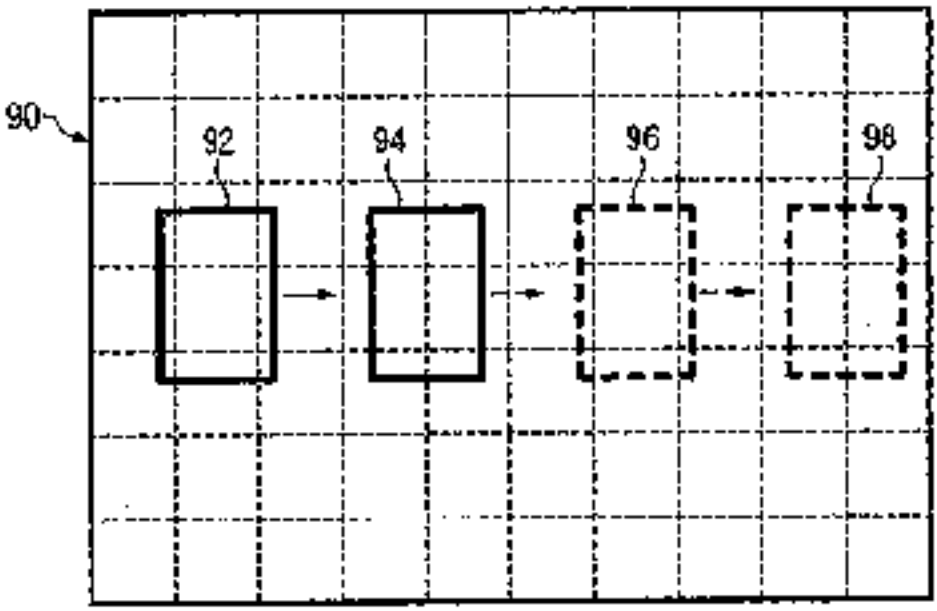
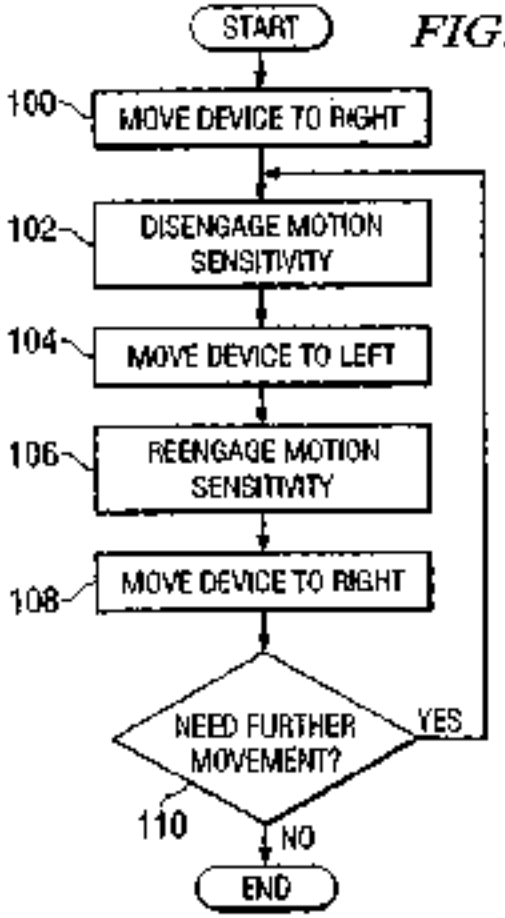


FIG. 9



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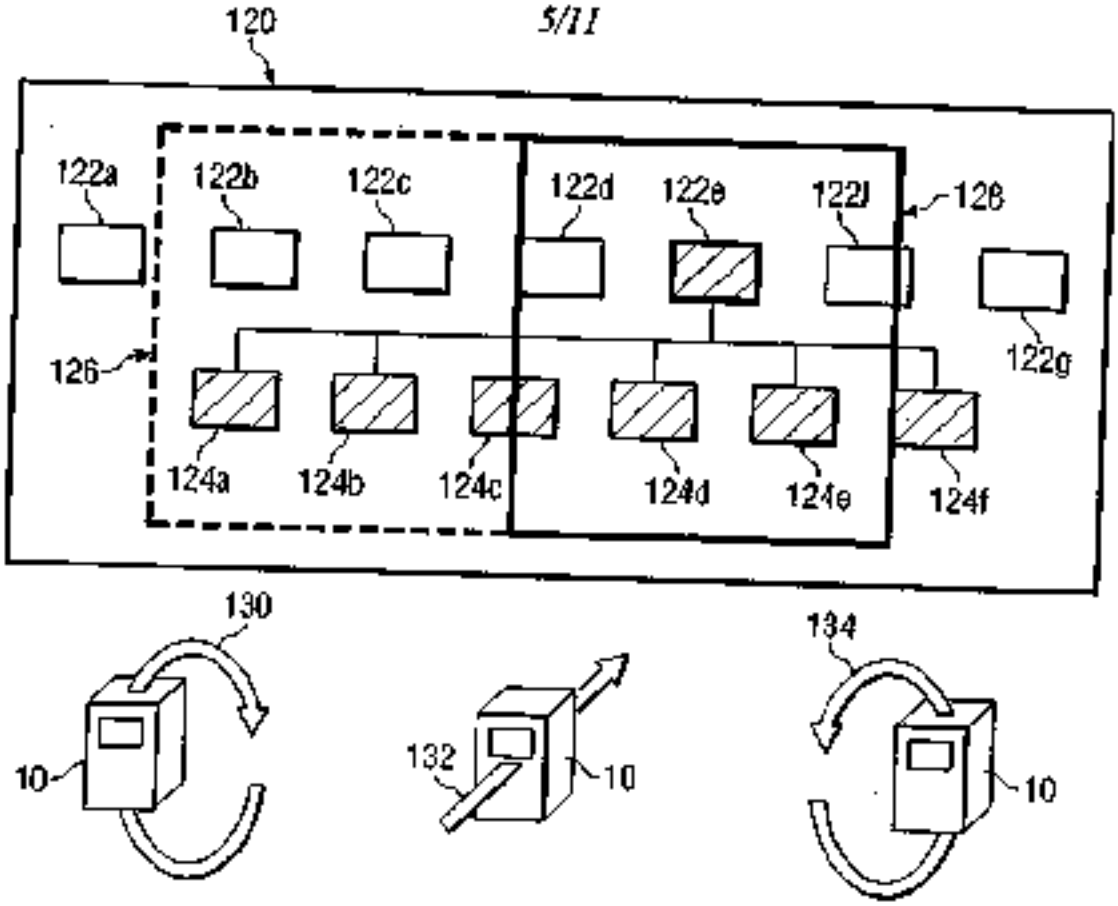


FIG. 10A

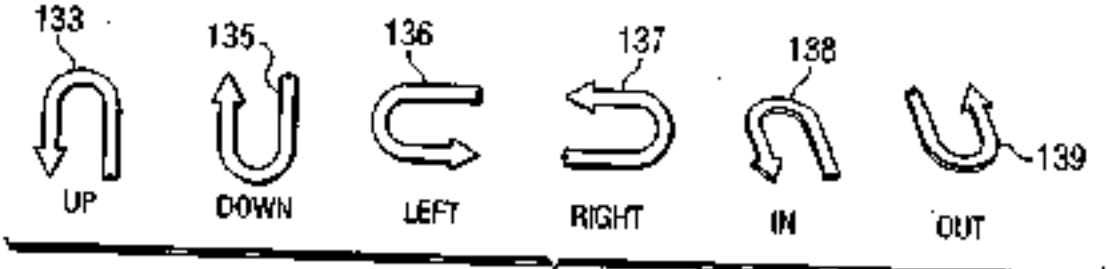


FIG. 10B

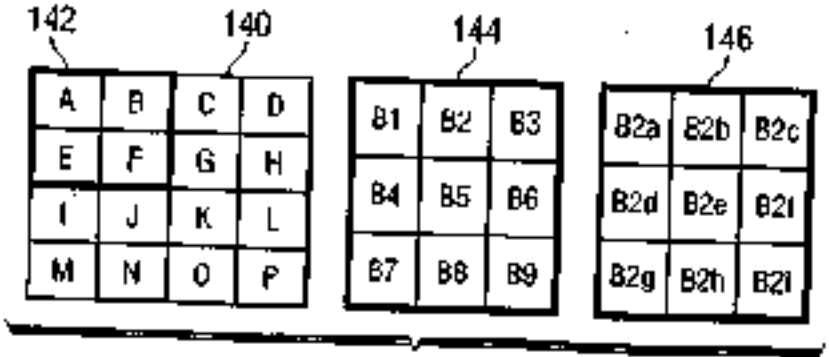


FIG. 11

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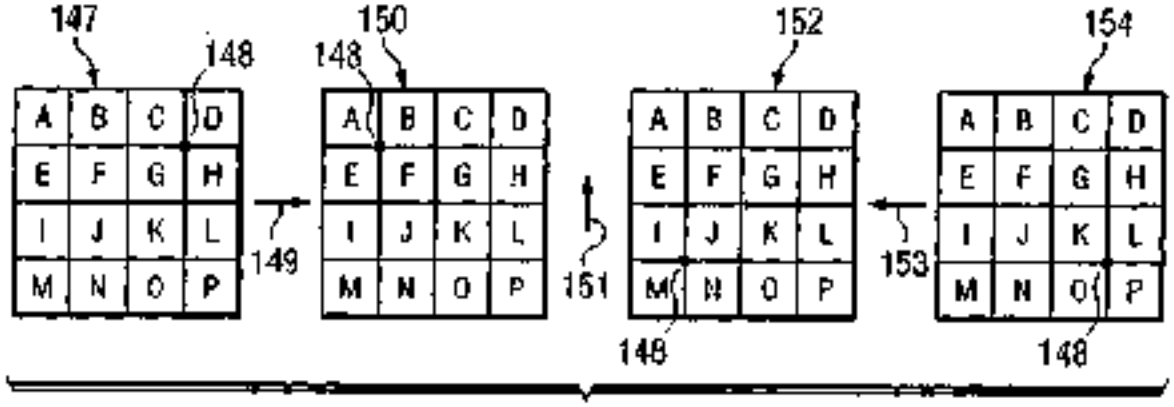


FIG. 12A

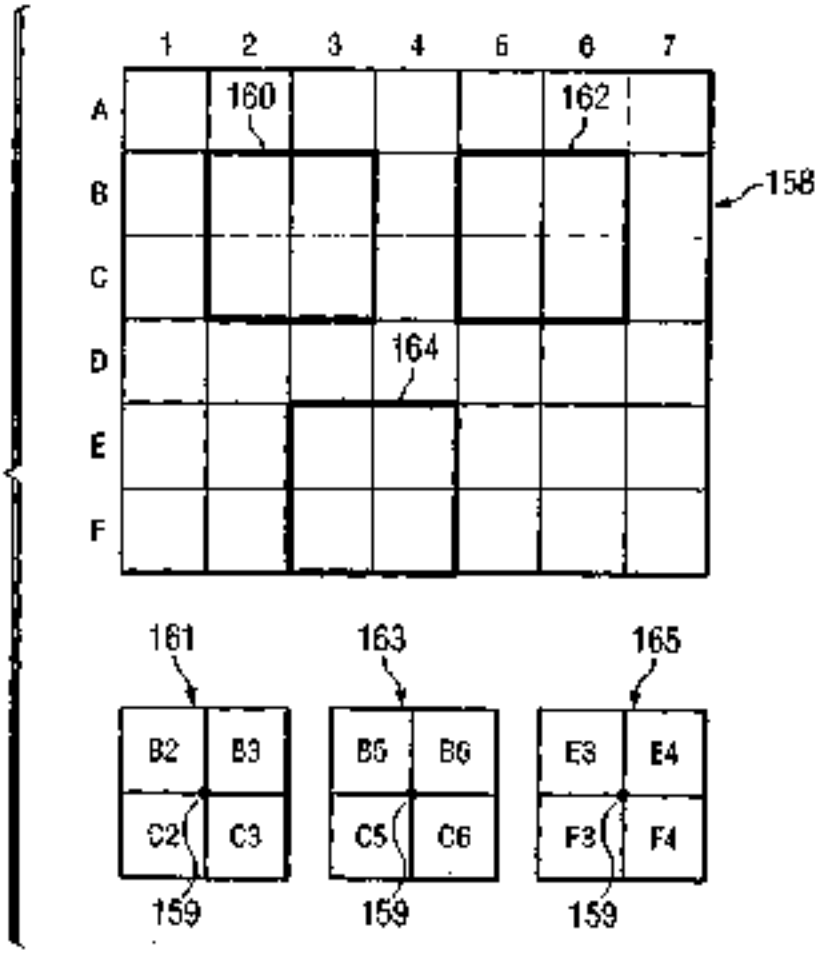


FIG. 12B

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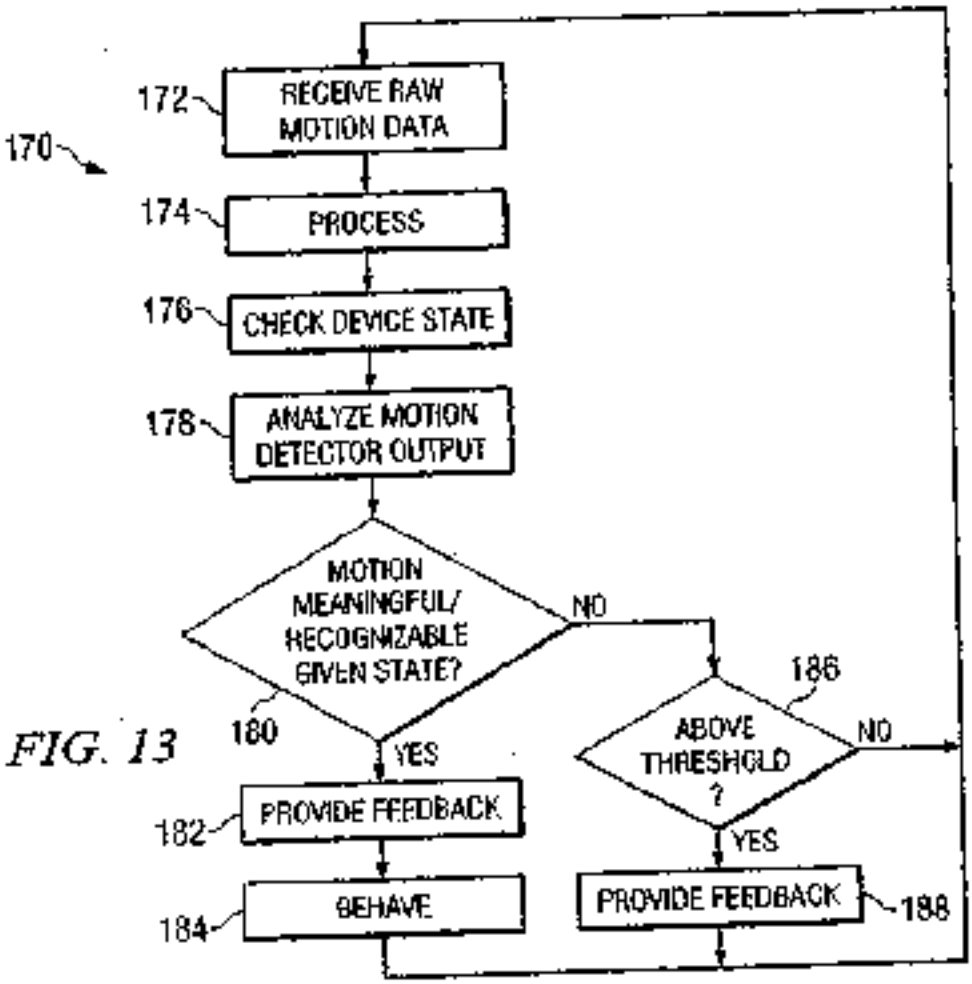


FIG. 13

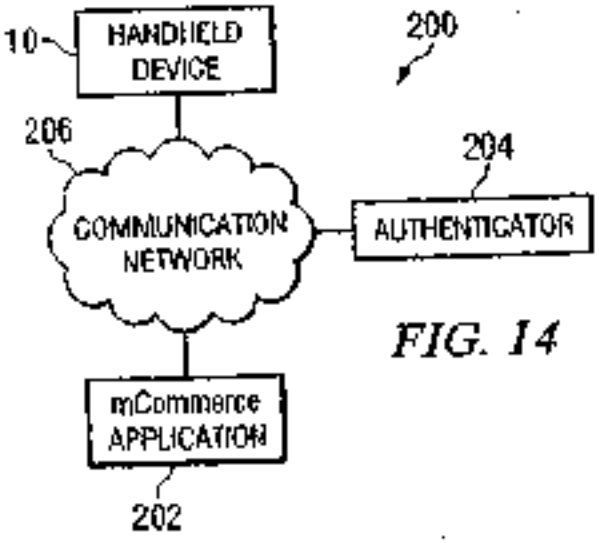


FIG. 14

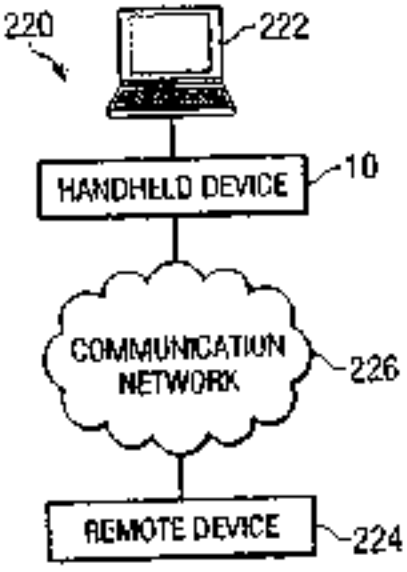


FIG. 15

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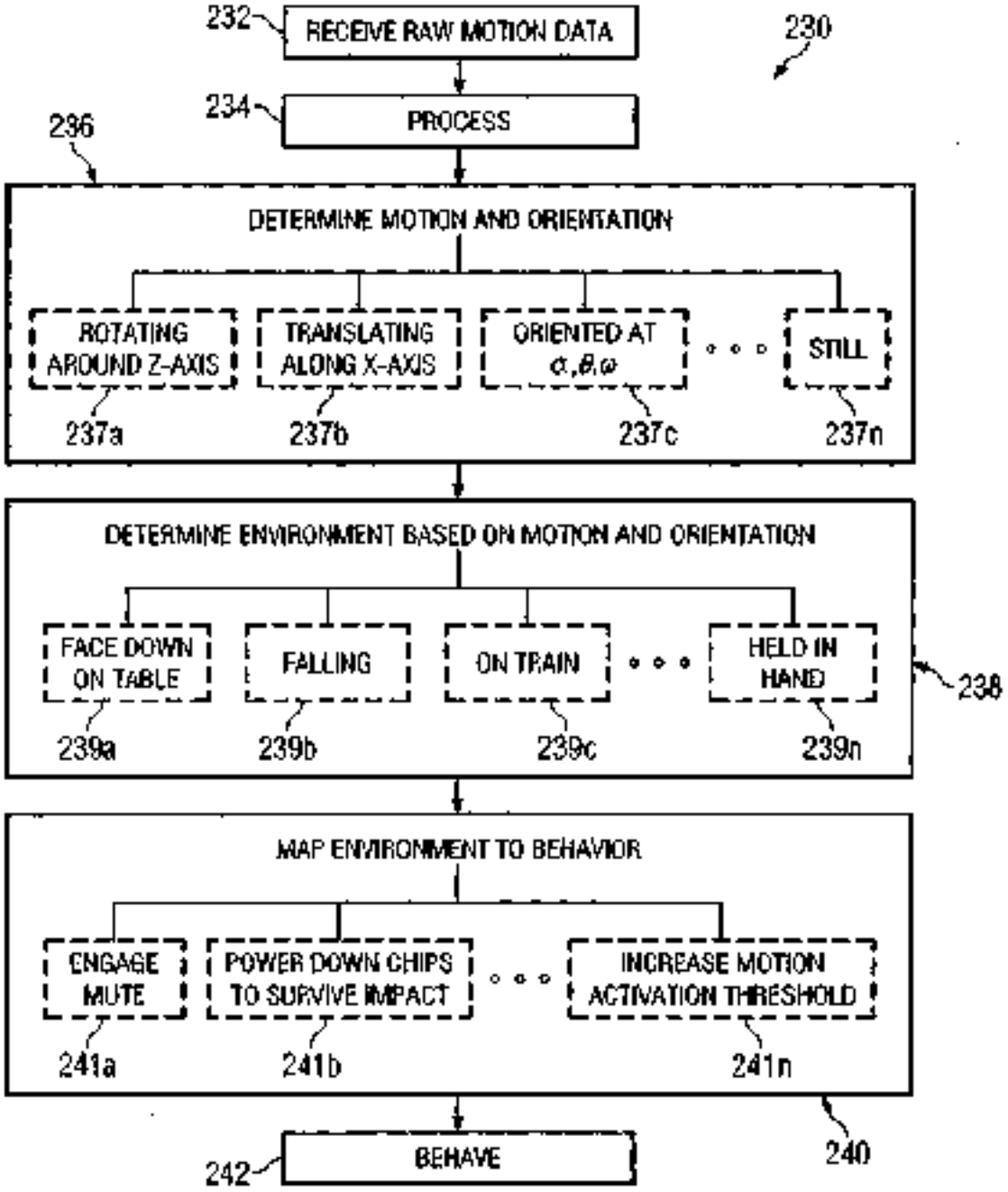


FIG. 16

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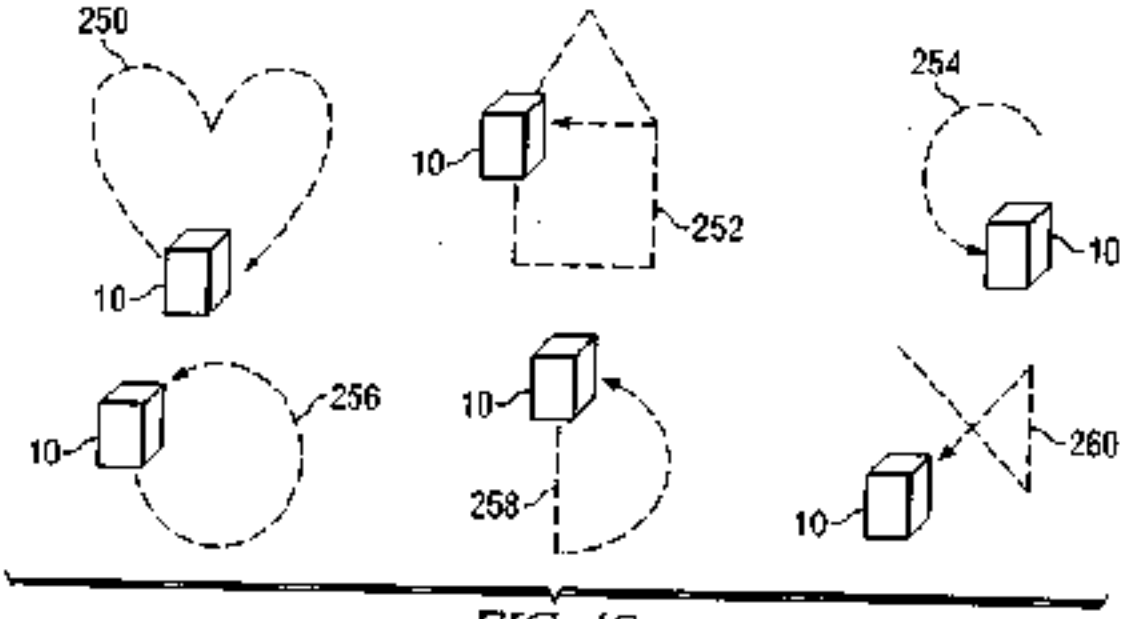


FIG. 17

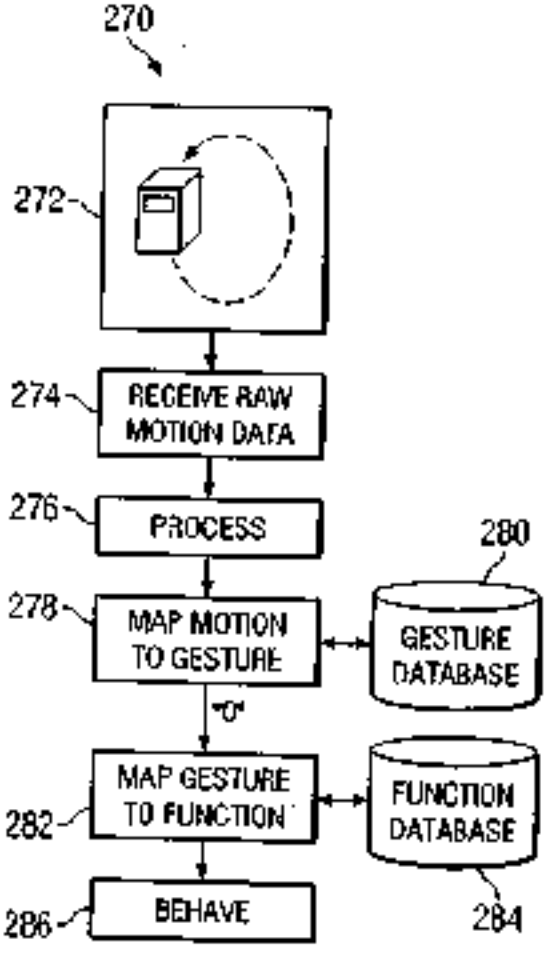


FIG. 18

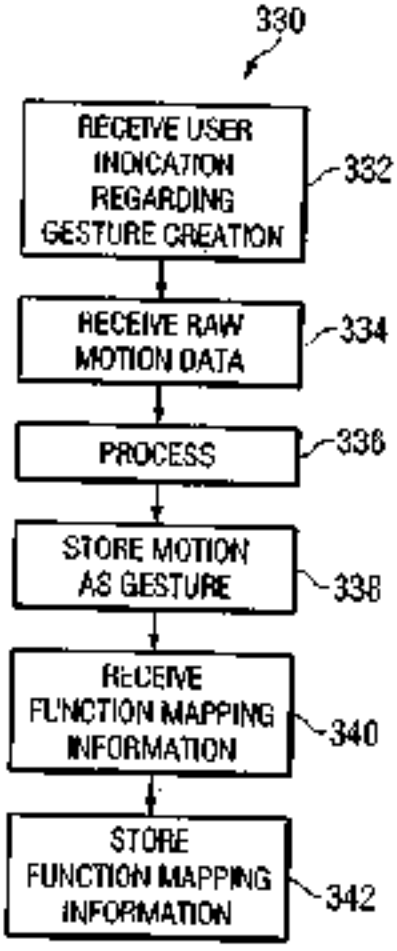


FIG. 21

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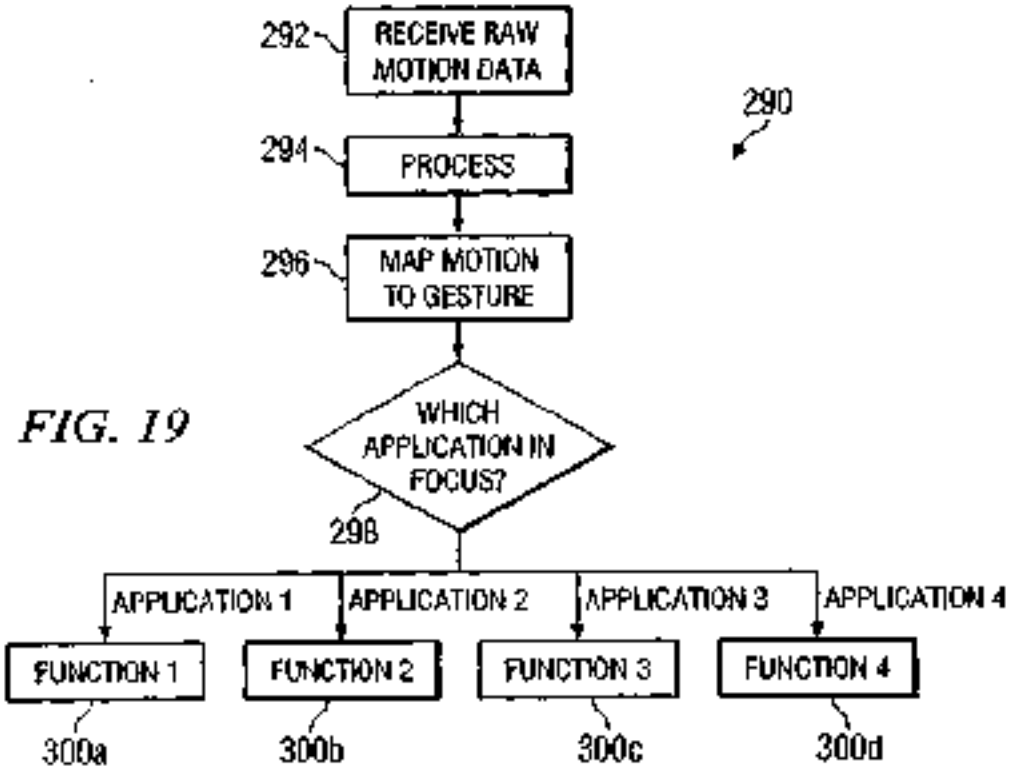


FIG. 19

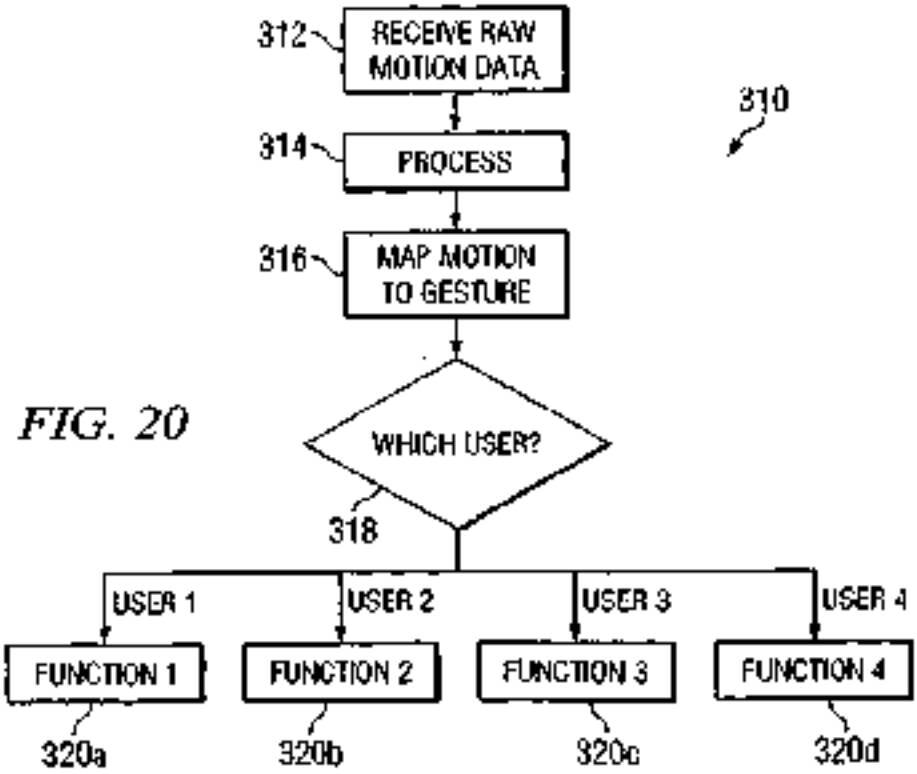


FIG. 20

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11/11

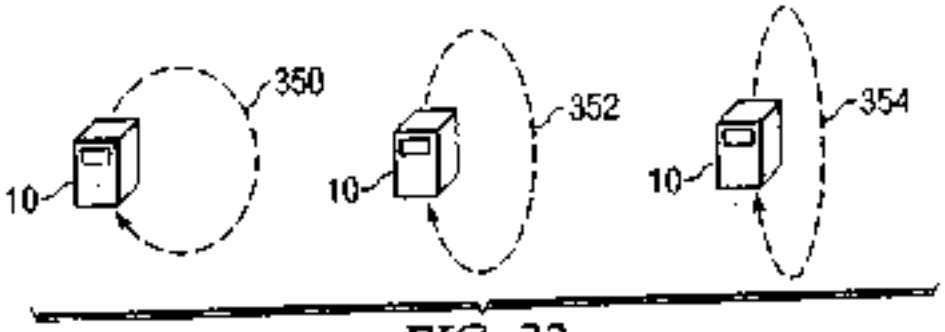


FIG. 22

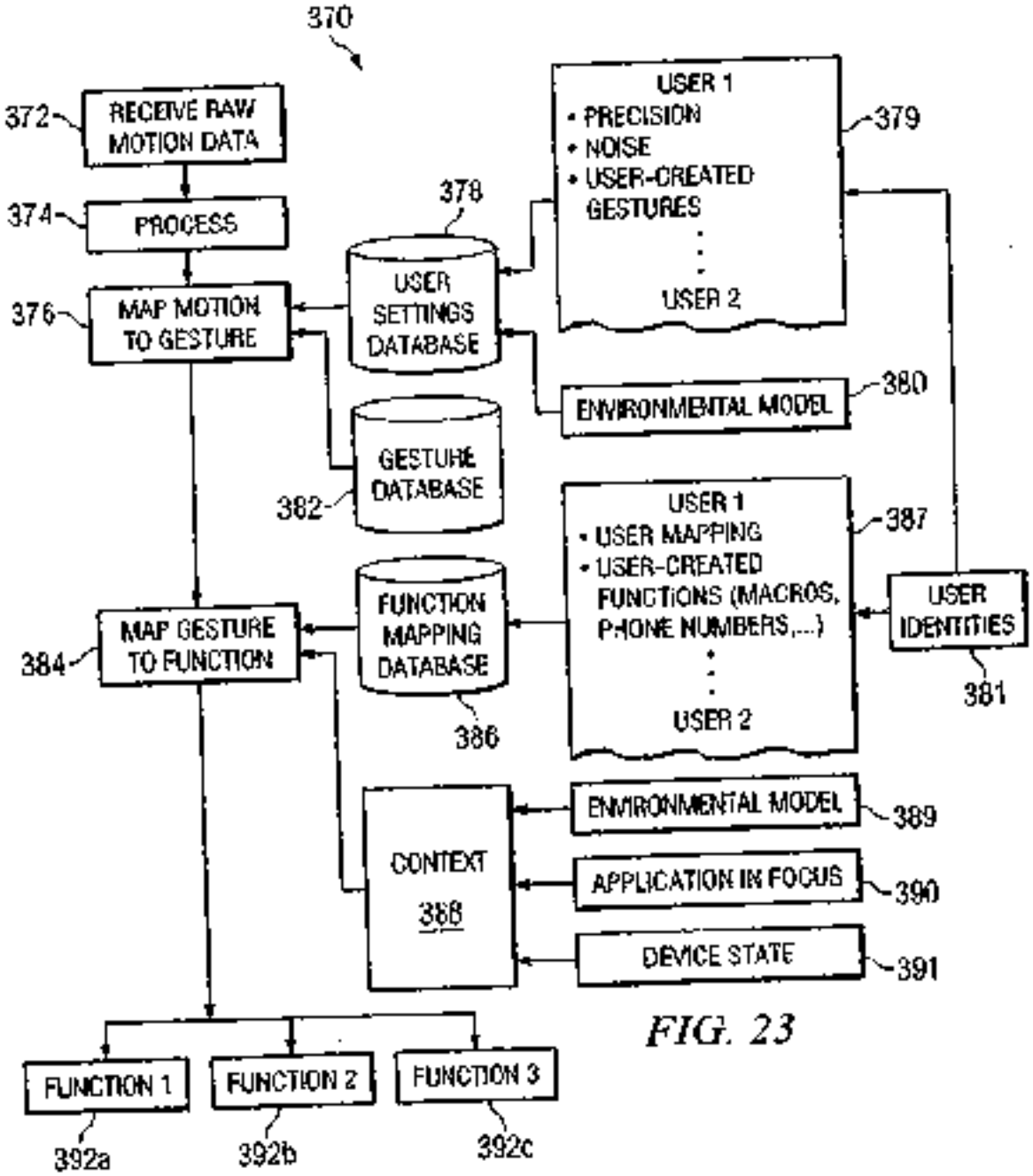


FIG. 23

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of	:	David Birnbaum et al.
Application No.	:	12/502,702
Filed	:	July 14, 2009
For	:	Systems and Methods for Transmitting Haptic Messages
Examiner	:	Unassigned
Art Unit	:	2472
Confirmation No.	:	6699

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are copies of the following documents for filing in the above-identified application:

Information Disclosure Statement Letter;

Form PTO/SB/08 listing 21 References; and

15 Non US Patent References.

The Commissioner if hereby authorized to charge any deficiencies to Deposit Account Number 16-1435.

Respectfully submitted.

Date: 11/20/2009

By: _____
Michael Morlock (Reg. No. 62,245)

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

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Amber Johnson

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Electronic Acknowledgement Receipt

EFS ID:	6499414
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Amber Johnson
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	20-NOV-2009
Filing Date:	14-JUL-2009
Time Stamp:	17:05:31
Application Type:	Utility under 35 USC 111(a)

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Information:					
4	NPL Documents	DeWitt.pdf	1624815	no	91
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12	NPL Documents	IMM351AddFees.pdf	168365	no	8
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17	Foreign Reference	WO2005103863.pdf	4113174	no	76
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If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
12/502,702	07/14/2009	David Birnbaum	IMM351 (51851/378586)

CONFIRMATION NO. 6669

34300
PATENT DEPARTMENT (51851)
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

PUBLICATION NOTICE

OC000000040262346

Title: Systems And Methods For Transmitting Haptic Messages

Publication No.US-2010-0045619-A1
Publication Date:02/25/2010

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(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	Birnbaum et al
Art Unit	2472
Examiner Name	Unassigned
Attorney Docket Number	IMM351

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	US-2003/0063128 A1	04-03-2003	Salmimaa et al.	
	2	US-2006/0161510 A1	08-17-2006	Rath	
	3	US-2006/0258074 A1	11-16-2006	Kumar et al.	
	4	US-2006/0279476 A1	12-14-2006	Obela	
	5	US-2007/0066283 A1	03-22-2007	Haar et al.	
	6	US-2007/0139926 A1	06-21-2007	Dunko et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	7	FR 2,910,160	06-20-2008	France Telecom		
	8	GB 2 416 962	02-08-2006	Vodafone PLC		
	9	WO 2005/103863	11-03-2005	Fujitsu Limited		

Examiner Signature		Date Considered	

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Fitbit v. Immersion

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Sheet 2 of 2

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
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Examiner Name	Unassigned
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NON PATENT LITERATURE DOCUMENTS			
Examiner Initials *	Cite No. [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T [2]
	10	International Search Report and Written Opinion mailed February 11, 2010 for corresponding International Application No. PCT/US2009/050080.	

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FITBIT 1002
Fitbit v. Immersion

Telecommunication system for mutual transmission of emotions, has communication interface provided with access unit accessing trajectory traced by user, and with restitution unit restituting trajectory of user to another user

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Publication date: 2008-06-20
Inventor(s): HOFFMANN CRISTINA; MARCHET ARNAUD; IMBERT SYLVIE +
Applicant(s): FRANCE TELECOM [FR] +
Classification:
- International: G06B6/00; G05D1/00; G06C19/00; G09B21/00; G09B5/06; G06F3/033; G06C19/00; G09G3/04
- European: G06F3/048A3
Application number: FR20060055490 20061213
Priority number(s): FR20060055490 20061213

Cited documents:
US2006146027 (A1)
EP1879821 (A2)
EP2117329 (A1)
FR2749915 (A1)
US2008084396 (A1)

Abstract of FR 2910160 (A1)

The system has a communication interface (2E), whose access unit for accessing a trajectory is traced by a user by using a part of a body of the user. A restitution unit of the interface restitutes the trajectory of the user to another user. The interface has a touch screen (2H) with two elements (23, 27) i.e. points, maintaining the users. An LED is located in a surface of the interface illuminated under a finger of the former user, when the former user poses the finger on another surface of the interface. Independent claims are also included for the following: (1) a method for transmitting information (2) a computer program comprising instructions to perform a method for transmitting information



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FITBIT 1002
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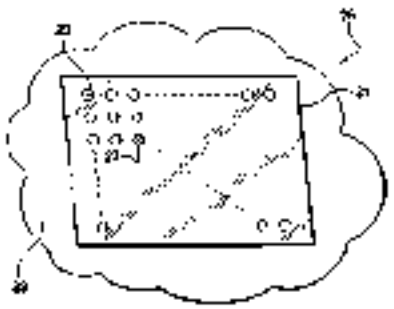
(73) Titulaire(s) :

(74) Mandataire(s) : FRANCE TELECOM

(54) SYSTEME DE TELECOMMUNICATION TACTILE.

(57) L'invention concerne un système de télécommunication. Le système selon l'invention est caractérisé en ce qu'il comprend :

- des moyens de saisie d'une trajectoire tracée par au moins un premier utilisateur au moyen d'une partie du corps dudit premier utilisateur, et
- des moyens de restitution de ladite trajectoire à au moins un deuxième utilisateur



FR 2 910 160 - A1

FITBIT 1002
Fitbit v. Immersion

Système de télécommunication tactile

L'invention concerne un système de télécommunication

Quand deux personnes sont géographiquement séparées, il leur est difficile d'échanger des émotions. Par exemple, dans le cas d'un couple dont un membre se trouve à un endroit différent de l'endroit où se trouve l'autre membre, il peut être difficile pour ces deux membres de se transmettre mutuellement leur émotions.

Ceci présente un inconvénient.

L'invention vise à pallier cet inconvénient. L'invention cherche à rendre possible une transmission d'émotions entre au moins deux utilisateurs, qui plus est par un moyen relativement peu coûteux et d'utilisation intuitive.

Le système de télécommunication selon l'invention est caractérisé en ce qu'il comprend:

- des moyens de saisie d'une trajectoire tracée par au moins un premier utilisateur au moyen d'une partie du corps dudit premier utilisateur, et
- des moyens de restitution de ladite trajectoire à au moins un deuxième utilisateur.

Avantageusement, l'invention permet une transmission d'émotions dont la trajectoire saisie est intuitivement représentative, permettant de mettre par exemple le toucher pour saisir et transmettre des dessins, et/ou de l'écriture.

Dans un mode de réalisation, le système de télécommunication est caractérisé en ce qu'il comprend en outre:

- des moyens de saisie d'une trajectoire tracée par ledit deuxième utilisateur au moyen d'une partie du corps dudit deuxième utilisateur, et
- des moyens de restitution de ladite trajectoire audit premier utilisateur.

Ceci permet avantageusement, sauf transmission des émotions dans une première direction, c'est-à-dire d'un premier utilisateur vers un deuxième utilisateur en plus la transmission des émotions dans une deuxième direction, c'est-à-dire du deuxième utilisateur vers le premier utilisateur.

L'invention concerne également un procédé de transmission d'informations caractérisé en ce qu'il comprend:

- une étape de saisie d'une trajectoire tracée par au moins un premier utilisateur au moyen d'une partie du corps dudit premier utilisateur, et
- une étape de restitution de ladite trajectoire à au moins un deuxième utilisateur.

Dans un mode de réalisation, le procédé de transmission d'informations est caractérisé en ce qu'il comprend en outre:

- une étape de saisi d'une trajectoire tracée par ledit deuxième utilisateur au moyen d'une partie du corps dudit deuxième utilisateur, et
- une étape de restitution de ladite trajectoire audit premier utilisateur.

Les avantages de ces procédés sont comparables aux avantages déjà mentionnés ci-dessus.

FITBIT 1002
Fitbit v. Immersion

L'invention concerne également un programme d'ordinateur, comprenant des instructions de code ce programme pour l'exécution d'au moins l'une des étapes d'un procédé décrit ci-dessus, lorsque ledit programme est exécuté sur un ordinateur.

Les étapes seront réalisées par des logiciels séparés, l'un d'entre eux exécutant au moins une étape de saisie, l'autre exécutant au moins une étape de restitution.

L'invention concerne également un interface de communication utilisable dans un système de télécommunication décrit ci-dessus, caractérisé en ce qu'il inclut des moyens de saisie et des moyens de restitution comprenant une deuxième surface, ladite deuxième surface incluant un premier élément symbolisant ledit premier utilisateur et un deuxième élément symbolisant ledit deuxième utilisateur, lesdits éléments mobiles dans ladite deuxième surface et capables de montrer ladite trajectoire dans ladite deuxième surface pendant un déplacement desdits éléments, et lesdits moyens de saisie et lesdits moyens de restitution comprennent en outre une première surface, ladite première surface présentant au moins une propriété apte à varier en fonction d'une interaction entre ladite premier surface et ladite partie du corps dudit premier utilisateur ou ladite partie du corps dudit deuxième utilisateur et en ce que lesdits éléments sont déplaçables en fonction de ladite interaction.

Une telle interface permet avantageusement la possibilité de transmission intuitive et bidirectionnelle des émotions. Le partage d'émotions peut être simultanée ou en temps différé. D'autres interfaces de communication pourront être des moyens de saisie sans contact (vidéo, laser, ou autre) de trajectoires dessinées par exemple dans l'air par un utilisateur.

Dans un mode de réalisation, l'interface de communication est caractérisée en ce que lesdits surfaces ont une dimension par rapport à ladite trajectoire qui est suffisamment fin pour pouvoir écrire un symbole unique mais pas trop fin pour écrire une phrase.

L'avantage d'un tel est qu'il n'a pas l'air d'être technologiquement avancé, ne représente pas un énorme investissement de la part des utilisateurs, qui seront donc plus prêt à l'adopter. En plus, l'interface offre la possibilité à deux personnes, par exemples deux membres d'un couple géographiquement séparés à créer un alphabet de symboles propre avec des connotations uniquement connues par eux et chargées de signifié.

Dans un mode de réalisation, l'interface de communication est caractérisée en ce que ladite deuxième surface comprend des diodes électroluminescentes (LED's).

L'utilisation d'une surface à LED's impose une limitation physique. Ceci est un avantage parce que la résolution de la deuxième surface sera ainsi basse par rapport aux écrans actuels. Ceci limite les usages que l'on peut faire de l'interface de communication et le détournement de l'interface de communication vers des usages comme block de notes ou interface d'échange de texte. Cet aspect est avantageux dans la communication d'émotions. En effet, si on peut écrire des grandes frases la fluidité d'utilisation se perd (communiquer à travers de symboles ou quelques lettres est tout d'abord rapide). En plus, les utilisateurs peuvent échangés des

FITBIT 1002
Fitbit v. Immersion

signes et/ou peuvent communiquer en langage codé, sans besoin d'écrire des phrases complètes.

Dans un mode de réalisation, l'interface de communication est caractérisée en ce que ladite propriété comprend une résistance.

Dans un mode de réalisation, l'interface de communication est caractérisée en ce que ladite propriété comprend une capacitance.

Dans un mode de réalisation, l'interface de communication est caractérisée en ce que ladite interface comprend en outre une couche moelleuse.

L'aspect "moelleux" de la surface de contact, contribue avantageusement à un aspect confortable, douillet qui colle bien avec un échange chargé en émotion et l'amélioration de l'ergonomie et plaisir d'utilisation de l'interface.

Dans un mode de réalisation, l'interface de communication est caractérisée ladite interface comprend un dispositif d'enregistrement de ladite trajectoire.

Ceci permet avantageusement d'établir une communication asynchrone, car on peut enregistre les "passages" d'un utilisateur et ses tentatives de communication, ou symboles laissés pour qu'un autre utilisateur les retrouve. Ainsi, un utilisateur peut en cours de communication (par exemple téléphonique) faire un enregistrement synchronisé entre les deux utilisateurs, qui permet de symboliser et capturer l'instant dans lequel l'échange se produit, le résultat étant fortement chargé d'émotion, ayant un grand pouvoir d'évocation et restant discret et indéchiffrable pour d'autres personnes, c'est-à-dire des personnes autres que ces deux utilisateurs spécifiques.

L'invention sera mieux comprise à l'aide de la description suivante, faite à titre d'exemple non-limitatif et en regard des dessins annexés, dans lesquels:

- la figure 1 montre une interface selon l'invention,
- la figure 2 montre le fonctionnement de l'interface selon l'invention, et
- la figure 3 montre la structure de l'écran de l'interface selon l'invention.

Dans l'état de la technique, il n'existe pas d'interfaces de communication qui permettent la transmission d'émotions entre deux personnes d'une façon simple et intuitive. Certes, on connaît des interfaces comme le téléphone, mais son utilisation est complexe, inconfortable ergonomiquement, et coûteuse en termes de temps et effort pour l'utilisateur. Un utilisateur doit par exemple mémoriser un numéro d'appel d'un correspondant ou chercher le numéro du correspondant dans une liste, décrocher le téléphone, et saisir le numéro. Ce sont donc plusieurs démarches que l'utilisateur doit effectuer pour être capable de transmettre ses émotions vers son correspondant.

La figure 1 est un schéma qui représente une interface 25 selon l'invention. L'interface 25 comprend un écran 21. L'écran pourrait être intégré dans une couche 29. L'écran pourrait être recouvert d'une couche avec des propriétés tactiles intéressantes, cette couche peut être choisie en fonction d'optimisation de rendu optique et/ou rendu optique et rendu tactile.

FITBIT 1002
Fitbit v. Immersion

L'écran 21 comprend un premier élément 23 qui représente un premier utilisateur de l'interface 25. Ce premier élément 23 peut par exemple être un point. L'écran 23 comprend un deuxième élément 27 symbolisant un deuxième utilisateur de l'interface 25. Ce deuxième élément 27 peut par exemple aussi être un point. L'écran 21 est tactile. Dans un système pour permettre la transmission des émotions entre au moins deux utilisateurs, il y aura au moins deux interfaces 25. Chaque utilisateur peut déplacer et seulement déplacer son point correspondant, c'est-à-dire le point qui lui symbolise en agissant sur l'interface 25 qui lui est propre. Autrement dit, chaque utilisateur n'a accès qu'au point qui le représente, il ne peut pas agir sur celui de l'autre utilisateur. Le déplacement du point se fait par exemple en utilisant un doigt (ou toute autre partie du corps d'un utilisateur) et en appuyant sur le point. Quand les points 23, 27 sont déplacés ils laissent une trajectoire sur l'écran 21 comme montré dans la figure 2. Le déplacement du point peut se faire par un contact direct entre l'utilisateur et son point, dans ce cas, l'utilisateur doit exercer de la pression sur l'écran. Cependant, un déplacement du point sans contact direct est aussi envisageable. Par exemple, quand l'utilisateur approche l'écran avec son doigt, il y aura un changement de température véhiculé par moyen de radiation infrarouge dans l'environnement de l'écran. Ce changement peut être détecté et peut déclencher le déplacement du point symbolisant cet utilisateur. Une autre possibilité est un maillage de rayons infra rouge qui détectent le mouvement. Une autre possibilité est des technologies qui détectent le mouvement à travers un champ électromagnétique d'une fréquence différent de la radiation infra rouge. Il est également possible que l'utilisateur fait un geste sans toucher l'écran qui est filmé et qui résulte en un déplacement du point de l'utilisateur correspondant. Ceci est une technique de détection d'image utilisé dans les installations artistiques, et utilise un mécanisme de captation et traitement d'image.

L'utilisateur peut aussi déplacer l'élément qui lui symbolise par moyen des ondes acoustiques ou sonores.

La structure de l'écran 21 sera maintenant expliquée en plus de détail, voir figure 3. L'écran 21 comprend une première surface tactile 41. Cette surface tactile 41 est translucide et située au dessus d'une deuxième surface 43. Cette deuxième surface 43 est lumineuse. Cette deuxième surface 43 pourrait par exemple être constituée par des LED's 47. La première surface 41 est connecte à la deuxième surface 43 par le biais d'un système électronique 45. Lorsqu'un utilisateur pose son doigt sur la première surface 41, la LED 47 située derrière ce point dans la deuxième surface 43 s'illumine sous son doigt.

Deux technologies, connus à l'instant par l'homme du métier peuvent être utilisés pour construire la première surface 41. Une première technologie est connu sous le nom "Quantum". La technologie "Quantum" est basée sur le principe de senseurs capacitifs. Sous le contact du doigt (ou comme dit toute autre partie du corps d'un utilisateur), la capacité de la première surface change localement ce qui peut être détecté par le système électronique

FITBIT 1002
Fitbit v. Immersion

45. Le corps sera à une capacité et la première surface à une autre, donc à travers le contact il y aura un changement de capacité entre les deux.

Un avantage de la technologie Quantum est que la surface tactile peut être constituée de n'importe quel matériel, et avoir n'importe quelle forme, ce qui permettrait d'utiliser des matériels avec des propriétés tactiles intéressantes.

Une autre possibilité pour la première surface 41 est une technologie qui est connu sous le nom "Elotouch" par l'homme du métier. La technologie "Elotouch" est basée sur la construction de dalles résistives.

La technologie Elotouch consiste en construire des dalles tactiles en verre, comme celles qui se trouvent superposées à des moniteurs dans des guichets automatiques. Un panneau en verre est couvert par une couche conductrice. Une deuxième couche en polyester, isolée à l'extérieur et conductrice à l'intérieur, est placée sur le verre, et séparée de celui-ci ces micro-points isolants. Ainsi, lorsque la dalle est touchée, un contact entre la couche conductrice du polyester et celle du verre se produit. Le voltage ainsi généré est proportionnel à la position.

Un avantage de la technologie Elotouch est que la dalle est transparente et prête à l'emploi, et il n'y a pas besoin de construire des pièces à la main, ce qui comporte un grand gain en termes de temps. Ainsi elle a une grande résolution, jusqu'à potentiellement 1024 x 496 pixels. La dalle est divisé dans un nombre de cellules égal au nombre de LED's. Les cellules constituent ensemble une grille. Ainsi plus une augmentation du nombre de LED's implique une augmentation du nombre des cellules dans la grille et, si les dimensions de la dalle restent les mêmes, plus petites seront les cellules. Ceci s'appelle quantification de la surface. Ce qui permet de pouvoir varier le nombre de LED's utilisées. Un LED spécifique est lié aux plusieurs pixels de la dalle composant une cellule. Cependant, pour éviter que deux LED's s'allument au même temps, il y a un partie entre deux LED's dont les pixels ne sont liés à aucun LED, comme il sera compris par l'homme du métier.

Au lieu de LED's qui s'illuminent, il est aussi possible que le déplacement du doigt de l'utilisateur a pour résultat un changement dans la structure de la deuxième surface 43, qui pourrait être aperçu à travers de la première surface 41. La deuxième surface 43 pourrait ainsi par exemple comprendre un écran à cristaux liquides (en anglais: "liquid crystal display, LCD").

Aussi, et comme il sera connu par l'homme du métier, les LEDs ne sont pas seulement des émetteurs de lumière, mais aussi des capteurs optiques capacitifs.

Quand le doigt se déplace sur le premier surface 41 les LED's se trouvant sous la position du doigt s'illumine au fur et à mesure. Les LED's qui se s'ont illuminé restent illuminés pendant un certain temps ce qui permet l'utilisateur de construire une trajectoire ou par exemple un caractère, un chiffre ou un autre symbole. L'écran permet de tracer avec le doigt, des formes autant continues que discontinues. En effet, lorsque le doigt est levé de la surface pour une période supérieure à 1,25 secondes (cette variable temporale est réglable), la forme tracée

FITBIT 1002
Fitbit v. Immersion

fera une disparition graduelle (ou en Anglais: "fade-out") pour s'effacer et permettre de tracer une nouvelle forme. Cette variable temporale est suffisamment longue pour qu'elle permette également la construction des formes où il est nécessaire de lever le doigt, parce qu'un utilisateur dans un tel cas ne lève son doigt que pour des périodes de quelques dizaines de millisecondes à peu près. Ceci est plus court que cette variable temporale.

Dans un mode de réalisation, l'écran comprend un mécanisme, (par exemple un bouton), que lorsqu'il est activé (on appuie sur le bouton), permet d'enregistrer les trajectoires présentes sur la deuxième surface 43. Par exemple, lorsque un utilisateur appuie sur le bouton et fait des trajectoires au même temps, c'est comme si on enregistrait une vidéo de ce qui se passe. L'utilisateur dessine une forme quelconque des trajectoires, ensuite lève le doigt définitivement et n'appuie plus sur le bouton, la forme (continue ou pas) fait un fade out mais ensuite recommence a être dessinée, en boucle. Pour cela, l'interface de communication comprend par exemple une mémoire.

Quand les LED's sont arrangés sous forme de matrice, par exemple une matrice de 64 LED's (8 files x 8 colonnes), la position du doigt pourrait être représentée par un pair de coordonnés.

Le nombre de LEDs par unité de surface pourrait être de l'ordre de 1LED choque 2 cm^2 (ou bien de ½LED/cm^2). Chaque LED pourrait avoir deux couleurs différentes, par exemple, rouges et vertes, Alternativement, l'utilisation des LEDs RVB peut être envisagée pour pouvoir choisir deux couleurs quelconques. Le champ lumineux crée par une LED pourrait être rond et avoir comme diamètre, par exemple 5mm.

Comme évoqué ci-dessus le système de deux interfaces selon l'invention peut être utilisé pour la transmission des émotions entre deux utilisateurs qui sont éloignés l'un de l'autre. Dans ce cas, les deux interfaces sont connectes à travers d'un réseau de communication, par exemple à travers d'un réseau Wifi et/ou l'Internet. Les deux écrans pourraient être synchronisés, c'est-à-dire, ils affichent toujours la même chose ou asynchrones. Par contre, un utilisateur interagit sur son propre interface.

FITBIT 1002
Fitbit v. Immersion

Revendications

1) Système de télécommunication caractérisé en ce qu'il comprend:
- des moyens de saisie d'une trajectoire tracée par au moins un premier utilisateur au moyen d'une partie du corps dudit premier utilisateur, et
- des moyens de restitution de ladite trajectoire à au moins un deuxième utilisateur.

2) Système de télécommunication selon la revendication 1 caractérisé en ce qu'il comprend en outre:
- des moyens de saisie d'une trajectoire tracée par ledit deuxième utilisateur au moyen d'une partie du corps dudit deuxième utilisateur, et
- des moyens de restitution de ladite trajectoire audit premier utilisateur.

3) Procédé de transmission d'informations caractérisé en ce qu'il comprend:
- une étape de saisie d'une trajectoire tracée par au moins un premier utilisateur au moyen d'une partie du corps dudit premier utilisateur, et
- une étape de restitution de ladite trajectoire à au moins un deuxième utilisateur.

4) Procédé de transmission d'informations selon la revendication 3 caractérisé en ce qu'il comprend en outre:
- une étape de saisi d'une trajectoire tracée par ledit deuxième utilisateur au moyen d'une partie du corps dudit deuxième utilisateur, et
- une étape de restitution de ladite trajectoire audit premier utilisateur,

5) Un programme d'ordinateur, comprenant des instructions de code de programme pour l'exécution d'au moins l'une des étapes d'un procédé conforme aux revendications 3 à 4, lorsque ledit programme est exécuté sur un ordinateur.

6) Interface de communication utilisable dans un système de télécommunication selon l'une quelconque des revendication 1 et 2, caractérisé en ce qu'il inclut des moyens de saisie et des moyens de restitution comprenant une deuxième surface, ladite deuxième surface incluant un premier élément symbolisant ledit premier utilisateur et un deuxième élément symbolisant ledit deuxième utilisateur, lesdits éléments mobiles dans ladite deuxième surface et capables de montrer ladite trajectoire dans ladite deuxième surface pendant un déplacement desdits éléments, et lesdits moyens de saisie et lesdits moyens de restitution comprennent en outre une première surface, ladite première surface présentant au moins une propriété apte à varier en fonction d'une interaction entre ladite premier surface et ladite partie du corps dudit

FITBIT 1002
Fitbit v. Immersion

premier utilisateur ou ladite partie du corps dudit deuxième utilisateur et en ce que lesdits éléments sont déplaçables en fonction de ladite interaction.

7) Interface de communication selon la revendication 6, caractérisé en ce que lesdits surfaces ont une dimension par rapport à ladite trajectoire qui est suffisamment fin pour pouvoir écrire un symbole unique mais pas trop fin pour écrire une phrase.

8) Interface de communication selon l'une quelconque des revendications 6 à 7 caractérisé en ce que ladite deuxième surface comprend des diodes électroluminescentes (LED's).

9) Interface de communication selon l'une quelconque des revendications 6 à 8 caractérisé en ce que ladite propriété comprend une résistance.

10) Interface de communication selon l'une quelconque des revendications 6 à 8 caractérisé en ce que ladite propriété comprend une capacitance.

11) Interface de communication selon l'une quelconque des revendications 6 à 10 caractérisé en ce que ladite interface comprend en outre une couche moelleuse.

12) Interface de communication selon l'une quelconque des revendications 6 à 11 caractérisé en ce que ladite interface comprend un dispositif d'enregistrement de ladite trajectoire.

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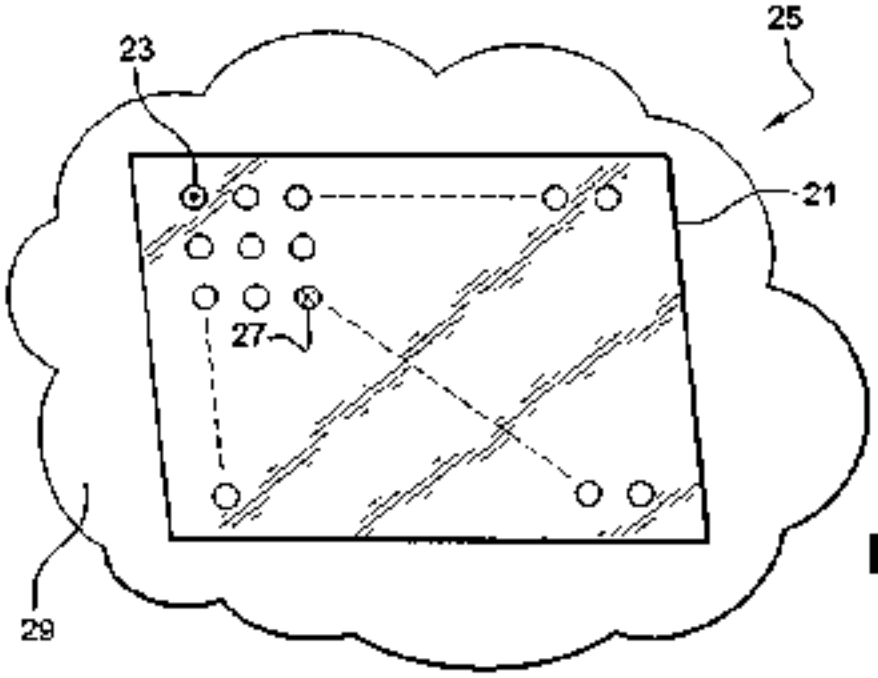


Fig. 1

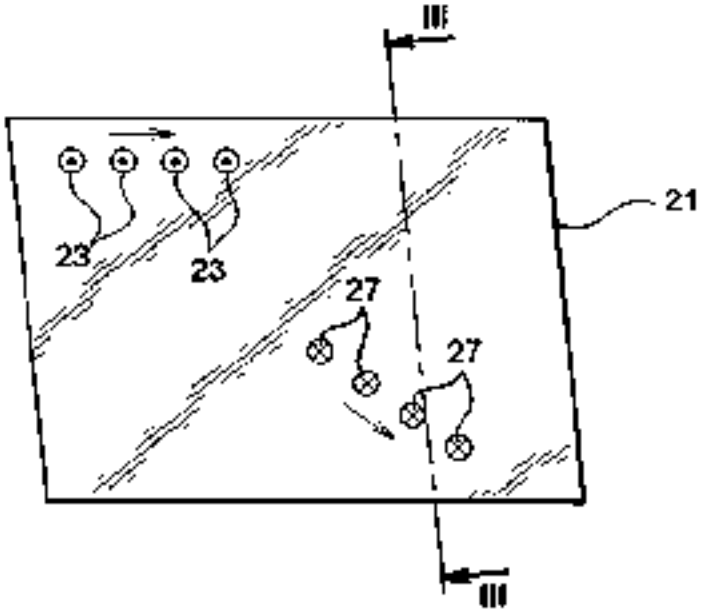


Fig. 2

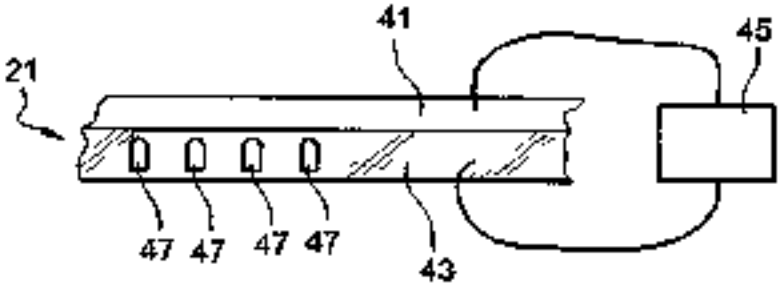


Fig. 3

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RAPPORT DE RECHERCHE PRÉLIMINAIRE

établi sur la base des dernières revendications déposées avant le commencement de la recherche

N° d'enregistrement national

FA 687300
FR 0655490

DOCUMENTS CONSIDÉRÉS COMME PERTINENTS		Revendication(s) concernée(s)	Classement attribué à l'invention par l'INPI
Catégorie	Citation du document avec indication, en cas de besoin, des parties pertinentes		
X	US 2006/148527 A1 (BLOUNT ALAN M [US]) 6 juillet 2006 (2006-07-06) * abrégé * * alinéa [0004] * * alinéa [0029] * * alinéa [0033] - alinéa [0034] * * alinéa [0056] - alinéa [0060] *	1-5	G08B6/00 G08C19/02 G09G3/14 G06F3/033
Y	* figures 1,9 *	6-12	
Y	EP 0 875 821 A (MATSUSHITA ELECTRIC IND CO LTD [JP]) 4 novembre 1998 (1998-11-04) * colonne 11, ligne 20 - ligne 40 * * colonne 20, ligne 31 - ligne 56 * * colonne 24, ligne 7 - ligne 56 * * figures 18-21 *	6-12	
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X	FR 2 743 915 A1 (PARIENTI RAOUL [FR]) 25 juillet 1997 (1997-07-25) * abrégé * * page 1, ligne 11 - ligne 30 * * page 2, ligne 4 - ligne 23 * * figure 1 *	1-5	H04M G06F G09G G08C A63F
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	-/--		

Date d'achèvement de la recherche	Examinateur
26 juillet 2007	Bianchi, Damiano

CATÉGORIE DES DOCUMENTS CITÉS

X : particulièrement pertinent à lui seul
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T : théorie ou principe à la base de l'invention
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D : cité dans la demande
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DOCUMENTS CONSIDÉRÉS COMME PERTINENTS		Revendication(s) concernée(s)	Classement attribué à l'invention par l'INPI
Catégorie	Citation du document avec indication, en cas de besoin, des parties pertinentes		
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			DOMAINES TECHNIQUES RECHERCHÉS (IPC)

Date d'achèvement de la recherche	Examinateur
26 juillet 2007	Bianchi, Damiano

CATÉGORIE DES DOCUMENTS CITÉS

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ANNEXE AU RAPPORT DE RECHERCHE PRÉLIMINAIRE RELATIF A LA DEMANDE DE BREVET FRANÇAIS NO. FR 0655490 FA 687300

La présente annexe indique les membres de la famille de brevets relatifs aux documents brevets cités dans le rapport de recherche préliminaire visé ci-dessus.
Les dits membres sont contenus au fichier informatique de l'Office européen des brevets à la date du 26-07-2007
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Document brevet cité au rapport de recherche		Date de publication	Membre(s) de la famille de brevet(s)		Date de publication
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EPO FORM P0465

Pour tout renseignement concernant cette annexe : voir Journal Officiel de l'Office européen des brevets, No 12/82

FITBIT 1002
Fitbit v. Immersion

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(56) Documents Cited:
GB 2388529 A WO 2004/053670 A2
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"Mobiles get a sense of touch" BBC News, 28th January 2003 Downloaded from: http://news.bbc.co.uk/1/hi/technology/2677619.stm Whole document

(58) Field of Search:
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(54) Abstract Title: Haptic communication in mobile telecommunications networks

(57) A mobile telecommunications network may be provided with mobile terminals including motion sensors 21 and pressure sensors 23. Movement and/or pressure applied to a mobile terminal can be sensed by these sensors 21,23 and converted into an electrical signal. This electrical signal is encoded and transmitted to the network core. The network core generates a message to a recipient mobile terminal having a movement enabler 25 and/or pressure enabler 26. When the message is received by the receiving mobile terminal, the movement and/or pressure enabler generate an approximation of the touch input generated at the sending mobile terminal. The users of mobile terminals are therefore able to communicate with each other by the sense of touch.

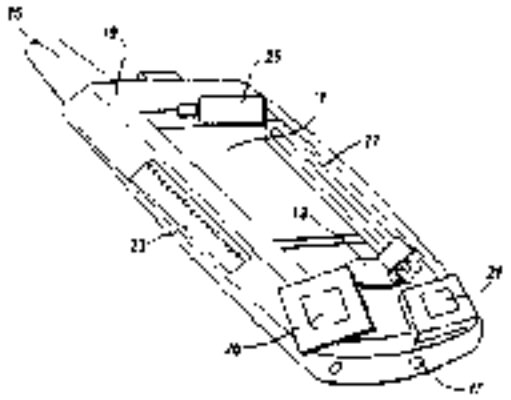


Fig.2

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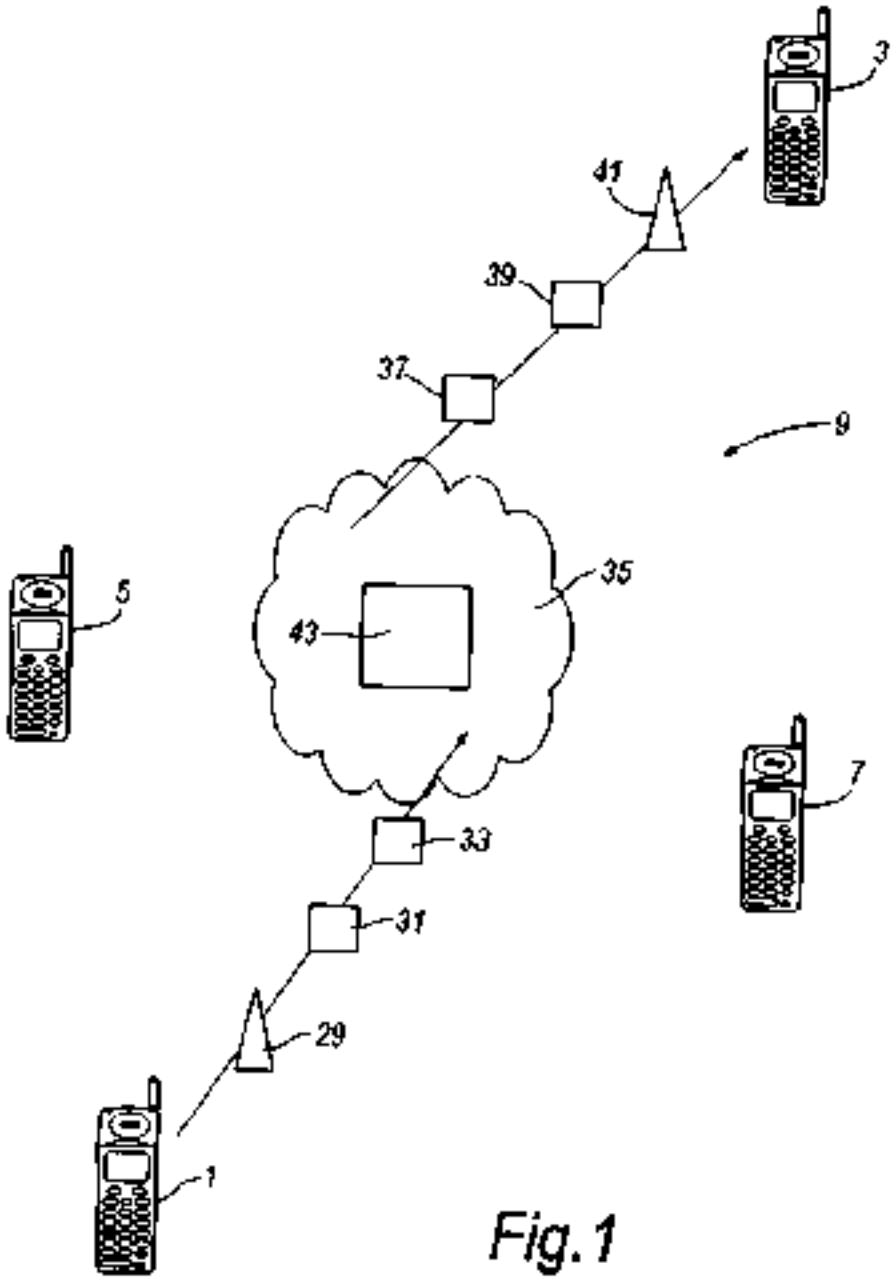


Fig.1

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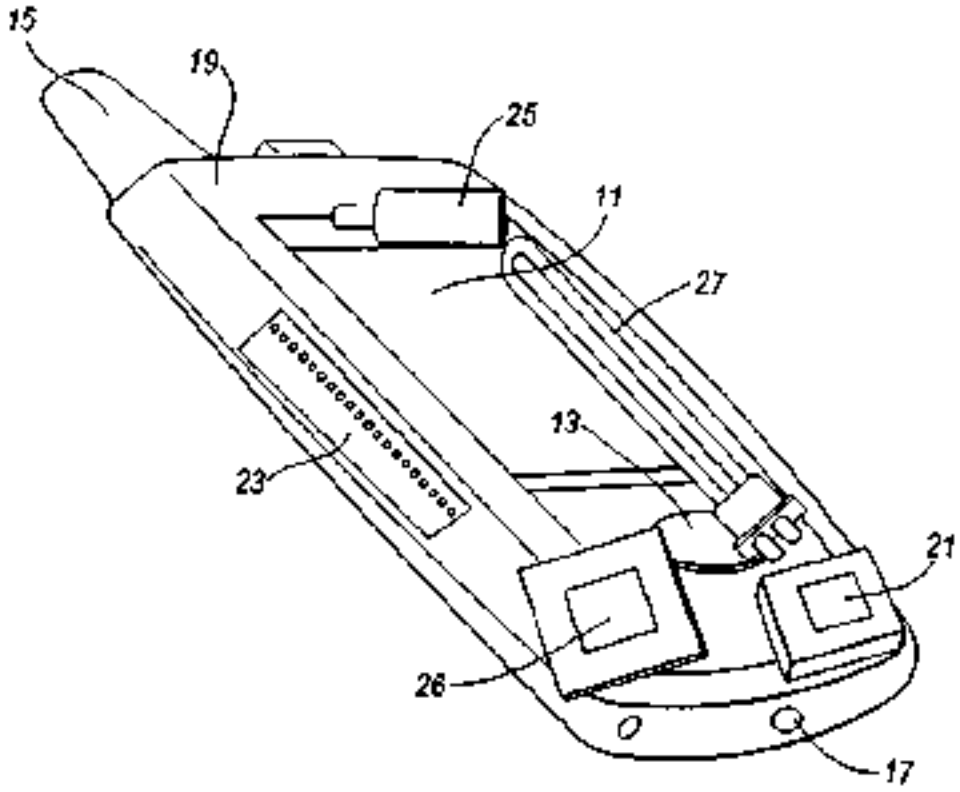


Fig.2

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NEW COMMUNICATION TYPE FOR MOBILE TELECOMMUNICATIONS NETWORKS

The present invention relates to a mobile telecommunications network, to terminals for use with a mobile telecommunications network and to a method of operating a mobile telecommunications network, and in particular to an arrangement in which communications can be enhanced by using the sense of touch.

In addition to voice calls between mobile terminals registered with a mobile telecommunications network, it is possible to send alphanumeric data in the form of an SMS or text message. Recent developments allow the transmission of multimedia messages (MMS) such as drawings, photographs, music and video clips. The present invention seeks to provide an additional type of communication using a mobile telecommunications network.

According to a first aspect of the present invention, there is provided a mobile telecommunications network including a plurality of terminals registered with the network, wherein a first of said terminals includes means for sensing the variation of a touch input with respect to time and generating a signal representative thereof; and including means for generating a message representative of said signal; and means for transmitting the message to a second of said terminals for generating an output in response to the message that is indicative of the touch input.

The message may be generated by the first terminal, the mobile telecommunications network or a separate entity.

The output may be a simulation or approximation of the input - it may stimulate the touch sense of the user of the second terminal to convey the touch

FITBIT 1002
Fitbit v. Immersion

input by the user of the first terminal, allowing the users to communicate by the sense of touch.

Alternatively, the output may be indicative of the touch input but may stimulate a different sense of the user of the second terminal - such as sight or hearing. This arrangement may be used when the second terminal is not capable of generating a touch output.

Particular touch inputs generate particular outputs (whether stimulating touch, sight or hearing). Particular inputs may be mapped to particular outputs. For example, shaking the first terminal may generate a particular audible message at the second terminal. This mapping may be pre-set and/or may be set by the users of the terminals or by a third party.

According to a second aspect of the present invention, there is provided a mobile telecommunications network, including means for receiving a message from a first terminal for delivery to a second terminal and for converting the message between a first type to a second type, wherein at least the first type of message includes data enabling the reproduction of an output by a terminal which output is detectable by the sense of touch and varies with respect to time in dependence upon the content of the message.

The data in the first type of message enabling the reproduction of an output by a terminal may data input from a terminal (which will subsequently be reproduced in some form) or data for generating an output from a terminal.

According to a third aspect of the present invention, there is provided a terminal for use with a mobile telecommunications network, the terminal including means for sensing a variation of a touch input with respect to time and generating a signal representative thereof, a representation of which is for

FITBIT 1002
Fitbit v. Immersion

inclusion in a message for transmission to another terminal for generating an output in response to the message that is indicative of the touch input.

According to a fourth aspect of the present invention, there is provided a terminal for use with a mobile telecommunications network, the terminal including means for receiving a message representative of an input signal generated by another terminal, means for generating an output detectable by the sense of touch and which varies with respect to time in dependence upon the content of the message.

According to a fifth aspect of the present invention, there is provided a method of operating a mobile telecommunications network having a plurality of terminals, the method including generating at a first of said terminals a signal representative of how a touch input varies with respect to time, generating a message representative of the signal, transmitting the message to a second of said terminals, and generating an output at the said second terminal in response to the message that is indicative of the touch input.

According to a sixth aspect of the present invention, there is provided a mobile telecommunication network including means for generating a message containing information for use by the user of a terminal, means for transmitting the message to said mobile terminal, and means for conveying the information to the user of said mobile terminal by stimulating the user's sense of touch.

Humans have five senses: sight, hearing, touch, smell and taste.

Known mobile terminals can detect visual and audible stimuli, convert these into a message and transmit this to another terminal via a mobile telecommunications network. For example, a user of a first mobile terminal may record a video clip (comprising sound and moving pictures) of themselves

FITBIT 1002
Fitbit v. Immersion

and transmit this as a message to a second mobile terminal, where it is reproduced, stimulating the sight and hearing sensors of the recipient. The present invention provides an enhancement to communications by allowing a touch input to be sensed by a mobile terminal and/or a touch output to be reproduced on a mobile terminal.

In the specification the term "touch" means anything that is detectable by the human sense of touch, and includes such stimuli as heating and vibration.

Some mobile terminals have the facility to vibrate in order to alert the user of an incoming call or message. However, the vibration is simply triggered by a mobile terminal on receipt of an incoming call or message. The vibration does not convey the content of the message.

Conventional mobile telephones are capable of receiving a touch input in the sense that they have buttons and other controls which are depressed. However, the nature of the touch input is not recorded and conveyed as part of a message. The depression of the key may result in data being recorded in a message (for example a letter in an SMS message), but the nature of the touching of the key (or how it varies with time) is not recorded or conveyed.

According to one aspect of the present invention the variation of a touch input with respect to time is sensed. The intensity of the touch input may be sensed.

The term mobile telecommunications "network" used in this specification does not necessarily refer to a single network operated by a particular (legal) entity. The network might comprise a plurality of separately operated networks, or a part of one of such networks.

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For a better understanding of the present invention, an embodiment will now be described by way of example, with reference to the accompanying drawings, in which:-

Figure 1 shows schematically principal elements of a mobile telecommunications network; and

Figure 2 shows schematically additional components provided to a mobile telecommunications terminal in accordance with an embodiment of the invention.

As shown in Figure 1, mobile terminals 1,3,5 and 7 are registered with a GSM or UMTS (3G) mobile or cellular telecommunications network 9. The mobile terminals may be hand held mobile telephones, personal digital assistants (PDAs) or laptop computers equipped with a datacard (or, of course, any combination of these). The mobile terminals communicate wirelessly with the mobile telecommunications network 9 via a radio access network comprising base transceiver stations (BTSs) and base station controllers (BSCs). Communications between the mobile terminals and the network 3 are routed from the radio access network via mobile switching centres (MSCs), which may be connected by a fixed (cable) link to the network 9. Of course, in practice, a typical mobile telecommunications network 9 will have many thousands of subscribers, each with one or more terminals.

Each of the mobile terminals 1,3,5,7 is provided with a respective subscriber identity module (SIM). During the manufacturing process of each SIM authentication information is stored thereon under control of the network 9. The network 9 itself stores details of each of the SIMs issued under its control. In operation of the network 9, a mobile terminal is authenticated (for example, when the user activates the terminal in the network with a view to making and

FITBIT 1002
Fitbit v. Immersion

receiving calls) by the network sending a challenge to the mobile terminal. The received challenge is passed to the SIM associated with the mobile terminal and the SIM calculates a reply (dependent on predetermined information held on the SIM - typically an authentication algorithm and a unique key Ki) and transmits it back to the network 9. The network receives the reply from the mobile terminal. Using information pre-stored concerning the content of the relevant SIM and the nature of the challenge sent to the mobile terminal, the network calculates the expected value of the reply from the mobile terminal. If the reply received matches the expected calculated reply, the SIM and the associated mobile terminal are considered to be authenticated.

A mobile terminal in accordance with an embodiment of the invention is shown in Figure 2. In a conventional manner the mobile terminal includes a visual display 11, various buttons and keys 13 and an antenna 15 for communication with the radio access network of the mobile telecommunications network 9. The mobile terminal also includes a microphone 17 for sensing audio input such as speech and a loudspeaker 19 for generating an audio output. The visual display 11 may provide a user interface such as a graphical user interface to facilitate access to functions provided by the mobile terminal and may also display messages received by the mobile terminal - such as alphanumeric text and pictures (moving or still). The mobile terminal also of course includes data processing circuitry (not shown) for allowing the user of the mobile terminal to control the terminal and for allowing wireless communications with the mobile telecommunications network 9. The features of the mobile terminal described thus far are conventional.

According to the embodiment the mobile terminal is provided with a motion sensor 21, such as a micro-accelerometer for detecting movement of the mobile terminal. A pressure sensor 23, such as a piezoelectric strip, is also provided for detecting, for example, squeezing, hitting and/or stroking of the mobile

FITBIT 1002
Fitbit v. Immersion

terminal. The sensors 21 and 23 allow the terminal to sense movement and pressure - for example caused by the user of the mobile terminal shaking the terminal or squeezing the terminal. The mobile terminal may be provided with an elastically deformable outer casing and may be configured to allow the outer casing to be resiliently compressed (for example, by squeezing) such that this is sensed by the pressure sensor 23.

Other sensors may also be provided that allow the mobile terminal to sense touch inputs (that is, inputs that would stimulate the human sense of touch). For example, the mobile terminal may also be provided with a temperature sensor.

The sensors 21 and 23 generate electrical signals in response to a touch input. These are detected by processing circuitry of the mobile terminal and may be stored or converted into a format suitable for transmission in the message to the mobile telecommunications network 9 and onwardly to another mobile terminal. The generation and transmission of such messages will be discussed further below.

In addition to providing sensors for receiving and recording a touch input, the mobile terminal also includes devices for generating a touch output (that is, devices that provide a stimulus to the human sense of touch). Motion output is created using a movement enabler 25 such as an electromagnetic device. Heat is generated using a heating element 27. Additionally, a pressure generation mechanism 26 may be provided for flexing (expanding/contracting) the resiliently deformable case of the mobile terminal These output types all stimulate the human sense of touch.

If the user of mobile terminal 1 wishes to communicate with the user of mobile terminal 3 using the mobile telecommunications network 9, data relating to the

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communication is routed wirelessly between mobile terminal 1 and the local BTS 29. From there the communication data is transmitted to the BSC 31 and to MSC 33 via a fixed or cable link. The mobile telecommunications network core 35 then routes the communication to an appropriate MSC 37 with which the mobile terminal 3 is registered. The communication data is transmitted from MSC 37 to the appropriate BSC 39, and from there to BTS 41. The communication data is transmitted from the BTS 41 wirelessly to the mobile terminal 3.

The communication data may be data representative of the users' voices in a conventional circuit switched voice call. The communication data may also be transmitted during a (packet switched) communication session between the mobile terminal 1 and the mobile terminal 3.

To efficiently facilitate such communication sessions, the third generation partnership project (3GPP) has recently defined a new concept known as IMS (IP-based multimedia subsystem). The aim of IMS is to allow users such as mobile telephone network operators to provide services to their subscribers as efficiently and effectively as possible. For example, the IMS architecture is likely to support the following communication types: voice, video, instant messaging, "presence" (a user's availability for contact), location-based services, email and web. Further communication types are likely to be added in the future. This diverse collection of communication devices requires efficient communication session management due to the number of different applications and services that will be developed to support these communication types. The 3GPP have chosen session initiation protocol (SIP) for managing these sessions.

SIP protocol is a session-based protocol designed to establish IP based communication sessions between two or more points or users. Once the SIP

FITBIT 1002
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session has been established, communication between these end points or users can be carried out using a variety of different protocols (for example, those designed for streaming audio and video). These protocols are defined in the SIP session initiation messages.

With IMS, users are no longer restricted to a separate voice call or data session. Sessions can be established between mobile terminals that allow a variety of communication types to be used and media to be exchanged. The sessions are dynamic in nature in that they can be adapted to meet the needs of the end users. For example, two users might start a session with an exchange of instant messages and then decide that they wish to change to a voice call, possibly with video. This is all possible within the IMS framework. If a user wishes to send a file to another user and the users already have a session established between each other (for example, a voice session), the session can be redefined to allow data file exchange to take place. This session redefinition is transparent to the end user.

One application of IMS is push-to-talk over cellular (PoC). PoC allows a communication session to be established between a group of devices such that the user of one of the devices can speak and the users of the or each of the other devices will hear that person speak. During such communication session each device functions like a two-way radio or walkie-talkie in a one-to-one or one-to-many group mode. Full duplex speech communication between the users of the respective devices during the PoC part of the communication is not possible - only one user can speak at a time.

One feature of PoC is that, when the communication is established, there is an "always on" communication in between the terminals. When a user wishes to talk to the or each of the other terminals associated with the communication session, the user issues an appropriate instruction to their device (typically

FITBIT 1002
Fitbit v. Immersion

using a soft key - that is, a key whose function is programmable), and the user's speech is captured by their terminal instantly, or within a relatively short mode of time, is transmitted to the or each of the other terminals and is reproduced on those terminals. There is no requirement for the user inputting the speech data to dial the or each other device, and nor is there any requirement for the users of the devices receiving the speech to take any action to receive the speech data - it is automatically reproduced by the device when it is received (assuming, of course, the device is operating in an appropriate mode for allowing PoC communication).

PoC is described in the document 'Push-to-talk over Cellular (PoC) - architecture, draft version 1.0 - 13th February 2004" available from the Open Mobile Alliance Limited (OMA).

In addition to establishing a PoC communication session using IMS, a PoC communication session could be established over existing GSM/GPRS networks by the exchange of data packets but without IMS.

In the embodiment of the present invention, the touch input of mobile terminal 1 is sensed by sensors 21 and/or 23 and a signal representative thereof is generated by the mobile terminal 1. In accordance with a feature of the present embodiment, this touch input is used as a means of communicating with the user of mobile terminal 3. The signal derived from the sensors 21 and/or 23 is encoded and transmitted to the network core 35 via BTS 29, BSC 31 and MSC 33. In the network core 35 a translation server 43 is provided which receives the encoded signal and generates a suitable output message representative of the encoded signal. The output message is transmitted to the mobile terminal 3 via MSC 37, BSC 39 and BTS 41.

FITBIT 1002
Fitbit v. Immersion

The data communicated between the mobile terminal 1 and the mobile terminal 3 may be transmitted by any suitable means. The data may be transmitted in the circuit switched domain, but is preferably transmitted in the packet switched domain. The data may be transmitted as GPRS data, as an SMS message or an MMS message. The data may also be transmitted during a IMS communication session (controlled by SIP) between the mobile terminals 1 and 3 (and possibly other mobile terminals). The data may be transmitted as part of a PoC communication session, so that when the message is received by the mobile terminal 3 an appropriate output is generated (preferably immediately) without requiring any action of the user of the mobile terminal 3. In this regard, although PoC relates to push-to-"talk", in fact any type of data can be communicated during such a session.

In a first example, it will be assumed that both mobile terminal 1 and mobile terminal 3 include the features of the mobile terminal shown in Figure 2. In mobile terminal 1 the touch input signals generated as a result of pressure, movement or heating of the mobile terminal 1 have the electrical signals generated thereby recorded and stored by their mobile terminal 1. How the signals received from the sensors vary with respect to time is recorded. For example, the variation in pressure applied to pressure sensor 23 may be recorded for a predetermined period of, for example, one, two, or five seconds (or of any other duration). Simultaneously, or during a different time period, the signals generated by the movement sensor 21 may be recorded and stored. The data processor of the mobile terminal 1 then encodes the signals in a suitable format such that their data content can be extracted by a receiving device. Typically, the data will be encoded as binary data. Suitable methods for encoding such data will be known to those skilled in the art and will not be described further here.

FITBIT 1002
Fitbit v. Immersion

A communication session (for example, a IMS, SIP controlled, communication session) between mobile terminal 1 and mobile terminal 3 is then initiated in a known manner if not already established. The encoded data is transmitted to the network core 35, where it is passed to translation server 43. In this example the translation server 43 need not take any action because the mobile terminals 1 and 3 are the same type of mobile terminal. The translation server 43 then issues a message comprising the encoded data to the mobile terminal 3. On receipt of the message the mobile terminal 3 decodes the message and applies appropriate electrical signals to movement enabler 25, pressure generation mechanism 26 and any other touch output devices provided. The touch output or outputs generated by the mobile terminal 3 will, if the user is in contact with mobile terminal 3, stimulate the touch sense of the user. The touch output is an approximation of the touch input to mobile terminal 1. For example, the squeezing of mobile terminal 1 will temporarily change the shape of its casing. The touch output of the mobile terminal 3 will cause a corresponding temporary change in the shape of the terminal 3. The users of mobile terminals 1 and 3 can therefore communicate with each other using the sense of touch.

If the user of mobile terminal 3 does not have a mobile terminal of the type illustrated in Figure 2, or at least has a mobile terminal of a different type to the mobile terminal 1, the translation server 43 is operative to process the encoded data received from the mobile terminal 1 to convert it into a suitable message for reproduction by the mobile terminal 3. For example, the user of mobile terminal 3 may not have a movement enabler 25. In such an instance, the translation server may generate the message such that the output produced by the mobile terminal 3 is an audible and/or visible output. That is, data encoded from the motion sensor 21 and/or pressure sensor 23 is detected by the translation server 43 and is converted into an encoded signal for generating a different type of output from the sensed input.

FITBIT 1002
Fitbit v. Immersion

For example, the encoded signals representing the touch input sensed by the motion sensor 21 and the pressure sensor 23 may be analysed by the translation server 43, where it is determined that these signals are indicative of the user of mobile terminal 1 stroking the mobile terminal. The translation server 43 then accesses a look-up table to determine to which type of output this type of input should be mapped. In this example, it is indicated that the output should be mapped to a simulated voice output generating an "oooh" sound. Similarly, if the translation server determines that the signals input to the movement sensor 21 and pressure sensor 23 are indicative of the mobile terminal 1 being squeezed by the user, the look-up table may indicate that the appropriate output is an audio voice simulation output generating the sound "aaah". Further, if it is determined from the sensors 21,23 that the mobile terminal has been shaken, the look-up table may indicate that the appropriate output is the signal to cause the display 11 of the mobile terminal 3 to have a red colour. Furthermore, if the signals derived from the sensor 21,23 indicate that the mobile terminal has been dropped, the appropriate output message may be a signal to cause the display to flash between red and blue colours.

It should of course be understood that these are merely examples of the translation of types of input to types of output. The output may stimulate more than one sense - for example, the output may produce both an audible and a visual stimulus to the user of mobile terminal 3, or a visual output and a touch output.

The mapping of the inputs of mobile terminal 1 to the appropriate output of mobile terminal 3 may be predetermined or preset by the mobile terminal 1, the mobile terminal 3 or the network 9. The mapping may depend upon the functionality of the mobile terminal 1 and/or the mobile terminal 3 - for example, whether the terminal has the facility to detect and/or reproduce movement. The type of message that needs to be generated by the translation

FITBIT 1002
Fitbit v. Immersion

server 43 to cause the receiving mobile terminal 3 to produce the desired output type may depend upon the particular type of mobile terminal 3, and this information may be obtained from the look-up table. If the mobile terminal 3 has a standard operating system, this may not be necessary.

As indicated above, the mapping of particular input stimuli to output stimuli may be predetermined or pre-set. The user of mobile terminal and/or the user of mobile terminal 3 may be able to select which input stimuli are mapped to which output stimuli, for example by appropriate data communication with the translation server 43. For example, the users of mobile terminals 1 and 3 may agree a particular form of communication between themselves. For example, the users may agree that the sensed squeezing of the mobile terminal 1 by pressure sensor 23 will cause heat generation by heating element 27 in mobile terminal 3. This allows the user of mobile terminals 1 and 3 to communicate in a manner that will not disturb others around them and which is only understandable to the users. Even if the heat output at the mobile terminal 3 was detected by the person other than the authorised user of mobile terminal 3, that person would not know what the generation of heat signified. If desired, this allows communications between the users of the mobile terminals 1 and 3 that have an element of secrecy.

The table below shows the entries of the look-up table stored in the translation server 43 in relation to the mobile terminal 1, indicating the appropriate output to receiving mobile terminals A,B,C and D, depending upon the input from mobile terminal 1.

Mobile terminal 1				
Input	**Output of Mobile terminal A**	**Output of Mobile terminal B**	**Output of Mobile terminal C**	**Output of Mobile terminal D**
Vertical stroke	Simulation of vertical stroke	Audio: "oooh"	Vibration	MMS image: ☺

FITBIT 1002
Fitbit v. Immersion

Squeeze	Simulation of Squeeze	Audio: "aaah"	Heat generation	MMS image:
Shake	Simulation of Shake	Display colour to red	Audio: "John is fine"	MMS image:
Drop	Simulation of Drop	Display flashes red/blue	Audio: "John is cross"	MMS image:

The mapping of particular input stimuli to output stimuli between any pair of mobile terminals may be set by the users of those terminals, or may be preset in dependence upon the input and output facilities of those terminals.

The mapping may also be set or altered by a third party - i.e. not the mobile terminals or the network. For example, mapping data may be obtained from a website and passed to the translation server 43. Such a website may, by way of illustration, be for users interested in massage. Details of the type of mobile terminals 1 and 3 may be provided to the website. The website may then provide for downloading suitable mapping coding that allows the user of mobile terminal 1 to cause the mobile terminal 3 to produce a touch output for performing a particular type of massage. The user of the mobile terminal 1 may do this by providing as an input a particular touch input, alphanumeric character or sound. The website may download a menu for providing a user interface for the user of mobile terminal 1 that provides a convenient mechanism for the desired touch output for mobile terminal 3 to be selected.

As an alternative, or in addition to, the translation server 43 being provided by the network core 35, the mobile terminal 1 may be provided with a data processing function that generates an appropriately formatted message that produces the desired output stimuli on the mobile terminal 3 when transmitted to that mobile terminal 3 without modification. Alternatively, the receiving mobile terminal 3 may receive encoded signals from the sensors 21 and/or 23 of the sending mobile terminal and may include a data processing function for converting those received data to an appropriate message to generate the

FITBIT 1002
Fitbit v. Immersion

desired output stimuli on the mobile terminal 3. These data processing functions may require a considerable amount of processing power, and at present it is preferred that these are performed by the network core 35, rather than the mobile terminals 1 and 3.

It should be understood that an output corresponding to the input stimuli of the mobile terminal 1 may be transmitted (possibly simultaneously) to a plurality of receiving terminals. The output stimuli generated by each of the receiving terminals may be different, in dependence upon the data in the relevant part of the look-up table accessed by the translation server 43 in respect of the receiving terminal and/or upon the output facilities of the receiving mobile terminal.

The touch output generated by the receiving mobile terminal may be in addition to conventional forms of visual and/audio output. During a single communication session (such as an IMS SIP controlled communication session), voice data, other audio data, picture data and touch data may be transmitted, providing an enriched communications experience between the users of mobile terminals 1 and 3.

FITBIT 1002
Fitbit v. Immersion

CLAIMS

1. A mobile telecommunications network including a plurality of terminals registered with the network, wherein a first of said terminals includes means for sensing the variation of a touch input with respect to time and generating a signal representative thereof; and including means for generating a message representative of said signal; and means for transmitting the message to a second of said terminals for generating an output in response to the message that is indicative of the touch input.

2. The network of claim 1, wherein the message is generated by a data processor of the first terminal.

3. The network of claim 1, wherein the message is generated by a data processor of an entity separate from the first terminal.

4. The network of claim 1, wherein the message is generated by a data processor associated with the mobile telecommunications network.

5. The network of claim 1, wherein the output is generated by a data processor of the second terminal.

FITBIT 1002
Fitbit v. Immersion

6. The network of any one of claims 1 to 5, wherein the output is a simulation or approximation of the touch input.

7. The network of any one of claims 1 to 5, wherein the output is indicative of the touch input but is an audible and/or visible output.

8. The network of any one of claims 1 to 7, including means for mapping selected inputs to generate selected outputs to provide a predetermined relationship therebetween.

9. The network of claim 8, wherein said mapping is determined by the first terminal.

10. The network of claim 8, wherein said mapping is determined by the second terminal.

11. The network of claim 8, wherein said mapping is determined by the mobile telecommunications network.

12. The network of claim 8, wherein said mapping is determined by a third party entity, separate from said terminals and the mobile telecommunications network.

FITBIT 1002
Fitbit v. Immersion

13. The network of any one of claims 1 to 12, wherein the sensing means includes a motion sensor.

14. The network of claim 13, wherein the motion sensor includes a micro-accelerometer.

15. The network of any one of claims 1 to 14, wherein the sensing means includes a pressure sensor.

16. The network of claim 15, wherein the pressure sensor includes a piezoelectric device.

17. The network of any one of claims 1 to 16, wherein the network comprises a GSM mobile telecommunications network.

18. The network of any one of claims 1 to 16, wherein the network comprises a UMTS (3G) mobile telecommunications network.

19. The network of any one of claims 1 to 18, wherein the network comprises a GPRS mobile telecommunications network.

20. The network of any one of claims 1 to 19, wherein the message is transmitted in a push-to-talk over cellular (PoC) communication session.

FITBIT 1002
Fitbit v. Immersion

21. The network of any one of claims 1 to 20, wherein the message is transmitted in a session initiation protocol (SIP) session.

22. The network of any one of claims 1 to 19, wherein the message is an SMS message.

23. The network of any one of claims 1 to 19, wherein the message is an MMS message.

24. A mobile telecommunications network, including means for receiving a message from a first terminal for delivery to a second terminal and for converting the message between a first type to a second type, wherein at least the first type of message includes data enabling the reproduction of an output by a terminal which output is detectable by the sense of touch and varies with respect to time in dependence upon the content of the message.

25. The network of claim 24 wherein the second type of message includes data enabling the production of an output by a terminal detectable by the sense of touch.

26. The network of claim 24, wherein the second type of message includes data enabling the production of an audible output.

FITBIT 1002
Fitbit v. Immersion

27. The network of claim 24, wherein the second type of message includes data enabling the production of a visible output by a terminal.

28. A terminal for use with a mobile telecommunications network, the terminal including means for sensing a variation of a touch input with respect to time and generating a signal representative thereof, a representation of which is for inclusion in a message for transmission to another terminal for generating an output in response to the message that is indicative of the touch input.

29. A terminal for use with a mobile telecommunications network, the terminal including means for receiving a message representative of an input signal generated by another terminal, means for generating an output detectable by the sense of touch and which varies with respect to time in dependence upon the content of the message.

30. A method of operating a mobile telecommunications network having a plurality of terminals, the method including generating at a first of said terminals a signal representative of how a touch input varies with respect to time, generating a message representative of the signal, transmitting the message to a second of said terminals, and generating an output at the said second terminal in response to the message that is indicative of the touch input.

FITBIT 1002
Fitbit v. Immersion

31. The method of claim 30, including generating the message at the first terminal.

32. The method of claim 30, including generating the message using a data processor associated with the mobile telecommunications network.

33. The method of claim 30, 31 or 32, wherein the output is a simulation or approximation of the touch input.

34. The method of claim 30, 31,32 or 33, wherein the output is indicative of the touch input but is an audible and/or visible output.

35. The method of any one of claims 30 to 34, including receiving said signal representative of how a touch input varies with respect to time, generating said message such that said output is produced for stimulating a selected human sense.

36. The method of any one of claims 30 to 35, including transmitting the message in a push-to-talk over cellular (PoC) communication session.

37. The method of any one of claims 30 to 35, including transmitting the message in a session initiation protocol (SIP) communication session.

FITBIT 1002
Fitbit v. Immersion

38. The method of any one of claims 30 to 35, including transmitting the message as an SMS message.

39. The method of any one of claims 30 to 35, including transmitting the message as an MMS message.

40. The method of any one of claims 30 to 39, wherein the mobile telecommunications network comprises a GSM, GPRS or UMTS (3G) mobile telecommunications network.

41. A mobile telecommunication network including means for generating a message containing information for use by the user of a terminal, means for transmitting the message to said mobile terminal, and means for conveying the information to the user of said mobile terminal by stimulating the user's sense of touch.

42. A mobile telecommunications network substantially as hereinbefore described with reference to and/or substantially as illustrated in any one of or any combination of the accompanying drawings.

43. A terminal for use with a mobile telecommunications network, substantially as hereinbefore described with reference to and/or substantially as illustrated in any one of or any combination of the accompanying drawings.

FITBIT 1002
Fitbit v. Immersion

44. A method of operating a mobile telecommunications network, substantially as hereinbefore described with reference to and/or substantially as illustrated in any one of or any combination of the accompanying drawings.

FITBIT 1002
Fitbit v. Immersion

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Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1 & 28 at least	GB 2308523 A	(NORTHERN TELECOM LTD) Abstract, figure 3 - 7.
X	28 at least	US 2003/064686 A1	(PHILIPS) see the figures and paragraph 0013
X	28 at least	US 2002/180698 A1	(KAELBLING) see abstract and paragraph 0028
A	-	WO 03/051062 A2	(IMMERSION CORP) Abstract, text e.g. page 3, line 4 - page 4, line 14, page 6, line 17 - page 7, line 14 and page 7, line 29 - page 8, line 33. Figure 1 - 4.
A	-	WO 04/053670 A2	(IMMERSION CORP ET AL.) Abstract, text e.g. page 3, line 24 - page 4, line 34, page 9 line 23 - page 11, line 24. Figure 1 - 6.
A	-	"Mobiles get a sense of touch" BBC News, 21th January 2003. Downloaded from http://news.bbc.co.uk/1/hi/technology/2677813.stm Whole document.	

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
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FITBIT 1002
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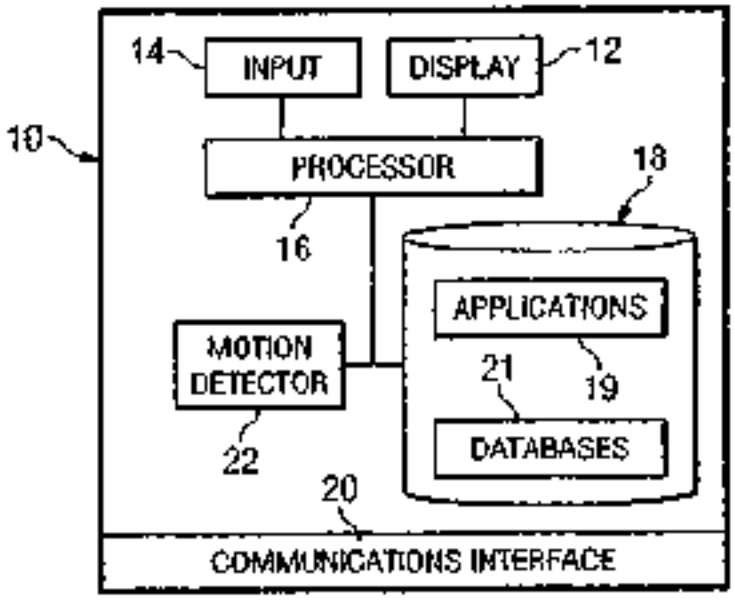
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(54) Title: DISTINGUISHING TILT AND TRANSLATION MOTION COMPONENTS IN HANDHELD DEVICES



(57) Abstract: A motion controlled handheld device includes a first accelerometer operable to detect acceleration along a first axis and a second accelerometer operable to detect acceleration along a second axis. The second axis is perpendicular to the first axis. The device includes a tilt detection component operable to detect rotation having a component around at least one of the first axis and the second axis and a display operable to present a current image. The device includes a motion tracking module operable to track motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component. The device also includes a controller operable to generate the current image and to modify the current image in response to the motion of the device.

WO 2005/103863 A2

FITBIT 1002
Fitbit v. Immersion

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FITBIT 1002
Fitbit v. Immersion

DISTINGUISHING TILT AND TRANSLATION MOTION COMPONENTS IN HANDHELD DEVICES

TECHNICAL FIELD

The present invention relates generally to portable devices and, more particularly, to portable devices with a motion interface.

BACKGROUND

The use of computing devices, such as cellular phones and personal digital assistants (PDAs) has grown rapidly. Such devices provide many different functions to users through different types of interfaces, such as keypads and displays. Some computing devices utilize motion as an interface by detecting tilt of the device by a user. Some implementations of a motion interface involve tethering a computing device with fishing lines or carrying large magnetic tracking units that require large amounts of power.

SUMMARY

In accordance with the present invention, a handheld device with motion a motion interface is provided.

In accordance with a particular embodiment, a motion controlled handheld device includes a first accelerometer operable to detect acceleration along a first axis and a second accelerometer operable to detect acceleration along a second axis. The second axis is perpendicular to the first axis. The device includes a tilt detection component operable to detect rotation having a component around at least one of the first axis and the second axis and a display operable to present a current image. The device includes a motion tracking module operable to track motion of the device in

FITBIT 1002
Fitbit v. Immersion

three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component. The device also includes a controller operable to generate the current image and to modify the current image in response to the motion of the device.

The display may comprise a viewable surface, and the first axis and the second axis may be substantially parallel to the viewable surface. The tilt detection component may comprise a third accelerometer operable to detect acceleration along a third axis, where the third axis is perpendicular to the first axis and perpendicular to the second axis. The motion tracking module may be further operable to distinguish translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer. The tilt detection component may comprise a third accelerometer operable to detect acceleration along a third axis, where the third axis is perpendicular to the first axis and perpendicular to the second axis. The tilt detection component may also comprise a camera operable to generate a video stream and a video analysis module operable to detect a direction of motion based on the video stream.

In accordance with another embodiment, a method for controlling a handheld device comprises detecting acceleration along a first axis using a first accelerometer and detecting acceleration along a second axis using a second accelerometer. The second axis is perpendicular to the first axis. The method also includes detecting rotation having a component around at least one of the first axis and the second axis using a tilt detection component and tracking motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component. The method includes displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

Technical advantages of particular embodiments of the present invention include a handheld device with motion detection components capable of distinguishing between tilt and translation of the device and a plane of translation. Accordingly, the device can recognize a larger number of motions to serve as input thus increasing the device's functionality. In some embodiments, a number of

FITBIT 1002
Fitbit v. Immersion

different types of motion detection components may be combined and utilized thus allowing a manufacturer to design the device using the most suitable components depending on the functionalities desired for the device.

Other technical advantages will be readily apparent to one skilled in the art from the following figures, descriptions and claims. Moreover, while specific advantages have been enumerated above, various embodiments may include all, some or none of the enumerated advantages.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of particular embodiments of the invention and their advantages, reference is now made to the following descriptions, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 illustrates a handheld device with motion interface capability, in accordance with a particular embodiment;

FIGURE 2 illustrates a motion detector of the handheld device of FIGURE 1, in accordance with a particular embodiment;

FIGURE 3 illustrates the use of motion detector components of the handheld device of FIGURE 1, in accordance with a particular embodiment;

FIGURE 4 illustrates an example handheld device with motion detection capability, in accordance with a particular embodiment;

FIGURE 5 illustrates an example of selection and amplification of a dominant motion of a handheld device, in accordance with a particular embodiment;

FIGURE 6 is a flowchart illustrating preferred motion selection, in accordance with a particular embodiment;

FIGURE 7 is a flowchart illustrating the setting of a zero-point for a handheld device, in accordance with a particular embodiment;

FIGURE 8 illustrates an example of scrubbing functionality with a handheld device for virtual desktop navigation, in accordance with a particular embodiment;

FIGURE 9 is a flowchart illustrating the scrubbing process of FIGURE 8, in accordance with a particular embodiment;

FIGURE 10A illustrates an example of menu navigation using gesture input, in accordance with a particular embodiment;

FITBIT 1002
Fitbit v. Immersion

FIGURE 10B illustrates example gestures which may be used to perform various functions at a handheld device, in accordance with a particular embodiment;

FIGURE 11 illustrates an example of map navigation using motion input, in accordance with a particular embodiment;

FIGURE 12A illustrates a form of motion input cursor navigation, in accordance with a particular embodiment;

FIGURE 12B illustrates another form of motion input cursor navigation, in accordance with a particular embodiment;

FIGURE 13 is a flowchart illustrating a process for utilizing feedback in response to motion input, in accordance with a particular embodiment;

FIGURE 14 illustrates an example system utilizing spatial signatures with a handheld device, in accordance with a particular embodiment;

FIGURE 15 illustrates an example system in which motion input of a handheld device controls multiple other devices, in accordance with a particular embodiment;

FIGURE 16 is a flowchart illustrating an environmental modeling process of a handheld device, in accordance with a particular embodiment;

FIGURE 17 illustrates example gestures which may be mapped to different functions of a handheld device, in accordance with a particular embodiment;

FIGURE 18 is a flowchart illustrating the utilization of a preexisting symbol gesture, in accordance with a particular embodiment;

FIGURE 19 is a flowchart illustrating the use of context-based gesture mapping, in accordance with a particular embodiment;

FIGURE 20 is a flowchart illustrating the use of user-based gesture mapping, in accordance with a particular embodiment;

FIGURE 21 is a flowchart illustrating the assignment process for user-created gestures, in accordance with a particular embodiment;

FIGURE 22 illustrates three gestures input using a handheld device with varying levels of precision, in accordance with a particular embodiment; and

FIGURE 23 is a flowchart illustrating a gesture recognition process utilizing a number of features, in accordance with a particular embodiment.

FITBIT 1002
Fitbit v. Immersion

DETAILED DESCRIPTION

FIGURE 1 illustrates a handheld device 10 with motion interface capability, in accordance with a particular embodiment of the present invention. Handheld device 10 can recognize movement of the device and can perform various functions corresponding to such movement. Thus, movement of the device operates as a form of input for the device. Such movement input may directly alter what is being displayed on a device display or may perform other functions. Handheld device 10 may comprise a mobile phone, personal digital assistant (PDA), still camera, video camera, pocket calculator, portable radio or other music or video player, digital thermometer, game device, portable electronic device, watch or any other device capable of being held or worn by a user. As indicated in the examples listed above, handheld device 10 may include wearable portable devices such as watches as well. A watch may include any computing device worn around a user's wrist.

Handheld device 10 includes a display 12, input 14, processor 16, memory 18, communications interface 20 and motion detector 22. Display 12 presents visual output of the device and may comprise a liquid crystal display (LCD), a light emitting diode (LED) or any other type of display for communicating output to a user. Input 14 provides an interface for a user to communicate input to the device. Input 14 may comprise a keyboard, keypad, track wheel, knob, touchpad, stencil or any other component through which a user may communicate an input to device 10. In particular embodiments, display 12 and input 14 may be combined into the same component, such as a touchscreen.

Processor 16 may be a microprocessor, controller or any other suitable computing device or resource. Processor 16 is adapted to execute various types of computer instructions in various computer languages for implementing functions available within system handheld device 10. Processor 16 may include any suitable controllers for controlling the management and operation of handheld device 10.

Memory 18 may be any form of volatile or nonvolatile memory including, without limitation, magnetic media, optical media, random access memory (RAM), read only memory (ROM), removable media or any other suitable local or remote memory component. Memory 18 includes components, logic modules or software executable by processor 16. Memory 18 may include various applications 19 with

FITBIT 1002
Fitbit v. Immersion

user interfaces utilizing motion input, such as mapping, calendar and file management applications, as further discussed below. Memory 18 may also include various databases, such as gesture databases and function or gesture mapping databases, as further discussed below. Components of memory 18 may be combined and/or divided for processing according to particular needs or desires within the scope of the present invention. Communications interface 20 supports wireless or wireline communication of data and information with other devices, such as other handheld devices, or components.

Motion detector 22 tracks movement of handheld device 10 which may be used as a form of input to perform certain functions. Such input movement may result from a user moving the device in a desired fashion to perform desired tasks, as further discussed below.

It should be understood that handheld device 10 in accordance with particular embodiments may include any suitable processing and/or memory modules for performing the functions as described herein, such as a control module, a motion tracking module, a video analysis module, a motion response module, a display control module and a signature detection module.

In particular embodiments, input movement may be in the form of translation and/or gestures. Translation-based input focuses on a beginning point and endpoint of a motion and differences between such beginning points and endpoints. Gesture-based input focuses on an actual path traveled by the device and is a holistic view of a set of points traversed. As an example, when navigating a map using translation-based input, motion in the form of an "O" may change the display during the movement but may ultimately yield no change between the information displayed prior to the movement and the information displayed at the end of the movement since the device presumably will be in the same point as it started when the motion ends. However, in a gesture input mode the device will recognize that it has traveled in the form of an "O" because in gesture-based input the device focuses on the path traveled during the motion or movement between a beginning point and an endpoint of the gesture (e.g., even though the beginning and endpoints may be the same). This gesture "O" movement may be mapped to particular functions such that when the device recognizes it has traveled along a path to constitute an "O" gesture, it may

FITBIT 1002
Fitbit v. Immersion

perform the functions, as further elaborated upon below. In particular embodiments, movement of the device intended as a gesture may be recognized as by the device as a gesture by matching a series, sequence or pattern of accelerations of the movement to those defining gestures of a gesture database.

Handheld devices in accordance with other embodiments may not include some of the components of the device illustrated in FIGURE 1. For example, some embodiments may include a handheld device 10 without an input 14 separate from a motion detector such that motion of the device provides the sole or primary input for the device. It should be noted that handheld devices in accordance with other embodiments may include additional components not specifically illustrated with respect to device 10.

FIGURE 2 illustrates motion detector 22 of FIGURE 1, in accordance with a particular embodiment of the present invention. In this embodiment, motion detector 22 includes accelerometers 24a, 24b and 24c; cameras 26a, 26b and 26c; gyros 28a, 28b and 28c; rangefinders 30a, 30b and 30c; and a processor 32.

Accelerometers 24a, 24b and 24c detect movement of the device by detecting acceleration along a respective sensing axis. A particular movement of the device may comprise a series, sequence or pattern of accelerations detected by the accelerometers. When the handheld device is tilted along a sensing axis of a particular accelerometer, the gravitational acceleration along the sensing axis changes. This change in gravitational acceleration is detected by the accelerometer and reflects the tilt of the device. Similarly, translation of the handheld device, or movement of the device without rotation or tilt also produces a change in acceleration along a sensing axis which is also detected by the accelerometers.

In the illustrated embodiment, accelerometer 24a comprises an x-axis accelerometer that detects movement of the device along an x-axis, accelerometer 24b comprises a y-axis accelerometer that detects movement of the device along a y-axis and accelerometer 24c comprises a z-axis accelerometer that detects movement of the device along a z-axis. In combination, accelerometers 24a, 24b and 24c are able to detect rotation and translation of device 10. As indicated above, rotation and/or translation of device 10 may serve as an input from a user to operate the device.

FITBIT 1002
Fitbit v. Immersion

The use of three accelerometers for motion detection provides certain advantages. For example, if only two accelerometers were used, the motion detector may not be able to disambiguate translation of the handheld device from tilt in the plane of translation. However, using a third, z-axis accelerometer (an accelerometer with a sensing axis at least approximately perpendicular to the sensing axes of the other two accelerometers) enables many cases of tilt to be disambiguated from many cases of translation.

It should be understood that some unique movements may exist that may not be discernible from each other by accelerometers 24a, 24b and 24c. For example, movement comprising a certain rotation and a certain translation may appear to accelerometers 24a, 24b and 24c as the same movement as a different movement that comprises a different particular rotation and a different particular translation. If a motion detector 22 merely included three accelerometers to detect movement (without any additional components to ensure greater accuracy), some unique, undiscernible movements may be mapped to the same function or may not be mapped to a function to avoid confusion.

As indicated above, motion detector 22 also includes cameras 26a, 26b and 26c, which may comprise charge coupled device (CCD) cameras or other optical sensors. Cameras 26a, 26b and 26c provide another way to detect movement of the handheld device (both tilt and translation). If only one camera were installed on a device for movement detection, tilt of the device may be indistinguishable from translation (without using other motion detection components, such as accelerometers). However, by using at least two cameras, tilt and translation may be distinguished from each other. For example, if two cameras were installed on handheld device 10 (one on the top of the device and one on the bottom of the device), each camera would see the world moving to the right when the device was translated to the left. If the device is lying horizontally and is rotated by lifting its left edge while lowering its right edge, the camera on the bottom will perceive the world as moving to the right while the camera on the top will perceive the world as moving to the left. Thus, when a device is translated, cameras on opposite surfaces will see the world move in the same direction (left in the example given). When a device is rotated, cameras on opposite surfaces will see the world move in opposite directions.

FITBIT 1002
Fitbit v. Immersion

This deductive process can be reversed. If both cameras see the world moving in the same direction, then the motion detector knows that the device is being translated. If both cameras see the world moving in opposite directions, then the motion detector knows that the device is being rotated.

When the device is rotated, the magnitude of the movement of the world to the cameras is directly related to the magnitude of the rotation of the device. Thus, the amount of the rotation can accurately be determined based on such movement of the world to the cameras. However, when the device is translated, the magnitude of the translation is related to both the magnitude of the movement of the world to the cameras and to the distance to the objects in the field of view of the cameras. Therefore, to accurately determine amount of translation using cameras alone, some form of information concerning the distance to objects in the camera fields of view must be obtained. However, in some embodiments cameras with rangefinding capability may be used.

It should be understood that even without distance information, optical information can be of significant value when correlated against the information from accelerometers or other sensors. For example, optical camera input may be used to inform the device that no significant motion is taking place. This could provide a solution to problems of drift which may be inherent in using acceleration data to determine absolute position information for certain device functions.

As discussed above, distance information may be useful to determine amount of translation when cameras are being used to detect movement. In the illustrated embodiment, such distance information is provided by rangefinders 30a, 30b and 30c. Rangefinders 30a, 30b and 30c may comprise ultrasound rangefinders, laser rangefinders or any other suitable distance measuring component. Other components may also be used to determine distance information. For example, cameras with rangefinding capability may be used, and multiple cameras may be utilized on the same side of the device to function as a range-finder using stereopsis. Determined distance information allows for accurate and explicit computation of the portion of any apparent translation that is due to translation and the portion that is due to rotation.

FITBIT 1002
Fitbit v. Immersion

As indicated above, motion detector 22 additionally includes gyros 28a, 28b and 28c. Gyros 28a, 28b and 28c are used in combination with the other components of motion detector 22 to provide increased accuracy in detecting movement of device 10.

Processor 32 processes data from accelerometers 24, cameras 26, gyros 28 and rangefinders 30 to produce an output indicative of the motion of device 10. Processor 32 may comprise a microprocessor, controller or any other suitable computing device or resource, such as a video analysis module for receiving a video stream from each camera. In some embodiments, the processing described herein with respect to processor 32 of motion detector 22 may be performed by processor 16 of handheld device 10 or any other suitable processor, including processors located remote to the device.

As discussed above, motion detector 22 includes three accelerometers, three cameras, three gyros and three rangefinders. Motion detectors in accordance with other embodiments may include fewer or different components than motion detector 22. For example, some embodiments may include a motion detector with three accelerometers and no cameras, gyros or rangefinders; two or three accelerometers and one or more gyros; two or three accelerometers and one or more cameras; or two or three accelerometers and one or more rangefinders. In addition, the location of the motion detection components on the device may vary on different embodiments. For example, some embodiments may include cameras on different surfaces of a device while other embodiments may include two cameras on the same surface (e.g., to add rangefinding functionality).

Altering the type, number and location of components of motion detector 22 may affect the ability of motion detector to detect or accurately measure various types of movement. As indicated above, the type and number of components of motion detectors may vary in different embodiments in order to fulfill particular needs. Fewer or less accurate components may be used in particular embodiments when it is desired to sacrifice accuracy to reduce manufacturing cost of a handheld device with motion detection capabilities. For example, some handheld devices may only need to detect that the device has been translated and may not need to detect exact amount of such translation to perform desired functions of the device. Such handheld devices

FITBIT 1002
Fitbit v. Immersion

may thus include a motion detector with cameras and without any sort of rangefinder or other component providing distance information. In particular embodiments, components described above, such as cameras and rangefinders, may also be used for other purposes by the device than those described above relating to motion detection functionality.

FIGURE 3 is a diagram illustrating the use of the motion detector components of handheld device 10 of FIGURE 1. Raw data from motion detection components is processed at processor 32. Such raw data includes x-axis accelerometer raw data 23a, y-axis accelerometer raw data 23b and z-axis accelerometer raw data 23c from accelerometers 24a, 24b and 24c, respectfully; camera raw data 25a, camera raw data 25b and camera raw data 25c from cameras 26a, 26b and 26c, respectfully; gyro raw data 27a, gyro raw data 27b and gyro raw data 27c from gyros 28a, 28b and 28c; and rangefinder raw data 29a, rangefinder raw data 29b and rangefinder 29c from rangefinders 30a, 30b and 30c, respectively. If the handheld device includes more, fewer or different motion detection components as may be the case in some embodiments, the raw data may correspond to the components included.

The raw data is processed at processor 32 to produce motion detector output 34 identifying movement of device 10. In the illustrated embodiment, motion detector output 34 comprises translation along x, y and z axes and rotation with respect to the x, y and z axes. The motion detector output is communicated to a processor 16 of the handheld device which identifies the operation, function or task the device should perform (i.e., device behavior 36) based on the device motion. The performance of certain operations, functions or tasks based on particular movements is further discussed below.

FIGURE 4 is an isometric illustration of an example handheld device 31 with motion detection capability, in accordance with particular embodiments. Handheld device 31 includes an x-axis accelerometer 33, a y-axis accelerometer 35 and a camera 37 oriented towards the z-axis. X-axis 38, y-axis 39 and z-axis 40 are also illustrated with respect to device 31 for reference. Handheld device 31 may detect movement, including tilt and translation in various directions, using accelerometers 33 and 35 and camera 37. Handheld device 31 may also include other components, such as components illustrated and described above with respect to handheld device 10.

FITBIT 1002
Fitbit v. Immersion

such as display 12, input 14, processor 16, memory 18 and communications interface 20. As indicated above, particular embodiments may include handheld devices having various types of motion detection components (including accelerometers, gyros, cameras, rangefinders or other suitable components) in any combination and positioned or oriented in any suitable manner upon the devices.

In particular embodiments, a user interface function may utilize input motion along one axis of motion at a time. For example, a device application may allow a user to scroll through a list displayed on the handheld device by moving the device along a particular axis (e.g., in one direction or in two opposite directions). It may be very difficult for a user to constrain the motion of the device to that particular axis as desired. In other words, some user generated device rotation or movement along another axis may be difficult to avoid. To counter this problem, the device may include preferred motion selection including the selection and amplification of a dominant motion and the minimization of movement in other directions or axes.

FIGURE 5 illustrates an example of selection and amplification of a dominant motion and minimization of movement in another direction as discussed above. In the illustrated example, actual motion 41 represents movement of a handheld device. Actual motion 41 comprises movement 42 along one axis 44 and movement 46 along another axis 48 perpendicular to axis 44. Since the amount of movement 42 is greater than the amount of movement 46, the handheld device may select movement 42 as the dominant motion. The handheld device may then amplify this dominant motion and minimize movement 46 (the other motion) such that actual motion 41 is treated by the device as represented motion 50. The amount or size of amplification of the dominant motion may vary in various embodiments according to particular factors, such as the particular application being run on the device at the time. Moreover, amplification of a dominant motion may also be based on magnitude of acceleration, speed of motion, ratio of a motion in one direction (e.g., movement 42) to motion in another direction (e.g., movement 46), size of underlying desktop being navigated or user preferences. In some embodiments, a handheld device may implement prefered motion selection only when certain motion characteristics occur. For example, in some cases the handheld device may select and amplify a dominant motion if motion in one axis is

FITBIT 1002
Fitbit v. Immersion

more than two times greater than any other motion. The other, smaller motion may then be minimized.

The selection and amplification of the dominant motion and minimization of other motion may further expand a user's ability to take advantage of motion user interfaces and may also allow the handheld device, or applications running on the device, to filter out undesired, user-induced noise. With this capability, the user may be able to, for example, move the device left to pick a list to examine, then scroll that list by moving up and down. Motion along inappropriate axes may be ignored or substantially reduced by the device.

In particular embodiments, the selection and amplification of a dominant motion and minimization of other motion may also be applied to rotational motion of the device. Dominant motion around an axis may be selected and amplified in the same manner as motion along an axis as described above with respect to translational motion. Moreover, rotation around another axis (that is not dominant rotation) may be minimized.

FIGURE 6 illustrates a preferred motion selection flowchart 60, in accordance with a particular embodiment of the present invention. In flowchart 60, raw data corresponding to movement of a handheld device is received. In the illustrated embodiment, the movement raw data includes x-acceleration data 62a, y-acceleration data 62b and z-acceleration data 62c that is processed at step 64 to yield an output indicating movement of the device. Other embodiments may include other types of movement raw data, such as optical or camera data, gyro data and/or rangefinder data. After the processing of the raw acceleration data 62, a dominant axis of motion is selected at step 66. If the selected dominant axis of motion is the x-axis, then the movement along the x-axis is augmented at step 68a. If the selected dominant axis of motion is the y-axis, then the movement along the y-axis is augmented at step 68b. If the selected dominant axis of motion is the z-axis, then the movement along the z-axis is augmented at step 68c. The amount of augmentation of movement in the dominant axis of motion may vary in different embodiments according to the application being utilized or other characteristics. In some embodiments, user preferences 69 may be utilized to determine type or amount of movement augmentation. Movement along axes other than the dominant axis of motion may be minimized as discussed above,

FITBIT 1002
Fitbit v. Immersion

such that such movement is ignored by a particular application in use. At step 70, the augmented movement is processed to yield device behavior 72. This processing step may include accessing an application being used to determine the particular device behavior to perform based on the augmented movement. Augmented movement may yield any of a number of types of device behavior according to the application in use, a particular user or otherwise.

For particular user interfaces utilizing motion input, there may be value in having the position of a virtual display, or the information displayed at display 12 of handheld device 10, linked to the position of the device. For example, in particular embodiments using translation-based input such as for navigating a map displayed at the device, the position of the handheld device may directly determine the portion of the map displayed at display 12. However, if device position information is kept in absolute terms (e.g., as with global positioning satellite (GPS) based systems) the utility for many tasks such as map or menu navigation may be impaired. Thus, it is beneficial in certain circumstances to define a "zero point," or an origin in a local context, that may be used to determine the behavior of the device. For example, if a zero point is defined when the device is at a point A, then motion between point A and a point B may be used as input. Particularly useful applications of setting a zero point may include external behaviors such as moving the virtual display or locating applications in the space around a user's body. Setting a zero point also addresses internal behaviors such as instructing the device to ignore the gravitational acceleration at the current orientation to allow the device to act only on additional, and presumably user generated, accelerations.

Handheld devices according to particular embodiments may include application user interfaces that utilize motion input only at certain times. At other times, for example, the motion of the device may not be utilized as input, and it may be useful to disengage or "turn off" motion sensitivity or the motion detection capability of the device. Disengagement of motion sensitivity may comprise, for example, deactivation of motion detector 22 of device 10 or other component, such as a motion response module of the device. Particular embodiments thus allow for the selective engagement and disengagement of the motion sensitivity of the device.

FITBIT 1002
Fitbit v. Immersion

As an example, a motion response module which modifies display 12 based on motion detected at motion detector 22, may have a mode of operation in which it awaits a trigger for switching to another mode of operation in which motion sensitivity is enabled. When motion sensitivity is not enabled, any motion of the device may be disregarded. The trigger may also set a zero-point for the device. When the zero-point is set, the motion response module may measure a baseline orientation of the device based on measurement from motion detection components. The baseline orientation may comprise the position of the device (determined from information from motion detector components) when the trigger is received. Future movement of the device will be compared against the baseline orientation to determine the functions to perform or the modifications which should be made at display 12 based on the user's motion of the device.

Particular embodiments provide for any number of user-initiated actions to act as a single trigger for zero-point selection and selective engagement/disengagement of the motion sensitivity of the device. Such actions may include, for example, the pressing of a key on input 14, moving device 10 in a particular way (e.g., movement corresponding to a particular gesture), and tapping display 12. It should be understood that any user-initiated action may set a zero-point and engage motion sensitivity of the device at the same time.

In some embodiments, a period of inactivity or minimal activity (i.e., relative stillness) may also set a zero-point and engage or disengage motion sensitivity. FIGURE 7 illustrates a flowchart 80 for the passive setting of a zero-point for a handheld device. Change in acceleration with respect to an x-axis is detected at step 82a, change in acceleration with respect to a y-axis is detected at step 82b and change in acceleration with respect to a z-axis is detected at step 82c. At steps 84a, 84b and 84c, it is determined whether any acceleration change detected is greater than a particular respective threshold. If detected acceleration change along each of the three axes is not greater than a set threshold, then the device may be considered at rest, and at step 86 a zero-point will be set. An at rest position may be determined, for example, from stabilization of the raw data or motion components of components of motion detector 22. However, if detected acceleration change along any of the three axes is greater than a set threshold, then the process returns to acceleration change

FITBIT 1002
Fitbit v. Immersion

detection at steps 82. Thus, this method of passively setting a zero-point may ensure that when the handheld device is at rest, a zero point will be set. Moreover, if a device is in constant motion but not being moved by a user at a particular time (e.g., resting in a train moving at a constant speed), a zero-point will be set since there will be no detected change in acceleration. The use of thresholds to determine whether an acceleration change is high enough so as not to trigger the setting of a zero-point enables a user to hold the device still to passively set the zero-point. Otherwise, this may be difficult since a device with highly sensitive accelerometers may detect acceleration change as a result of very minor unintended, user-initiated movement. It should be understood that similar methods may be used in connection with motion detectors with components other than accelerometers. Thresholds may also be used in such similar methods to account for small, unintended movements that may otherwise prevent setting of a zero point.

Particular embodiments of the present invention include the ability to allow a user to repeatedly selectively engage and disengage the motion sensitivity of the handheld device in order to allow greater movement through a virtual desktop (or information space) using motion input in a limited amount of physical space. This process can be analogized to "scrubbing" with a mouse controlling a cursor, or lifting the mouse off of a surface and replacing the mouse on the surface at a different location to allow greater movement of the cursor. Lifting the mouse breaks the connection between the motion of the mouse and the motion of the cursor. Similarly, a user may be able to engage and disengage the connection between the motion of a handheld device, such as device 10, and the operations, functions or actions based on movement of the device.

FIGURE 8 illustrates an example of the use of scrubbing functionality to navigate across a virtual desktop, or information space, larger than the display of a handheld device. In the illustrated example, a handheld device is used to navigate through virtual desktop 90. Virtual desktop 90 is illustrated as a grid map and may represent any suitable information through which a user may desire to navigate. Information of virtual desktop displayed at the handheld device is represented by box 92. In this embodiment, translation of the handheld device is used to navigate through virtual desktop 90. For example, a user may move the handheld device from right to

FITBIT 1002
Fitbit v. Immersion

left to navigate from right to left through information of virtual desktop 90. It should be understood that while the example illustrated describes moving the device to the right to implement the scrubbing process, it should be understood that handheld devices of particular embodiments may be moved in any suitable manner to implement the scrubbing process.

As indicated above, box 92 represents the information of virtual desktop 90 currently displayed at the device. If a user desired to view information represented at box 94, the user may move the handheld device from left to right. For purposes of this example, imagine that the user moves the device to the right, and the information of virtual desktop 90 contained in box 94 is displayed at the device. Also imagine that the user's arm is now outstretched to the user's right such that the user must walk or otherwise move further right in order to view at the display of the device information of virtual desktop 90 that is to the right of box 94. If this were the case, and the user could not, or did not desire to, walk or otherwise move further to the right so that the device would be moved further to the right, then the user could selectively disengage the motion sensitivity of the handheld device, move the device back to the left, selectively reengage the motion sensitivity of the device and move the device back to the right to display information to the right of box 94. In this manner, the user could display information of virtual desktop 90 contained in box 96, and this process could be repeated to display information contained in box 98, which is further to the right of box 96.

The selective disengagement and reengagement of the motion sensitivity of the device in order to allow greater movement within a virtual desktop in a limited amount of physical space may be enabled in any of a variety of ways, such as by a key on an input of the device, moving the device according to a particular gesture or movement (e.g., an arc movement) or tapping the device display. Any other user-initiated action may be used to disengage and reengage motion sensitivity for this purpose. Particular embodiments may allow multiple actions to disengage and reengage motion sensitivity of the device. Moreover, a user action that disengages motion sensitivity of the device may be different from a user action that reengages motion sensitivity. This scrubbing process may be performed in any suitable application, such as map navigation, menu navigation and scrolling through a list.

FITBIT 1002
Fitbit v. Immersion

FIGURE 9 is a flowchart illustrating the steps of the scrubbing process described above with respect to FIGURE 8, in accordance with a particular embodiment. The flowchart begins at step 100, where the handheld device is moved to the right to go from displaying information of box 92 of virtual display 90 to information of box 94. As indicated above, the user may desire to display information further to the right of box 94 but may have run out of physical space to move the device further to the right. Thus, the user disengages the motion sensitivity of the device at step 102. Any suitable user action may perform such disengagement, such as the pressing of a button on the device or moving the device according to a particular gesture. At step 104, the user moves the device to the left so that the user will have more physical space through which the user may move the device to the right when motion sensitivity is reengaged.

At step 106, the user reengages motion sensitivity of the device. Again, such reengagement may be performed by any suitable user action, and such user action may be different from the user action performed to disengage motion sensitivity in step 102. Since motion sensitivity has been reengaged, the user moves the device to the right at step 108 in order to change the information being displayed at the device from the information of box 94 to the information of box 96. At step 110, it is determined whether further movement of the device to the right is needed. If further movement is needed (e.g., to display the information of virtual display 90 in box 98), then the process returns to step 102 where motion sensitivity of the device is again disengaged. If no further movement is needed, then the process ends. As indicated above, this scrubbing process may be utilized in any suitable application of the device that supports motion input, and the device may be moved in any suitable manner in order to implement this functionality.

As indicated above, a particular movement of the device (e.g., a particular gesture) may be utilized in the scrubbing process to signal to the device not to change the information presented on the display during such movement. This allows the user to return the device to a position from which the user may move the device to further change the information presented on the display. For example, the device may be at a base reference position from which movement of the device changes the information displayed. A particular predetermined movement (e.g., an arc movement) may be

FITBIT 1002
Fitbit v. Immersion

used which may signal to the device not to change the information displayed based on motion until the movement is completed. Once the predetermined movement is completed, the base reference position may be reset such that future movement of the device from the base reference position further changes the information displayed. The base reference position may identify a baseline orientation of the device represented by baseline components of the motion data received by the motion detection components of the device. In particular embodiments, gestures may be received, as determined by movement from the base reference position, to perform particular commands which change the information displayed at the device.

As discussed with respect to various embodiments described above, handheld devices in accordance with particular embodiments may utilize multiples types or modes of input to operate the device. Such input modes include motion input modes, such as a translation input mode and a gesture input mode. While multiple input modes may sometimes be used in combination with each other, in some cases the handheld device may be set to recognize a certain mode type at one time. In some situations, the handheld device may be set to function based on multiple types of non-motion input and only one type of motion input (e.g., translation or gesture) at a particular time.

To facilitate this flexibility of the handheld device in recognizing multiple input modes, in particular embodiments a certain trigger may be used to switch between input modes. For example, a user may press a particular key or may move the device in a certain manner (e.g., a particular gesture) to switch input modes. In some cases where an application of the device recognizes and functions based upon multiple types of motion input, a particular key may be pressed or a particular gesture may be formed using the device to switch between a translation motion input mode and a gesture motion input mode. The trigger may also comprise the mere switch from one application to another or the switch from one displayed image to another. In some situations, the trigger may switch between a non-motion input mode and a motion input mode. Any particular user-action may be implemented to act as a trigger to switch between different input modes, such as between different motion input modes. In some embodiments, a voice command or physical action upon the device (e.g., a device or screen tap) may be utilized to switch input modes.

FITBIT 1002
Fitbit v. Immersion

In particular embodiments, a user action that reengages motion sensitivity of a device may also contain other information that might otherwise affect device behavior. For example, if a user makes one motion to reengage translation sensitivity, it may render the device more sensitive to motion than if the user makes a different motion to reengage motion sensitivity. A reengaging motion may comprise a gesture that indicates the user's identity or context, thereby engaging a variety of operational settings, such as user preferences.

As indicated above, particular embodiments include the ability to receive motion input to control various functions, tasks and operations of a handheld device and may be used to alter information displayed at the device in the process. In some cases, such motion input may be in the form of gestures, as opposed to mere translation-based input. Gesture input may be used to navigate through a multidimensional menu or grid in some applications. For example, as discussed above with respect to the scrubbing process, a display of a handheld device may be smaller than the amount of information (e.g., menu options, map information) that can be presented on the display. This may lead to a menu structure that is narrow and deep. In many cases, broad, shallow menu structures may be preferred over a narrow, deep menu structure because a user is not required to remember as much information concerning where functionalities are located.

FIGURE 10A illustrates an example of menu navigation using gesture input, in accordance with a particular embodiment. In the illustrated embodiment, a handheld device is used to navigate through virtual desktop 120. Virtual desktop 120 includes a menu tree with menu categories 122 for selection. Each menu category 122 may include respective sub-categories for selection. In some embodiments, menu categories 122 may comprise categories of functions, while sub-categories of each menu selection may include the actual functions under each such category. In other embodiments, menu categories may comprise nouns (e.g., "folder," "document," "picture"), while sub-categories comprise verbs (e.g., "move," "paste," "cut"). If the handheld device comprised a cellular phone, menu categories 122 may include "calls," "phone book," "messages," "planner," "sounds," "setup" or other items. Each menu category 122 may include functions which may be accessed once a menu category 122 is selected. While two menu levels are illustrated in FIGURE 10A, it

FITBIT 1002
Fitbit v. Immersion

should be understood that a multidimensional desktop or display of information for motion interface navigation may include any number of selections (e.g., menus) utilizing any number of levels.

In the illustrated example, menu category 122e has been selected, and sub-categories 124 of menu category 122e are displayed as available for selection. Boxes 126 and 128 represent information displayed at the handheld device for the user. As illustrated, virtual desktop 120 includes more information, or menus, which can be displayed at the device at one time. A user may move the device according to particular gestures to navigate across or through the virtual desktop. Gestures may also be used to navigate through different menu levels and to make menu selections. As an example, a user may move device 10 in the form of a clockwise circle 130 to navigate a predetermined amount to the right across virtual desktop 120 (e.g., moving from information of box 126 to information of box 128). A particular menu category 122 may be selected by an away gesture 132, or a downward gesture (e.g., to select menu category 122e), and thus display sub-categories 124 for selection. Similarly, to move to the left across virtual desktop 120, a user may move device 10 in the form of a counterclockwise circle 134. In some cases, navigation may be accomplished through four gestures: a forward gesture, a backward gesture, a left gesture and a right gesture. In some embodiments, gestures comprising motion vectors in perpendicular directions may be used for navigation.

In particular embodiments, gestures may be used that are mirror images of other used gestures to execute opposite functions from those accomplished by the other gestures. For example, a motion toward a user might zoom in while an opposite motion, a motion away from the user, may zoom out. Using mirror image or reciprocal gestures mapped to opposite functions may make a motion user interface for a device easier to learn and to use.

In some cases, the menu item at the center of the display may be highlighted for selection, while in other cases a particular gesture may indicate which menu selection of a plurality of displayed selections a user desires to select. It should be understood that the menus or other information through which a user may navigate using gestures may be presented at the handheld device in any number of ways. In some embodiments, only one level of information (i.e., one menu level) may be

FITBIT 1002
Fitbit v. Immersion

displayed at once, while sub-levels or higher levels are not displayed until they are available for selection.

FIGURE 10B illustrates example gestures which may be utilized to perform various functions, such as functions enabling a user to navigate through a virtual desktop. The illustrated example gestures include an "up" gesture 133 to navigate in an upward direction through the desktop, a "down" gesture 135 to navigate down, a "left" gesture 136 to navigate left, a "right" gesture 137 to navigate right, an "in" gesture 138 to navigate in a direction towards the user and an "out" gesture 139 to navigate away from the user. It should be understood that these are mere example gestures and commands for particular embodiments, and other embodiments may include different gestures or similar gestures mapped to different commands for navigating through a desktop or performing other functions with a handheld device.

FIGURE 11 illustrates another example of map navigation using motion input, in accordance with a particular embodiment of the present invention. FIGURE 11 includes a virtual desktop 140 representing an information grid divided into sixteen portions, each referenced by a respective letter (A, B, C, . . . P). Portions of virtual desktop 140 are identified using reference letters only for purposes of describing particular embodiments, and portions of virtual desktops in accordance with other embodiments may or may not be identified in a device application by a reference character or otherwise. Virtual desktop 140 includes more information that can be displayed at a particular handheld device at one time. Virtual desktop 140 may represent any suitable information through which a user may desire to navigate using a handheld device, such as a street map. A user may desire to navigate across virtual desktop 140 to display different portions of information on the handheld device display and may also desire to zoom in (and out of) virtual desktop 140 (i.e., change the granularity of the information displayed) to more clearly view certain portions of the information of virtual desktop 140.

In the illustrated example, box 142 represents information currently displayed at handheld device 10. Box 142 includes portions A, B, E and F of virtual desktop 140. In particular embodiments, if a user desires to change the information of desktop 140 displayed at the device to, for example, information of boxes C, D, G and H, then the user can use motion input to move box 142 representing the display of the device

FITBIT 1002
Fitbit v. Immersion

to the right the necessary amount (two portions to the right in the illustrated example). Such motion input may comprise translation input (moving the handheld device 10 to the right an applicable amount to change the information displayed) or a gesture input (moving the handheld device 10 according to a particular gesture mapped to this function). As an example, one gesture may be mapped to moving the display one portion to the right, while another gesture may be mapped to moving the display two portions to the right. Thus, using translation input or gesture input, the user may navigate across desktop 140.

The handheld device 10 may also allow the user to zoom in on certain information displayed for a clearer view of such information, for example, through translation input or gesture input. As an example using gesture input, if the information displayed at the device included four of the sixteen portions (e.g., box 142 displaying portions A, D, E and F), then a user may use one of four gestures, each mapped to zoom in on a particular portion, to zoom in on one of the four displayed portions. If the user moved the handheld device according to the gesture mapped to zoom in on portion B, then the device may display information represented by box 144 (portions B1, B2, B3, B4, B5, B6, B7, B8 and B9) collectively forming the information of portion B of virtual desktop 140 in an enlarged view. Thus, the information of portion B may be more largely and clearly displayed. When viewing the information of box 144 on the device, the user may zoom out or zoom in again on a particular portion currently displayed using appropriately mapped gestures. If the user moved the handheld device according to a gesture mapped as zooming in on portion B2 (this could be the same gesture as that used to zoom in on portion B when information of box 142 was displayed), then the device may display information of box 146 (portions B2a, B2b, B2c, B2d, B2e, B2f, B2g, B2h and B2i). The user may also be able to navigate across the virtual desktop when zoomed in on a particular portion. For example, when zoomed in on portion B (viewing information of box 144), the user may use translation or gesture input to move across the virtual desktop to view enlarged views of portions other than portion B. As an example, when viewing information of box 144 the user may make a gesture that moves the information displayed to the right such that the entire display shows only information of portion C of virtual desktop 140 (i.e., zoomed in on portion C showing portions C1,

FITBIT 1002
Fitbit v. Immersion

C2, C3, C4, C5, C6, C7, C8 and C9). It should be understood that a user may navigate through the information of virtual desktop 140 (both navigating across and zooming in and out) in any suitable manner using motion input.

As indicated above, any suitable gestures may be used to both navigate across a virtual desktop (or across a particular level) and to navigate between or through different levels or dimensions of a multidimensional desktop. Moreover, in some embodiments motion, such as gestures, may be used to navigate across the multidimensional desktop, and non-motion actions may be used to select or navigate between dimensions. Such non-motion actions may include the pressing of a key in a device input. Thus, a combination of motion and non-motion actions may be used for multidimensional virtual desktop or menu navigation in particular embodiments.

Particular embodiments may allow gesture-based navigation through any suitable application, such as a multidimensional grid, menu, calendar or other hierarchical application. For example, in a calendar application certain gestures may be used to navigate within one level, such as months, while other gestures may be used to navigate between levels, such as between years, months, days, hours and events. Moreover, different applications implemented in the handheld device that use such gesture navigation may use different gestures. Thus, the particular navigation gestures may change according to the particular application in use. In some embodiments, translation-based interfaces may be used to navigation through multidimensional information of a virtual desktop, as opposed to merely using gesture-based movements. For example, movement along x and y-axes may be used to travel within a level of a hierarchy, while movement along a z-axis may be used to travel between levels of the hierarchy.

Another example might involve using a telephone directory with institutions, letters of the alphabet, names, contact details (e.g., office, cellular and home phone numbers, email) and action to initiate contact all along different levels of a hierarchy. In this example, the hierarchy may contain information (nouns) and actions (verbs). One could map this example onto only two axes with, for example, a y-axis being used to select within a level of hierarchy and an x-axis being used to move between levels. A z-axis could be used to confirm the actions and help prevent inadvertent execution of actions.

FITBIT 1002
Fitbit v. Immersion

In some cases, the number of levels traversed may depend on the magnitude of the motion, particular in translation-based navigation. Moving the device a small amount may navigate one level at a time, while moving the device a large amount may navigate multiple levels at a time. The greater the magnitude of motion, the more levels may be navigated at once. As applied to gesture-based motion inputs, different gestures may be used to navigate different numbers of levels in the hierarchy at once. These gestures may be different magnitudes of the same motion or entirely different motions.

The use of motion interface navigation through a multidimensional desktop or information display increases may allow menus to be flattened since a user may more easily navigate across a particular menu or dimension of a virtual desktop too large to fit on a device's display. As a result of the menu flattening, the user may be required to memorize less information thus increasing functionality and capability of the device for the user.

As discussed above, handheld devices in particular embodiments allow a user to navigate across a virtual desktop using motion input. In some cases, a user may utilize a cursor to navigate across information displayed at the handheld device. For example, certain information may be displayed at the device, and the user may utilize motion input to move the cursor around the device display and to select particular items displayed to perform certain functions. In some cases, motion input may be utilized to move a cursor, while a non-motion action (such as pressing a button) may be used to select an item currently indicated by the cursor. It should be understood that both gesture and translation motion input may be utilized in various embodiments of cursor navigation.

In particular embodiments, information displayed may be fixed with respect to the device, and the cursor may remain fixed in space such that movement of the device is used to navigate the cursor across the information. FIGURE 12A illustrates an example utilizing this form of motion input cursor navigation. Display 147 represents a display of a handheld device. In order to describe this cursor navigation example, display has been divided into a grid to show information being displayed. The grid includes portions A-P. Display 147 includes a cursor 148 between portions C, D, G and H. As stated above, in this embodiment the information displayed

FITBIT 1002
Fitbit v. Immersion

remains fixed with respect to the device when the device is moved, and the cursor remains fixed in space. However, the cursor's position with respect to the information displayed changes according to motion input. When the device is translated to the right, according to right movement 149, the cursor is translated according to a motion opposite to the translation of the device.

Display 150 represents a possible display after the device is moved according to right movement 149, with cursor 148 now between portions A, B, E and F. It should be understood that since this example involves translation-based input, the magnitude of the movement of the device (e.g., to the right in this example) may directly affect the magnitude of the movement of the cursor with respect to the information displayed. Display 152 represents another display after the handheld device has been moved according to up movement 151, with cursor 148 now between portions I, J, M and N. As evident, the cursor will have moved down with respect to information displayed since it remains fixed in space. Display 154 represents another display after the handheld device has been moved according to left movement 153, with cursor 148 now between portions K, L, O and P. As evidence, the cursor will have moved to the right with respect to information displayed. Thus, in this form of cursor navigation, motion of the device changes the position of the cursor on the information. In this manner for example, the handheld device may be moved instead of using a stylus to point to certain portions of information displayed.

At any point in the cursor navigation process, a user may utilize any form of input (e.g., gesture, key press, etc.) to select or otherwise perform a function according to the information currently indicated at the cursor. For example, with respect to display 152, a user may use a particular gesture or press a button to zoom in, select or perform some other function based on information between portions I, J, M and N currently indicated by cursor 148.

As described above with respect to FIGURE 12A, particular embodiments may translate the cursor in a motion opposite from the motion of the device to move the cursor across the information displayed. In one example of implementation, input motion of the device may be divided into motion along each of three axes, two of which are parallel to the device display (e.g., an x-axis and a y-axis). While motion of the device in the x-axis and y-axis plane changes information displayed at the device

FITBIT 1002
Fitbit v. Immersion

based on such motion, the cursor may be moved at the same time according to a translation vector that is opposite to the sum of movement in the x-axis direction and the y-axis direction to substantially maintain the position of the cursor in space. In some cases, when the cursor would move past a display edge off of the display according to the translation vector, the vector may be reduced in order to keep the cursor within the display. Such reduction may include reducing one or more components of the translation vector to maintain the cursor within a certain distance from the display edge.

It should be understood that the division of information displayed into portions A-P is done only for illustrating and describing the embodiments described above, and information displayed at handheld devices of particular embodiments may not include such a division or other type of reference information.

FIGURE 12B illustrates another form of motion input cursor navigation, in accordance with a particular embodiment. In this example, the cursor remains in a fixed position with respect to the display while motion input is used to navigate across a virtual desktop larger than the device display. FIGURE 12B includes virtual desktop 158 which comprises information through which a user may navigate using motion input at a handheld device, such as a street map. Virtual desktop 158 includes more information that can be displayed at a particular handheld device at one time. In order to describe this cursor navigation example, virtual desktop 158 has been divided into a grid to differentiate between information presented at the desktop. The grid includes 6 rows (A-F) and 7 columns (1-7). Portions of the grid may be identified herein for this example using their row letter and column number (e.g., portion B7 or D2). It should be understood that the division of virtual desktop 158 into portions referenced by row and column number is done only for illustrating and describing the embodiments described above, and the virtual desktops of particular embodiments may not include such a division or other type of reference information.

Box 160 represents information of virtual desktop 158 currently displayed at a handheld device. Display 161 represents the display of a handheld device showing information of box 160. Display 161 also includes a cursor 159 positioned at the intersection of portions B2, B3, C2 and C3. As indicated above, as a user utilizes motion input to move around the virtual desktop (i.e., to change the information

FITBIT 1002
Fitbit v. Immersion

displayed at the device), the cursor remains in a fixed position with respect to the display. However, the cursor's position changes with respect to the information of the virtual desktop displayed at the handheld device. For example, a user may utilize motion input to change the information displayed at the device to that represented at box 162. The information displayed at the device changes (to portions B5, B6, C5 and C6); and cursor 159 will remain fixed at the device display (e.g., in this case at the center of the display) such that its position changes with respect to the information of virtual desktop 158, as illustrated at display 163. If the user desired to use motion input to change the information displayed at the device to that represented at box 164, the information displayed at the device changes to portions E3, E4, F3 and F4, as illustrated at display 165. Cursor 159 is positioned between these illustrated portions in the center of the display since its position relative to the display remains fixed in this embodiment.

Thus, according to the form of cursor navigation illustrated with respect to FIGURE 12B, the cursor will remain at a position fixed with respect to the device display, while its position with respect to the information of a virtual desktop changes. As discussed above with respect to the embodiment described and illustrated with respect to FIGURE 12A, at any point in the navigation process, a user may utilize any form of input (e.g., gesture, key press, etc.) to select or otherwise perform a function according to the information currently indicated at the cursor. For example, with respect to display 163, a user may use a particular gesture or press a button to zoom in, select or perform some other function based on information between portions B5, B6, C5 and C6 currently indicated by cursor 159.

It should be understood that any particular input, such as a gesture or key press, may be used to switch cursor navigation modes at the device. For example, a user may switch between the translation-controlled cursor mode of FIGURE 12A and the fixed cursor mode of FIGURE 12B.

As discussed above, particular embodiments allow a user to move handheld device 10 according to a gesture to perform particular functions or operations. In some cases however, a user may not move the device according to the particular gesture intended, and the device may, as a result, not be able to recognize the movement as the intended gesture. In order to indicate that a particular movement of

FITBIT 1002
Fitbit v. Immersion

the device by a user is recognized as a particular gesture, handheld devices in some embodiments provide feedback to notify the user that the movement was in fact recognized as a gesture.

This feedback may comprise an audio format, such as speech, a beep, a tone or music, a visual format, such as an indication on the device display, a vibratory format or any other suitable feedback format. Audio feedback may be provided through a user interface speaker or headphone jack of device 10, and vibratory feedback may be provided through a user interface vibration generation module of device 10. Audio, visual and vibratory feedback may be varied to provide capability for multiple feedback indicators. As an example, vibratory feedback may be varied in duration, frequency and amplitude, singly or in different combinations over time. The richness and complexity of the feedback may be expanded by using feedback of different types in combination with one another, such as by using vibratory feedback in combination with audio feedback. In some cases, the feedback may be gesture-specific, such that one or more recognized gestures have their own respective feedback. For example, when a certain gesture is recognized the device may beep in a particular tone or a particular number of times, while when one or more other gestures are recognized the beep tones or number of beeps may change. The use of audio feedback may be especially valuable for gestures that do not have an immediately visible on-screen manifestation or function, such as calling a certain number with a cellular phone. Different types of feedback may also be context or application specific in some embodiments. Different contexts might include device state, such as what application is in focus or use, battery level, and available memory, as well as states defined by the user, such as quiet or silent mode. For example, a handheld device may utilize vibratory feedback in response to gesture input while in silent mode when audio feedback would otherwise be used. This feedback process may also be utilized by a handheld motion input device of a computer or other component.

Similar to the feedback relating to gesture recognition described above, handheld devices in particular embodiments may also provide feedback for the user in the event that a particular user movement was not recognized as a gesture when the device is in a gesture input mode. For example, if a motion appears intended to be a gesture, but cannot be assigned to a particular gesture that is known to the device, it

FITBIT 1002
Fitbit v. Immersion

may play a sound indicating failure. This notifies the user that the user must make another attempt at moving the device according to the intended gesture for the device to perform the operation or function desired. The feedback notifying the user that a movement was not recognized may also comprise an audio, visual, vibratory or other suitable format and may be a different feedback than that communicated when a particular movement is recognized by the device as a particular gesture. In order to determine whether a user's intent was to input a gesture, handheld device 10 may look at certain characteristics of the movement that imply that the motion was intended to be a gesture. Such characteristics may include, for example, the amplitude of the motion, the time course of the above-threshold motion and the number and spacing of accelerations. If a particular gesture is unrecognized by the device, a system of gestural feedback may be used to determine the gesture intended. For example, audio feedback may indicate possibilities determined by the handheld device, and the user may utilize gestures to navigate an auditory menu to select the intended gesture.

In particular embodiments, a system of audio or vibratory feedback may be used such that a user could operate handheld device 10 without having to resort to viewing display 12. For example, handheld devices in some embodiments may provide audio, visual or vibratory feedback to a user navigating a menu or other information of a virtual desktop. In effect, this device feedback combined with the motion input of a user could act as a type of "conversation" between the user and the device. As indicated above, multiple types and complexities of feedback may be utilized. The feedback process could be particularly advantageous in environments where it may be inconvenient, unsafe or impractical to look at the device display (e.g., while driving or while in a dark environment).

It should be understood that feedback, such as audio, visual and vibratory feedback, may also be used in some embodiments in connection with translation motion input. For example, a feedback indicator may be given when a user reached a limit or edge of a virtual desktop using translation input.

FIGURE 13 is a flowchart 170 illustrating a process for utilizing feedback in response to motion input, in accordance with a particular embodiment. At step 172 of the process raw motion data is received at handheld device 10. As described above, the raw motion data may be received by any combination of accelerometers, gyros,

FITBIT 1002
Fitbit v. Immersion

cameras, rangefinders or any other suitable motion detection components. At step 174, the raw motion data is processed to produce a motion detector output indicative of the motion of the device. Such processing may include various filtering techniques and fusion of data from multiple detection components.

At step 176, the device state may be checked, because in some embodiments the feedback for a particular motion depends on the state of the device when the motion is received. As indicated above, example device states may include the particular application in focus or use, battery level, available memory and a particular mode, such as a silent mode. At step 178, the motion detector output is analyzed with respect to the device state. At step 180, it is determined whether the motion indicated by the motion detector output is meaningful or otherwise recognizable given the particular device state. For example, a particular gesture may perform a certain function in one application (e.g., a calendar application) while the gesture serves no function in another application. If the gesture is recognizable or meaningful give the state of the handheld device, then at step 182 feedback is provided. As indicated above, in particular embodiments feedback may be in an audio, visual or vibratory format. In some cases the feedback may merely be an indication that the device recognizes the gesture given the state of the device. In other cases, the feedback may be a further query for additional input, for example if the user was utilizing a particular application of the device that provided for a series of inputs to perform one or more functions. At step 184, the device behaves according to the motion input and device state, and the process may return to step 172 where additional raw motion data is received.

If it is determined at step 180 that the motion indicated by the motion detector output is not meaningful or recognizable given the particular device state, then the process proceeds to step 186. At step 186, it is determined whether the motion is above a particular threshold. This determination may be made to determine whether particular motion input was, for example, intended to be a gesture. As indicated above, threshold characteristics for this determination may include the amplitude of the motion input, the time course of the motion input and the number and spacing of accelerations of the motion. If it is determined that the motion input was not above a particular threshold, then the process may return to step 172 where additional raw

FITBIT 1002
Fitbit v. Immersion

motion data is received. If, however, the motion input was above a threshold such that a gesture may have been intended but was not recognized or meaningful given the device state, feedback is provided at step 188. The feedback may include audio, visual and/or vibratory feedback and may indicate that the gesture was not recognizable or meaningful. In particular embodiments, the feedback may also provide a query regarding the intended gesture or may otherwise provide the user with a number of potentially intended gestures from which the user may select the particular gesture intended by the motion. It should be understood that particular embodiments may not include some of the steps described (e.g., some embodiments may not include the threshold determination of step 186), while other embodiments may include additional steps or the same steps in a different order. As suggested above, particular embodiments may utilize motion input feedback (e.g., including feedback "conversations") in any of a number of applications and ways and the type and complexity of feedback systems may vary greatly in different embodiments.

As indicated above, handheld devices according to particular embodiments may receive gesture motion input to control any number of functions of any number of applications running at the device. Some applications that utilize gesture involve may comprise mobile commerce (mCommerce) applications in which a mobile device, such as handheld device 10, is used to conduct various transactions, such as commercial or consumer purchases. Many mCommerce applications utilize some form of authentication to authenticate a user, such as personal identification numbers (PINs), credit card information and/or possession of the mobile device. However, many forms of authentication can be "leaked." They can be shared intentionally or inadvertently. Another form of authentication is a user's written signature, which does not suffer from such leaking problems since forgery is typically difficult to accomplish and may be easy to detect. Particular embodiments may utilize motion input to receive a user's signature as a form of authentication in mCommerce or other transactions through the handheld device.

A written signature may be considered a two dimensional record of a gesture. When utilizing a handheld device with motion input, a user's signature may be in three dimensions and may thus comprise a "spatial signature." Moreover, when combined with other forms of input received at the device, a user's signature can take

FITBIT 1002
Fitbit v. Immersion

on any number of dimensions (e.g., four, five or even more dimensions). For example, a three-dimensional gesture "written" in space using the device and detected at motion detector 22 may be combined with key-presses or other inputs to increase the number of dimensions of the signature.

These spatial signatures can be tracked, recorded, and analyzed by motion detectors 22 of handheld devices. They can be recorded with varying degrees of precision with varying numbers of motion detector components to serve as an effective form of authentication. A user's spatial signature may take comprise a three-dimensional form based on the user's traditional two-dimensional written signature or may comprise any other suitable gesture which the user records at the handheld device as his or her signature.

In some embodiments, the process for recognizing a spatial signature may involve pattern recognition and learning algorithms. The process may analyze relative timings of key accelerations associated with the signature. These may correspond to starts and stops of motions, curves in motions and other motion characteristics. In some cases, some hash of a data set of a points of a signature motion may be stored, and subsequent signatures may be compared against the hash for recognition. This may further verify if the signature was genuine by determining whether it was unique. For example, in particular embodiments, a signature may be detected (e.g., by a signature detection module of device 10) by comparing a particular movement of the device with respect to an initial or reference position. Such comparison may be made by comparing a sequence of accelerations of the movement with a predetermined sequence of accelerations of a stored spatial signature. This determination may be made regardless of the scale of the user's input motion signature.

In some embodiments, the device can detect whether motion of the device matches the signature by determining whether positions of the device in motion relative to an initial position match the spatial signature.

FIGURE 14 illustrates an example system 200 utilizing spatial signatures as authentication for mCommerce transactions. System 200 includes handheld device 10, mCommerce application 202, authenticator 204 and communication network 206. mCommerce application 202 may comprise any suitable application for transacting

FITBIT 1002
Fitbit v. Immersion

business with a handheld device of a user. Such transactions may include consumer purchases, such as products or services of a business or other user from a website, online bill paying, account management or any other commercial transaction. Authenticator 204 authenticates, or verifies, a spatial signature input by the user at handheld device 10 to complete an mCommerce transaction. Authenticator 204 may store one or more spatial signatures of one or more users for authentication in an mCommerce transaction. In some embodiments, authenticator may be located within handheld device 10, within mCommerce application 202 or at any other suitable location. Communication network 206 is capable of transmitting information or data between components of system 200 and may include one or more wide area networks (WANs), public switched telephone networks (PSTNs), local area networks (LANs), the Internet and/or global distributed networks such as intranets, extranets or other form of wireless or wireline communication networks. Communication network 206 may include any suitable combination of routers, hubs, switches, gateways or other hardware, software or embedded logic implementing any number of communication protocols that allow for the exchange of information or data in system 200.

In operation, when a user utilizes handheld device 10 to conduct a transaction with mCommerce application 202, the user may utilize motion input to communicate an authentication signature, for example by moving the device according to the user's three-dimensional signature. As an example, a user might use their cellular phone at a point-of purchase (e.g., store) instead of a credit card. Instead of signing a paper document that then needs to be shipped and processed, the user could simply move device 10 according to the user's spatial signature. As indicated above, the user's signature may include more than three dimensions in some embodiments. The signature may have been previously recorded by the user using handheld device 10 or another mobile device, and the recorded signature may be stored at handheld device 10, mCommerce application 202, authenticator 204 or other suitable location such as a signature storage database for signatures of multiple mCommerce users.

The motion of handheld device 10 may be processed at the device, and motion output indicative of the motion may be transmitted to mCommerce application 202. mCommerce application 202 may communicate the motion output to authenticator 204 for verification that the motion input received at device 10 was in fact the

FITBIT 1002
Fitbit v. Immersion

signature of the user attempting to transact mCommerce. If authenticator 204 verifies the user's signature, then mCommerce application may complete the transaction with the user. As indicated above, authenticator 204 may be located within handheld device 10 or at mCommerce application 202 in particular embodiments and may access signatures for verification stored at device 10, mCommerce application 202 or any other suitable location.

Authentication may also be used by handheld devices in a non-mCommerce application, for example when electronic security is desired to perform functions such as sending private or secure data using the device. A user desiring to transmit data or other information using handheld device 10 may use their spatial signature in the encryption process. Spatial signatures may be used in any of a variety of ways to secure data for communication through a network and may be utilized in connection with public/private key encryption systems. For example, in some embodiments handheld device 10 may authenticate a user's signature received through motion input and then use its own private key to encrypt data for transmission. In other cases, data may be communicated to handheld device 10 such that an intended recipient must input their spatial signature to receive the decrypted data. In some embodiments, data may be communicated to a computer wirelessly connected to handheld device 10, and the intended recipient must use handheld device 10 as a way to communicate the user's signature to the computer for data decryption. Moreover, in particular embodiments, a user's spatial signature itself may represent an encryption key such that motion of the device generates the encryption key instead of the signature motion merely being used for authentication. In some cases a device may recognize a combination of accelerations as a signature by converting the signature into the equivalent of a private key. The handheld device may then use the private key as part of an authentication process for a transaction.

In particular embodiments, a spatial signature may be used to manage physical access to a building or event. For example, the signature input by a user at a device may be checked against a list of people allowed to enter as IDs are checked at "will call" for an event.

In particular embodiments, a user may utilize motion input for handheld device 10 to control other devices, such as audio/video equipment, home appliances

FITBIT 1002
Fitbit v. Immersion

and devices, computing devices or any other device capable of being controlled by a handheld device. Devices may be controlled by handheld device 10 through communications interface 20 of device 10 utilizing any of a number of wireless or wireline protocols, including cellular, Bluetooth and 802.11 protocols. In some embodiments, device 10 may receive motion input to control, through wireless or wireline communication, other devices through a network. Thus, devices controlled through motion input of device 10 may be at any location with respect to device 10, such as in the same room or across a country. Moreover, control of the other device may be implemented through any number of intermediate devices (e.g., through a network).

As an example, if handheld 10 device were a Bluetooth-enabled cellular phone, then particular gestures or other motion of the cellular phone may wirelessly communicate commands to control another device, such as a laptop across a room to drive a PowerPoint presentation. Other devices which may be controlled through motion input of handheld device 10 may include televisions, radios, stereo equipment, satellite receivers, cable boxes, DVD players, digital video recorders, lights, air conditioners, heaters, thermostats, security systems, kitchen appliances (e.g., ovens, refrigerators, freezers, microwaves, coffee makers, bread makers, toasters), PDAs, desktop and laptop PCs, computer peripheral equipment, projectors, radio controlled cars, boats and planes and any other device. As another example, a commuter may shake their cellular phone in a certain manner to tell their heater at home to turn on before the commuter arrives at home. In some embodiments, a handheld device may receive and process raw motion data to determine commands or intended functions for communication to other devices. In other embodiments, a motion detector of a handheld device may output raw data received from its motion detection components for communication to one or more devices controlled by device 10 through the motion of device 10. As a result, different devices controlled by device 10 may treat the same raw motion data of device 10 differently. For example, a particular gesture of device 10 may perform different functions of different devices controlled by device 10.

FIGURE 15 illustrates an example system 220 in which handheld device 10 controls multiple other devices through motion input of device 10. System 220 includes handheld device 10, laptop 222 and remote device 224 connected, through

FITBIT 1002
Fitbit v. Immersion

wireless or wireline links, to handheld device 10 through communication network 226. Handheld device 10 receives raw motion data of a particular motion of the device through motion detection components, such as accelerometers, cameras, rangefinders and/or gyros. The raw motion data is processed at the handheld device. Particular databases, such as gesture and gesture mapping databases, may be accessed to determine a matching gesture and intended function based on motion tracked by a control module of the device. The intended function may be for another device to be controlled by handheld device 10, such as laptop 222 or remote device 224. Thus, the motion input is the interface for the underlying operational signal communicated from device 10 to the controlled device. In other embodiments, the raw motion data or other data merely indicating a particular motion input for device 10 may be directly sent to laptop 222 and/or remote device 224 without determining a function at device 10. In these embodiments, laptop 222 and/or remote device 224 may themselves process the raw motion data received from handheld device 10 to determine one or more intended functions or operations they should perform based on the raw motion data. In some embodiments, a user of device 10 may indicate to device 10 through motion or otherwise the other devices that handheld device 10 should communicate raw motion data or intended functions of such other devices, as applicable. While two devices controlled by handheld device 10 are illustrated, it should be understood that particular embodiments may include any number of devices of varying types to be controlled by handheld device 10 through motion input as discussed above.

As indicated above, particular embodiments include the ability to control other devices, such as other local or remote devices, through motion input of handheld device 10. In some embodiments a user of handheld device 10 selects the other device that a particular motion input of device 10 is intended to control. For example, a user may use input 14 of handheld device 10 (e.g., by pressing a button or moving a trackwheel) to select a local or remote device to control before moving device 10 according to a particular motion mapped to a function or operation desired for the other device. In particular embodiments however, a user may move handheld device 10 according to a particular gesture in order to select the other device (e.g., other local or remote device) to be controlled at the time through motion input of device 10.

FITBIT 1002
Fitbit v. Immersion

Thus, particular embodiments provide gesture motion selection of other devices to be controlled by handheld device 10.

Handheld device 10 may include a device selection module operable to detect a device selection gesture which indicates that a user desires to control a particular device. Each controllable device may include its own gesture command maps which correlate gestures to be input using device 10 and commands of the controllable device. A control module of the handheld device may select a particular command map corresponding to the controllable device selected for control. In some embodiments, device 10 may include a device locator operable to detect, for each of a plurality of remote devices, a direction from the handheld device to each remote device. In this case, the user may move handheld device 10 in the direction of a particular remote device the user desires to control in order to select that remote device for control.

While motion input for device 10 may be used for such control of the other devices, other types of input (e.g., utilizing input 14) may also be used to control other local or remote devices selected for control by gesture input. In some embodiments different gestures may be each mapped to control a different device. In other embodiments, device 10 may display possible other devices for control and particular gesture(s) to utilize to indicate a user's selection as to which other device the user desires to presently control through device 10. Handheld devices according to the present invention may utilize any particular manner of gesture selection of one or more local or remote devices to be controlled by the handheld devices.

As discussed above, particular embodiments include handheld devices 10 capable of detecting motion of the device through a motion detector 22 to modify the behavior of the device in some way according to the motion detected. Handheld devices 10 in some embodiments are capable of modeling their particular environment and subsequently modifying their behavior based on such environment. One distinction between modeling an environment of a handheld device and detecting a particular motion of the device is that in the former case there may be reasoning involved and in the latter case there may be no such reasoning. As an example, if a handheld device changes its behavior when moved according to a particular gesture, that may be considered sensing or detecting a particular motion and reacting based on

FITBIT 1002
Fitbit v. Immersion

the motion detected. If, on the other hand, the handheld device determines that it is sitting face down on a table and reacts accordingly, that may be considered modeling its environment. As another example, if a handheld device moves to the left and changes its behavior based on such movement, that may be considered detecting motion and reacting. If the handheld device finds itself in free fall and powers-down so as to survive an impending collision with the ground, that may be considered modeling its environment. A further distinction may be that environmental modeling may not require an immediate response to a user input, while detecting an event, such as a particular motion, generally does require such an immediate response. Modeling an environment may thus involve sensing or detecting a pattern of motion (or lack thereof), matching it to a predefined set of environmental conditions and modifying the behavior of the device based on the modeled environment. The behavior implemented based on the environment modeled may also change based on a particular application in use or in focus. In some cases, the device may change its sensitivity to particular motions based on the environment modeled.

As an example, a handheld device may recognize, through accelerometers or other motion detection components, that it is at rest on an approximately horizontal surface. Such recognition may result from a determination that the device is not moving, or still, with a static 1g of acceleration orthogonal to a surface. The device may be able to differentiate resting on a table from resting in a user's hand, for example, because a user's hand typically will not be able to hold the device perfectly still. The device may, as a result, behave in a certain manner according to the recognition that it is at rest on an approximately horizontal surface. For example, if handheld device 10 recognized that it was lying at rest on a table, it may power off after lying in such position for a certain amount of time. As another example, a cellular phone in a vibrate mode may vibrate more gently if it recognizes it is on a table upon receipt of a call or upon any other event that may trigger vibration of the phone. In some embodiments, the device may recognize its orientation while lying on a table such that it may behave in one manner when lying in a "face down" position (e.g., it may power off) while it may behave in a different manner when lying in a non-face down position. If handheld device 10 comprised a cellular phone, it may enter a speaker mode when it is on a call and recognizes that it is placed by a user in a

FITBIT 1002
Fitbit v. Immersion

"face up" position on a table while on the call. If, on the other hand, the cellular phone is on a call and is placed face down on the table, it may enter a mute mode.

As another example, handheld device 10 may recognize through a brief period of approximately 0g that it is in free-fall and then may behave to reduce damage due to impending impact with the ground or another surface. Such behavior may include, for example, powering down chips and/or hard drives, retracting lenses, applying covers or any other device behavior. In particular embodiments, non-hand-held devices or devices that do not otherwise detect motion for input may also be able to model their environment and to behave based on the environment modeled. As an additional example, acceleration patterns may be detected to recognize that a handheld device 10 is in a moving environment (e.g., being held by a user in a car or on a train) and may adjust various sensitivities, threshold and/or other characteristics to enable better performance of the device in that environment.

In other embodiments, handheld device 10 may comprise a digital camera. Through its motion detection components, the camera may determine whether it is on a tripod or is being held by a user when a picture is taken. The camera may set a shutter speed for the picture based on that determination (e.g., slow shutter speed if on a tripod or fast shutter speed if being held by a user).

If handheld device 10 comprised a device that utilized a cradle for syncing up with another device, such as a PC, then device 10 may recognize that it is in the cradle based on its stillness (or supported state) and its particular orientation. The device may then operate or function according to its state of being in the cradle (e.g., it may then sync up with its associated PC).

FIGURE 16 is a flowchart 230 illustrating an environmental modeling process, in accordance with a particular embodiment. At step 232, raw motion data is received at handheld device 10. As described above, the raw motion data may be received by any combination of accelerometers, gyros, cameras, rangefinders or any other suitable motion detection components. At step 234, the raw motion data is processed to produce a motion detector output from which motion and orientation of the device is determined at step 236. Boxes 237 represent example motions and orientations of the device, such as rotating around the z-axis in box 237a, translating along the x-axis in box 237b, oriented at particular angles α, θ, ω in box 237c and still

FITBIT 1002
Fitbit v. Immersion

in box 237n. These are mere example motions and orientations of the device, and any number of motions may be utilized that are determined at step 236. In some embodiments, the determined orientations may comprise an orientation of the device with respect to gravity.

At step 238, handheld device 10 determines its environment based on the motion and orientation determined at step 236. Boxes 239 represent example environments of the device, such as face down on a table in box 239a, falling in box 239b, on a train in box 239c and held in hand at box 239n. Any number of environments may be determined based on motions and orientations determined at step 236. In particular embodiments, the environmental determination may also be based on a history of the device, such as a motion/orientation history. For example, when implementing a speaker mode function of a cellular phone, the device may detect a quite period when horizontal in the middle of a call after a short jarring is detected (e.g., the short jarring caused by a user placing the phone face up on a table). The phone can detect that it was jarred so that stillness and a perpendicular position relative to gravity may take on a different meaning than had the jarring not occurred. Thus, the determination of the environment may be based on the motion and orientation of the device and its history. The history may comprise a previous motion/orientation of the device or any other information relating to a device's history.

At step 240, the determined environment is mapped to a particular behavior. The mapped behavior may depend on any number of factors in addition to the determined environment, such as desired characteristics of the particular user using the device at the time or the particular application in use or focus at the time. For example, the behavior according to a particular modeled environment may include engaging a mute function of the handheld device in box 241a, powering down chips of the device to survive an impact in box 241b and increasing a motion activation threshold of the device in box 241n. The mute behavior indicated in box 241a may be implemented when a cell phone's environment comprises laying face down on a table while on a call. The powering down chips behavior in box 241b may be implemented when the environment of handheld device 10 comprises a free fall of the device. The increasing a motion activation threshold behavior of box 241n may be implemented

FITBIT 1002
Fitbit v. Immersion

when a handheld device's environment comprises being in a car or train where bumpiness may require a greater movement threshold for a user's motion input to register as an intended input. Particular embodiments may include any number of behaviors mapped to one or more modeled environments. At step 242, the handheld device behaves according to the behavior to which its environment is mapped at step 240.

As indicated above, users may move handheld devices according to particular gestures to cause the devices to perform desired functions, operations or tasks. In particular embodiments, gestures used as motion input for the device may comprise pre-existing symbols, such as letters of the alphabet, picture symbols or any other alphanumeric character or pictographic symbol or representation. For example, gestures used as motion input may mimic upper and lower case members of an alphabet in any language, Arabic and Roman numerals and shorthand symbols. Preexisting gestures may be used for handheld input devices for other local and remote devices as well. Using preexisting gestures for handheld device input may facilitate the learning process for users with respect to gesture motion interfaces.

FIGURE 17 illustrates example gestures which may be mapped to particular functions. For example, if handheld device 10 comprised a cellular phone, a user may move device 10 in the form of heart 250 to call the user's girlfriend, boyfriend or spouse or house 252 to call the user's home. As another example, if handheld device 10 were a PDA or other device running an application managing files or data, moving the device in the form of C-gesture 254 may be a command for copying data, O-gesture 256 may be a command for opening a file, D-gesture 258 may be a command for deleting data and X-gesture 260 may be an exit command for a file or application. The logical connection between gestures and their intended functions or operations (e.g., "O" for opening a file) further facilitates user interaction and learning.

Any number of pre-existing symbols may be used as gestures for motion input as commands for performing any number of functions, operations or tasks of a handheld device. Many preexisting gestures typically exist in two dimensions. Handheld device 10 may recognize such gestures. In some cases, for example, handheld device 10 may disable receipt of a particular dimension so that any movement in a third dimension when a user is attempting to input a two-dimensional

FITBIT 1002
Fitbit v. Immersion

gesture is not received or detected in order to facilitate recognition of the two-dimensional gesture. In some embodiments, handheld device 10 may receive three-dimensional gestures that may be based on preexisting two-dimensional gestures. Receiving and detecting three-dimensional gestures increases the capabilities of the device by, for example, increasing the number and types of gestures which may be used as motion input.

FIGURE 18 is a flowchart 270 illustrating the utilization of a preexisting symbol gesture, the letter "O," as motion input. As illustrated in step 272, a user moves handheld device 10 in the form of the letter "O." At step 274, handheld device 10 receives raw motion data of the "O" movement from motion detection components and process such raw motion data at step 276 to determine the actual motion of the device. At step 278, handheld device 10 accesses a gesture database 280 which may include a plurality of gestures recognizable by the device to map the motion to the gesture "O." The plurality of gestures of the gesture database may each be defined by a series of accelerations of a movement. The actual motion of the device may be matched to a series of accelerations of one of the gestures of the gesture database. At step 282, handheld device 10 maps the gesture "O" to a particular function by accessing a function database 284 (or a gesture mapping database) which may include a plurality of functions that may be performed by one or more applications running on the device. In particular embodiments, the gesture and function databases may be comprised in memory 18 of the device. The particular function mapped to the gesture "O" may depend on a particular application in focus or being used by the user at the time. For example, in some applications "O" be comprise a command to open a file, while in other applications it may comprise a command to call a certain number. In some cases, one gesture may be mapped to the same function for all applications of the device. At step 286, the device behaves according to the mapped function, such as opening a file.

As indicated above, gestures used as motion input for handheld device 10 may have different meanings (e.g., functions, operations, tasks) based on a particular context, such as a particular application in use or in focus, a particular device state with respect to an application or otherwise, a particular modeled environment or any combination of these or any other context. For example, a particular gesture may be

FITBIT 1002
Fitbit v. Immersion

mapped as a command to scroll a page up when running a web browser at the device, while the gesture may be mapped as a command to examine a different date when running a calendar program. The ability for particular gestures to be mapped to different commands depending on the context, such as the application in use, increases the functionality of the device.

Handheld devices in some embodiments may be able to utilize simpler motion detection components if gestures are mapped to different commands depending on the context. As an example, a handheld device may include particular motion detection components such that the handheld device may only be able to recognize and distinguish between twenty different gestures. If each gesture is mapped to a different function for each of four different applications, then the ability to only recognize twenty unique gestures still provides eighty different functions on the device (twenty for each application). If each gesture were mapped to its own function, no matter what application was in focus, then the overall capability of the device would be reduced, and some gestures would likely not be used in some applications. The ability to use less complex components that are able to recognize and distinguish between fewer gestures as a result of mapping gestures to a plurality of functions depending on the context can lead to reduced costs in the components utilized in the device and can also simplify the task of physically learning gestures required to control the device. As indicated above, gestures may be mapped to different functions, operations or tasks depending on the application in use, device state, modeled environment or other context. In some cases, gestures may be mapped to different functions depending on the state of a particular application. For example, in the case of a word processing program, some gestures may have some functions when in one state of the program (e.g., a menu state) while the same gestures may have different functions when in another state of the word processing program (e.g., a document editing state). In this case, a command map associated with the gesture function mappings may include gesture mappings for each such state.

FIGURE 19 is a flowchart 290 illustrating the use of context-based gesture mapping, in accordance with a particular embodiments. In the illustrated embodiment, a gesture has different functions assigned based on the application in focus. At step 292, handheld device 10 receives raw motion data of a particular

FITBIT 1002
Fitbit v. Immersion

gesture movement and process such raw motion data at step 294 to determine the actual motion of the device. At step 296, handheld device 10 maps the motion to a gesture, for example, by accessing a gesture database. At step 298, handheld device 10 determines which application is in focus. For example, if the device were capable of running four different applications, then it would determine which of the four was in focus or was being used at the time. The device then performs the function mapped to the gesture according to the application in focus. The identification of such function may be accomplished in some embodiments by accessing a function database which may also be referred to as a gesture mapping database since it correlates gestures of a gesture database to functions. In the illustrated embodiment, if Application 1 is in focus, then the device performs Function 1 at step 300a; if Application 2 is in focus, then the device performs Function 2 at step 300b; if Application 3 is in focus, then the device performs Function 3 at step 300c; and if Application 4 is in focus, then the device performs Function 4 at step 300d.

As a further example of context-based gesture mapping, a handheld device with phone and PDA capabilities may run four applications: a phone application, a calendar application, a file management application and an e-mail application. A gesture input mimicking the letter "S" may have different functions depending on the application in focus. For example, if the phone application is in focus, then receiving the gesture input "S" may be a command for calling a particular number designated to the "S" gesture. If the calendar application is in focus, then receiving the gesture input "S" may be a command for scrolling to the month of September in the calendar. If the file management application is in focus, then receiving the gesture input "S" may be a command for saving a file. If the e-mail application is in focus, then receiving the gesture input "S" may be a command for sending an e-mail. Particular embodiments contemplate great flexibility in the ability to map gestures to different functions depending on the context.

As discussed above, gestures may have different functions depending on a particular context at the time. In particular embodiments, handheld devices may be customizable to allow users to assign device functions to pre-defined gestures. The functions may be context-based such that some gestures may have different functions depending on an application in use, a device state or a modeled environment.

FITBIT 1002
Fitbit v. Immersion

Handheld devices in some embodiments may allow different users of the same device to assign different functions to the same gesture, and such functions may also be context-based as discussed above.

For example, a handheld device 10 may be utilized by a number of different users at different times. Each user may assign different functions for the same gestures. When the handheld device receives a gesture input, it must thus know which user is using the device at the time to determine which function the user intends the device to perform. The device may determine the user in any of a variety of ways. In some embodiments, users may log into the device prior to use by using a username and password or otherwise. In other embodiments, the handheld device may be able to identify the user based on the manner in which the user moves the device for motion input, such as the way the user forms a gesture using the device. As indicated above, each user may also assign commands to gestures based on context, such as based on the application in focus at the device. The ability for the handheld device to map functions to gestures based on particular users further increases the device's capabilities and flexibility, particularly if the device is able to recognize and distinguish only a particular number of gestures.

FIGURE 20 is a flowchart 310 illustrating the use of user-based gesture mapping, in accordance with a particular embodiment. In the illustrated embodiment, a gesture has different functions assigned based on the user using the device. At step 312, handheld device 10 receives raw motion data of a particular gesture movement and process such raw motion data at step 314 to determine the actual motion of the device. At step 316, handheld device 10 maps the motion to a gesture, for example, by accessing a gesture database. At step 318, handheld device 10 determines which user is using the device. Such determination may be made, for example, through a log in system in which users log into the device prior to use. Handheld device 10 may determine the current user through other suitable methods as well. At steps 320, the device performs the functions assigned to the gesture input based on the user using the device. In the illustrated embodiment describing the process with four possible users, if User 1 is using the device, then the device performs Function 1 at step 320a; if User 2 is using the device, then the device performs Function 2 at step 320b; if User 3 is

FITBIT 1002
Fitbit v. Immersion

using the device, then the device performs Function 3 at step 320c; and if User 4 is using the device, then the device performs Function 4 at step 320d.

As indicated above, in some embodiments, gestures may be assigned different functions based on both users using the device and a context. In this situation, the illustrated flowchart 310 described above may have an additional step to determine the context at the time (e.g., step 298 of flowchart 290 determining the application in focus). The particular function desired for performance by a certain gesture thus depends on both the user using the device at the time and the context, such as the particular application in focus at the time.

As previously discussed, some embodiments include handheld devices with the ability to receive preexisting symbols as gestures for motion input. Some of those embodiments as well as other embodiments may include the ability for user's to create their own gestures for mapping to functions and/or keys. The gestures may comprise any user-created symbol or other motion that the user desires to utilize as motion input for one or more particular functions, operations or tasks that the device is able to perform. Users may be able to create motions with some personal significance so they may more easily remember the motion's command or intended function.

FIGURE 21 is a flowchart 330 illustrating the assignment process for user-created gestures, in accordance with a particular embodiments. At step 332, an indication is received from a user for gesture creation. The indication may be received in any of a variety of ways using any suitable input format (e.g., keys, trackwheel, motion, etc.). The user may move the device according to the user-created gesture such that raw motion data for the user-created gesture is received at the handheld device at step 334. The raw motion data may comprise a sequence of accelerations of a movement after stabilization of the device from a base reference position until an indication is received to stop recording the reference positions. Indications to start and stop recording a user-created gesture may include motion or non-motion indications (e.g., key presses and key releases). The raw motion data is processed at step 336. At step 338, the motion is stored as a gesture, for example, at a gesture database. In particular embodiments, the indication for gesture creation may be received after the user moves the device according to the user-created gesture. For example, the user may move the device according to a user-created gesture that is

FITBIT 1002
Fitbit v. Immersion

currently unrecognizable by the device. The device may query the user to determine if the user desires to store the unrecognized gesture for a particular function. The user may respond in the affirmative so that the user may utilize the gesture as motion input in the future.

At step 340, function mapping information for the gesture is received from the user. The function mapping information may comprise functions, operations or tasks of the device that the user desires the user-created gesture to command. In particular embodiments, such function mapping information may comprise a series of functions (e.g., a macro) that one gesture may command. The user may assign different functions for a gesture according to an application in focus. In some cases, a user may desire to map different gestures to different keys or keystrokes of the device. One examples of mapping a series of functions to a gesture may include mapping a long string of characters to a gesture (e.g., telephone numbers including pauses, where appropriate). At step 342, the function mapping information is stored, for example, at a function database or gesture mapping database.

As indicated above, it may be difficult for a user to move handheld device 10 in the same precise manner for one or more gestures each time those gestures are used as input. Particular embodiments thus allow for varying levels of precision in gesture input. Precision describes how accurately a gesture must be executed in order to constitute a match to a gesture recognized by the device, such as a gesture included in a gesture database accessed by the device. The closer a user generated motion must match a gesture in a gesture database, the harder it will be to successfully execute such gesture motion. As discussed above, in particular embodiments movements may be matched to gestures of a gesture database by matching a detected series of accelerations of the movements to those of the gestures of the gesture database.

As the precision of gestures required for recognition increases, one may have more gestures (at the same level of complexity) that can be distinctly recognized. As an example, if the precision required was zero, then the device could only recognize a single gesture but it would recognize it easily because anything the user did would be recognized as that gesture. If, however, the precision required was infinite then it would be virtually impossible for a user to form a gesture that was recognized by the device, but the device could support an infinite number of gestures with only

FITBIT 1002
Fitbit v. Immersion

infinitesimal differences between them. One area in which the precision requirement is especially applicable is in the area of spatial signatures. With spatial signatures, the level of precision correlates well with the level of security.

In particular embodiments, the precision required by handheld device 10 for gesture input may be varied. Different levels of precision may be required for different users, different regions of the "gesture space" (e.g., similar gestures may need more precise execution for recognition while gestures that are very unique may not need as much precision in execution), different individual gestures, such as signatures, and different functions mapped to certain gestures (e.g., more critical functions may require greater precision for their respective gesture inputs to be recognized). Moreover, in some embodiments users may be able to set the level(s) of precision required for some or all gestures or gestures of one or more gesture spaces. As an example, a user may set the precision required for spatial signatures higher than for other gestures for the user thus increasing security for spatial signature input.

As indicated above, in particular embodiments gestures may be recognized by detecting a series of accelerations of the device as the device is moved along a path by a user according to an intended gesture. Recognition occurs when the series of accelerations is matched by the device to a gesture of a gesture database.

In some embodiments, each gesture recognizable by handheld device 10, or each gesture of a gesture database, includes a matrix of three-dimensional points. In addition, a user movement intended as a gesture input includes a matrix of three-dimensional points. Handheld device 10 may compare the matrix of the movement with the matrices of each recognizable gesture (or each gesture in the gesture database) to determine the intended gesture. If a user moves the device such that the movement's matrix correlates to each point of an intended gesture's matrix, then the user may be deemed to have input the intended gesture with perfect precision. As the precision required for gesture input is reduced, then the greater the allowable differences between a user gesture movement and an intended gesture of a gesture database for gesture recognition.

FIGURE 22 illustrates three gestures input using a handheld device with varying levels of precision. In the illustrated embodiment, the intended gesture comprises an "O." Gesture movement 350 is input as a perfect "O," or with 100%

FITBIT 1002
Fitbit v. Immersion

precision for the intended gesture. Gesture movement 352 is input with less than 100% precision as it does not form a perfect "O." Gesture movement 354 is input with less precision than gesture movement 352. The precision requirement for the input of gesture "O" may be set at handheld device to accept varying levels of precision. For example, the precision level may be set such that only gesture movement 350 is recognized as gesture "O," gesture movements 350 and 352 are both recognized as gesture "O" or gesture movements 350, 352 and 354 are all recognized as gesture "O." As indicated above, the higher the precision requirement, then the more space available for additional recognizable gestures. For example, if the precision level for handheld device 10 were set such that only gesture movement 350 was recognized as gesture "O," then gesture movements 352 and 354 may be recognized as other, distinct gestures.

In particular embodiments, handheld devices may alter gestures recognized for performing particular functions based on a user's personal precision. In this manner, a handheld device may have dynamic learning capability of gesture mappings. For example, if a particular gesture of a gesture database is mapped to a particular function, and a user's repeated attempts to input the gesture lack precision in a consistent manner; then the handheld device may alter the gesture in the gesture database to match the consistent gesture movement of the user such that the user's consistent gesture motion input will be mapped to the particular function.

As an example, if a particular gesture comprises a square motion and a user's motion intended for the gesture comprises more of a triangular motion on a consistent basis (e.g., on multiple consecutive times), then the handheld device may be able to recognize this consistent difference in an intended gesture and the actual user motion to change the intended gesture (e.g., a square) in the gesture database mapped to the function intended to the user's actual consistent motion (e.g., triangle). Thus, after such change is made, any time the user inputs the triangle gesture then the function previously mapped to the square gesture will be commanded. The device may determine the gesture intended in any of a variety of ways, such as through two-way communication with the user through any form of input. In particular embodiments, this dynamic learning of users' input characteristics may be applied on a user-specific

FITBIT 1002
Fitbit v. Immersion

basis. For example, in the example described above another user may still input the square gesture using the same handheld device to command the same function.

As indicated above, as the precision of user motion with respect to intended gestures increases, then the number of gestures available for mapping to functions increases. In some embodiments, handheld devices may recognize that a user's precision increases over time and the devices may, as a result, increase the gestures available for use. Increasing gestures available for input may also increase the functions capable of being commanded through gesture input.

As an example, a user's personal precision for inputting gestures may be such that the user is only able to input a certain number of gestures that will be recognized by the handheld device. However, over time, the user's personal precision may increase. This increase may be recognized by the handheld device and, as a result, the device may enable additional gestures that the user may use as gesture input. In some embodiments, the enabling of additional gestures may occur when the user's precision increases over a particular precision threshold, or a certain precision level. Since the user's precision has increased, the handheld device will be able to recognize when the user attempts to input these additional gestures. As indicated above, providing additional gestures for input by a user may also increase the number of functions that the user is able to command through gesture input, since each gesture may be mapped to command a different function.

Handheld devices in particular embodiments may also allow users to set and vary noise thresholds of the device. Noise thresholds are the magnitude of motion of the device that must be detected in order to be considered intended motion input (e.g., an intended gesture) of the user. For example, if noise thresholds are set low, then minimal motion of the device may be considered by the device as motion input. However, if noise thresholds are set high, then greater movement of the device would be required before the motion is considered intended input from the user. If, for example, a user is travelling in a car on a bumpy road, the user may desired to set the noise threshold higher so that when the device moves as a result of bumps in the road then such movement may not be considered by the device to be intended motion input.

FITBIT 1002
Fitbit v. Immersion

In particular embodiments, noise thresholds may automatically change at the device based on a modeled environment. For example, if a device determines that the environment comprises traveling in a car, then the device may automatically increase the noise threshold so that minimal movements resulting from the car will not register as user-intended motion.

FIGURE 23 is a flowchart 370 illustrating a gesture recognition process utilizing a number of features described herein, in accordance with a particular embodiment. At step 372, raw motion data of a particular gesture movement is received. The raw motion data is processed at step 374 where the actual motion of the device is determined. Such processing may include various filtering techniques and fusion of data from multiple detection or sensing components. At step 376, the actual motion is mapped to a gesture. Mapping the actual motion to a gesture may include accessing a user settings database 378, which may include user data 379 comprising, for example, user precision and noise characteristics or thresholds, user-created gestures and any other user-specific data or information including user identities 381. User-specific information may be important, for example, because different users of the handheld device may have different settings and motion input characteristics. For example, an older user may have less precision than a younger user when inputting gestures such that the older person may have fewer gestures available. Moreover, a more experienced user may have more device functionality available through gesture input.

User settings database 378 may also include environmental model information 380 which may factor in determining the gesture applicable at the time. As discussed above, through environmental modeling, the device can internally represent its environment and the effect that environment is likely to have on gesture recognition. For example, if the user is on a train, then the device may automatically raise the noise threshold level. The device may also reduce the precision required, depending upon how crowded the gesture space is near the gesture under consideration. Mapping the actual motion to a gesture may also include accessing gesture database 382.

At step 384, the gesture is mapped to a function for the device. This step may include accessing a function mapping database 386 which may include correlation

FITBIT 1002
Fitbit v. Immersion

between gestures and functions. Different users may have different mappings of gestures to functions and different user-created functions. Thus, function mapping database 386 may also include user-specific mapping instructions or characteristics, user-created functions (e.g., macros and/or phone numbers) and any other function information which may be applicable to mapping a particular gesture to one or more functions. In some embodiments, gestures may be mapped to individual keystrokes. User identities 381 may also be accessed in this step. In addition, device context information 388 may also be accessed and utilized in mapping the gesture, which may include environmental model information 389, application in focus information 390 and device state information 391, such as time and date information, location information, battery condition and mode information (e.g., silent mode). At steps 392, the device performs the appropriately-mapped one or more function(s), such as Function 1 at step 392a, Function 2 at step 392b or Function 3 at step 392c.

As discussed above, in particular embodiments handheld device 10 may comprise a cellular phone with many of the capabilities described herein. For example, cellular phones with motion input capabilities may use motion input to flatten menus as discussed above. The cellular phone may detect device states and environments, such as free fall or the cellular phone being face down or face up to map to behaviors such as mute, speaker phone and power-off. Other detection of device states may include detecting that the phone is being held to disengage mute or speakerphone states. The cellular phone may utilize gestures to control dialing (e.g., through gestural speed dial) or to lock/unlock a keypad of the device. For example, the device may be moved in a clockwise circle to dial home, a counterclockwise circle to dial work and in the shape of a heart to dial a significant other. Users may also be able to program the cellular phone to customized gestural mappings.

In particular embodiments handheld device 10 may comprise a digital camera utilizing motion input for at least some of the functions described herein. For example, digital cameras with motion input capabilities may use motion input to flatten menus as discussed above. Motion may also be used to allow a user to zoom in (and back out) on still photos or video to examine it more closely for smoother and more intuitive functionality. Motion may be used to zoom in and out of a number of thumbnails of photographs or video clips so that it is easy to select one or more to

FITBIT 1002
Fitbit v. Immersion

review. Virtual desktops may be used to review many thumbnails of many digital photos or video clips or to review many digital photos or video clips by translating the camera or using gestural input. Gestures and simple motions may be used alone or in combination with other interface mechanisms to modify various settings on digital still and video cameras, such as flash settings, type of focus and light sensing mode. Moreover, free fall may be detected to induce the camera to protect itself in some way from damage in an impending collision. Such protection may include dropping power from some or all parts of the camera, closing the lens cover and retracting the lens.

In particular embodiments handheld device 10 may comprise a digital watch utilizing motion input for at least some of the functions described herein. For example, digital watches with motion input capabilities may use motion input to flatten menus as discussed above. In some embodiments, the tapping of the watch or particular gestures may be used to silence the watch. Other functions may also be accessed through taps, rotations, translations and other more complex gestures. These functions may include changing time zones, setting the watch (e.g., setting the time and other adjustable settings), changing modes (e.g., timers, alarms, stopwatch), activating the backlight, using a stopwatch (e.g., starting, stopping and splitting the stopwatch) and starting and stopping other timers.

In some embodiments, motion detection may be separate from a display. For example, a display may be worn on glasses or contacts, and other parts of the handheld device may be dispersed across a user's body such that the display may not be part of the same physically component as the motion input device or component

As discussed above, particular figures illustrate various methods, flowcharts and processes which may be performed in particular embodiments. It should be understood that steps may be performed in any order, and steps from a particular method, flowchart or process may be combined with other methods, flowcharts or processes or other steps from the same method, flowchart or process in various embodiments without departing from the scope of the invention.

Although the present invention has been described in detail with reference to particular embodiments, it should be understood that various other changes, substitutions, and alterations may be made hereto without departing from the spirit and scope of the present invention. For example, although the present invention has

FITBIT 1002
Fitbit v. Immersion

been described with reference to a number of elements included within handheld device 10, these elements may be combined, rearranged or positioned in order to accommodate particular architectures or needs. In addition, any of these elements may be provided as separate external elements to each other where appropriate. The present invention contemplates great flexibility in the arrangement of these elements as well as their internal components.

Numerous other changes, substitutions, variations, alterations and modifications may be ascertained by those skilled in the art and it is intended that the present invention encompass all such changes, substitutions, variations, alterations and modifications as falling within the spirit and scope of the appended claims.

FITBIT 1002
Fitbit v. Immersion

WHAT IS CLAIMED IS:

1. A motion controlled handheld device comprising:

a first accelerometer operable to detect acceleration along a first axis;

a second accelerometer operable to detect acceleration along a second axis, the second axis perpendicular to the first axis;

a tilt detection component operable to detect rotation having a component around at least one of the first axis and the second axis;

a display operable to present a current image;

a motion tracking module operable to track motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component; and

a controller operable to generate the current image and to modify the current image in response to the motion of the device.

2. The motion controlled handheld device of Claim 1, wherein:

the display comprises a viewable surface; and

the first axis and the second axis are substantially parallel to the viewable surface.

3. The motion controlled handheld device of Claim 1, wherein:

the tilt detection component comprises a third accelerometer operable to detect acceleration along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis; and wherein:

the motion tracking module is further operable to distinguish translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer.

FITBIT 1002
Fitbit v. Immersion

4. The motion controlled handheld device of Claim 1, wherein the tilt detection component comprises:

a third accelerometer operable to detect acceleration along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

a camera operable to generate a video stream; and

a video analysis module operable to detect a direction of motion based on the video stream.

5. The motion controlled handheld device of Claim 4, wherein the tilt detection component further comprises:

a range finder operable to determine distance information including a distance between the device and an object in the video stream; and wherein:

the video analysis module is further operable to determine a magnitude of translation of the device using the distance.

6. The motion controlled handheld device of Claim 1, wherein the tilt detection component comprises:

a first camera operable to generate a first video stream, the first camera aligned to focus in a first direction along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

a second camera operable to generate a second video stream, the second camera aligned to focus in a second direction along the third axis, the second direction opposite the first direction; and

a video analysis module operable to detect a direction of motion of the device based on the first video stream and the second video stream.

7. The motion controlled handheld device of Claim 6, wherein the tilt detection component further comprises a third accelerometer operable to detect acceleration along the third axis.

FITBIT 1002
Fitbit v. Immersion

8. The motion controlled handheld device of Claim 6, wherein the video analysis module is further operable to:

detect first edges of objects in the first video stream;

detect second edges of objects in the second video stream;

identify movement of the first edges and the second edges;

determine a differential between the movement of the first edges and the movement of the second edges; and

determine tilt components and translation components based on the differential.

9. The motion controlled handheld device of Claim 1, further comprising:

a gesture database comprising a plurality of gestures, each gesture defined by a motion of the device with respect to a first position of the device; and

a gesture mapping database mapping each of the gestures to a corresponding command; and wherein

the controller is further operable to compare the tracked motion of the device against the gestures to determine a received gesture, to identify the corresponding command mapped to the received gesture, and to execute the identified command to modify the current image.

10. The motion controlled handheld device of Claim 1, wherein:

the motion tracking module is further operable to identify translation of the device within a plane formed by the first axis and the second axis based upon motion of the device;

the current image displays a subsection of a larger image; and

the controller is further operable to continuously modify the current image to display another subsection of the larger image based on a resulting position of the device resulting from the translation.

11. The motion controlled handheld device of Claim 1, wherein the motion tracking module is further operable to disregard acceleration detected by the first

FITBIT 1002
Fitbit v. Immersion

accelerometer and acceleration detected by the second accelerometer that register below a noise threshold.

12. A method for controlling a handheld device comprising:

detecting acceleration along a first axis using a first accelerometer;

detecting acceleration along a second axis using a second accelerometer, the second axis perpendicular to the first axis;

detecting rotation having a component around at least one of the first axis and the second axis using a tilt detection component;

tracking motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component; and

displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

13. The method of Claim 12, wherein:

the display comprises a viewable surface; and

the first axis and the second axis are substantially parallel to the viewable surface.

14. The method of Claim 12, further comprising:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

distinguishing translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer.

FITBIT 1002
Fitbit v. Immersion

15. The method of Claim 12, further comprising:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

monitoring a video stream generated by a camera of the device; and

detecting a direction of motion based on the video stream.

16. The method of Claim 15, further comprising:

determining distance information including a distance between the device and an object in the video stream; and

determining a magnitude of translation of the device using the distance.

17. The method of Claim 12, further comprising:

monitoring a first video stream generated by a first camera of the device, the first camera aligned to focus in a first direction along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

monitoring a second video stream generated by a second camera of the device, the second camera aligned to focus in a second direction along the third axis, the second direction opposite the first direction; and

detecting a direction of motion of the device based on the first video stream and the second video stream.

18. The method of Claim 17, further comprising:

detecting first edges of objects in the first video stream;

detecting second edges of objects in the second video stream;

identifying movement of the first edges and the second edges;

determining a differential between the movement of the first edges and the movement of the second edges; and

determining tilt components and translation components based on the differential.

FITBIT 1002
Fitbit v. Immersion

19. The method of Claim 12, further comprising:

comparing the tracked motion of the device against a gesture database, the gesture database comprising a plurality of gestures with each gesture defined by a motion of the device with respect to a first position of the device;

identifying a command mapped to the received gesture; and

executing the identified command to modify the current image.

20. Logic for controlling a handheld device, the logic embodied in a computer readable medium and operable when executed to perform the steps of:

detecting acceleration along a first axis using a first accelerometer;

detecting acceleration along a second axis using a second accelerometer, the second axis perpendicular to the first axis;

detecting rotation having a component around at least one of the first axis and the second axis using a tilt detection component;

tracking motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component; and

displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

21. The logic of Claim 20, further operable when executed to perform the steps of:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

distinguishing translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer.

FITBIT 1002
Fitbit v. Immersion

22. The logic of Claim 20, further operable when executed to perform the steps of:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

monitoring a video stream generated by a camera of the device; and

detecting a direction of motion based on the video stream.

23. The logic of Claim 20, further operable when executed to perform the steps of:

determining distance information including a distance between the device and an object in the video stream; and

determining a magnitude of translation of the device using the distance.

24. The logic of Claim 20, further operable when executed to perform the steps of:

monitoring a first video stream generated by a first camera of the device, the first camera aligned to focus in a first direction along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

monitoring a second video stream generated by a second camera of the device, the second camera aligned to focus in a second direction along the third axis, the second direction opposite the first direction; and

detecting a direction of motion of the device based on the first video stream and the second video stream.

FITBIT 1002
Fitbit v. Immersion

25. The logic of Claim 24, further operable when executed to perform the steps of:

detecting first edges of objects in the first video stream;

detecting second edges of objects in the second video stream;

identifying movement of the first edges and the second edges;

determining a differential between the movement of the first edges and the movement of the second edges; and

determining tilt components and translation components based on the differential.

26. The logic of Claim 20, further operable when executed to perform the steps of:

comparing the tracked motion of the device against a gesture database, the gesture database comprising a plurality of gestures with each gesture defined by a motion of the device with respect to a first position of the device;

identifying a command mapped to the received gesture; and

executing the identified command to modify the current image.

27. A motion controlled handheld device comprising:

means for detecting acceleration along a first axis;

means for detecting acceleration along a second axis, the second axis perpendicular to the first axis;

means for detecting rotation having a component around at least one of the first axis and the second axis;

means for tracking motion of the device in three dimensions based upon the acceleration along the first axis, the acceleration along the second axis, and the rotation; and

means for displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

FITBIT 1002
Fitbit v. Immersion

1/11

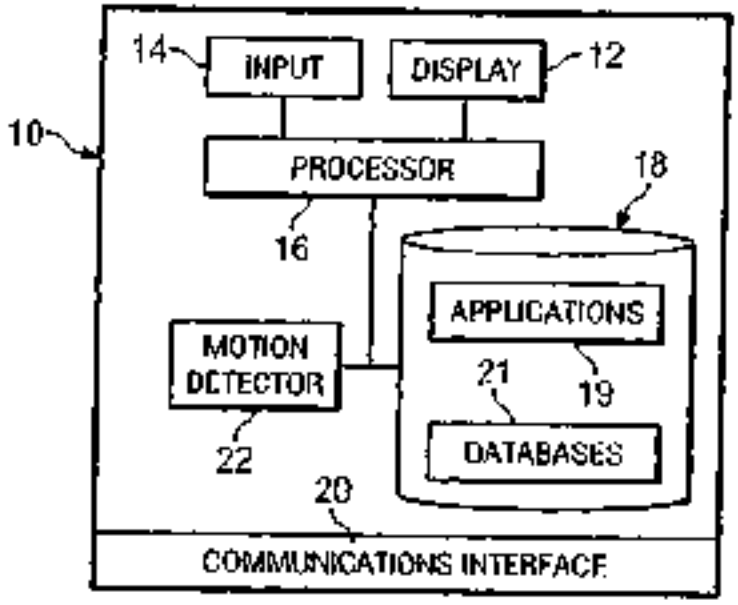


FIG. 1

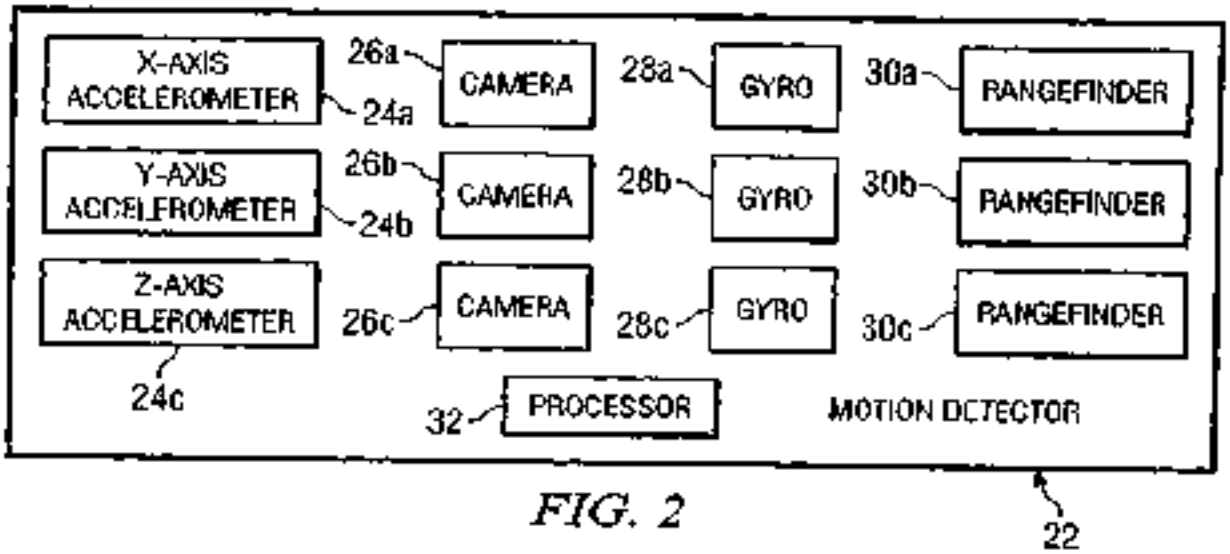


FIG. 2

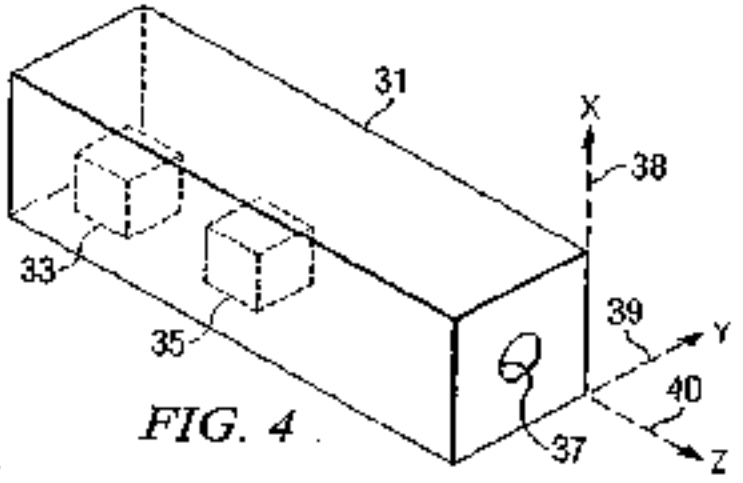


FIG. 4

FITBIT 1002
Fitbit v. Immersion

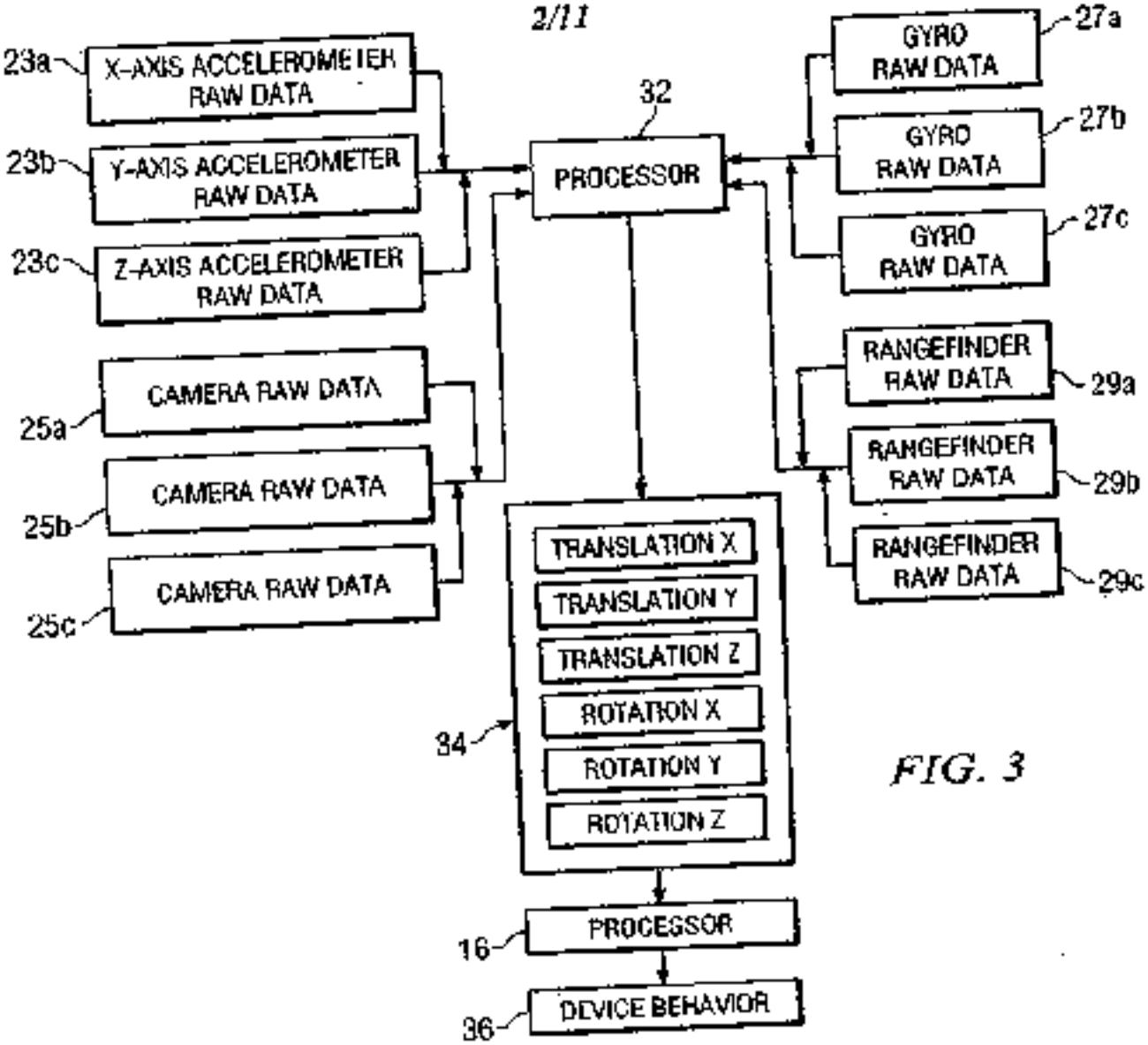


FIG. 3

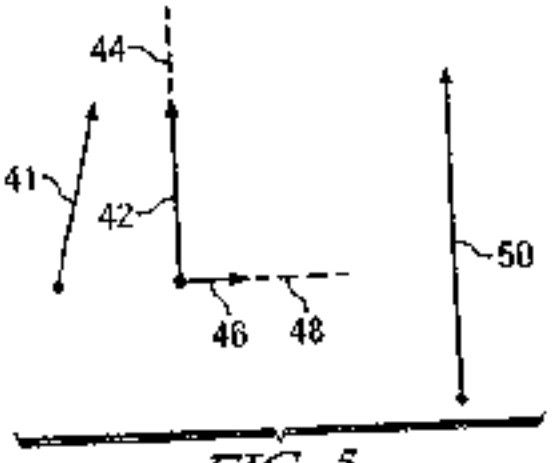


FIG. 5

FITBIT 1002
Fitbit v. Immersion

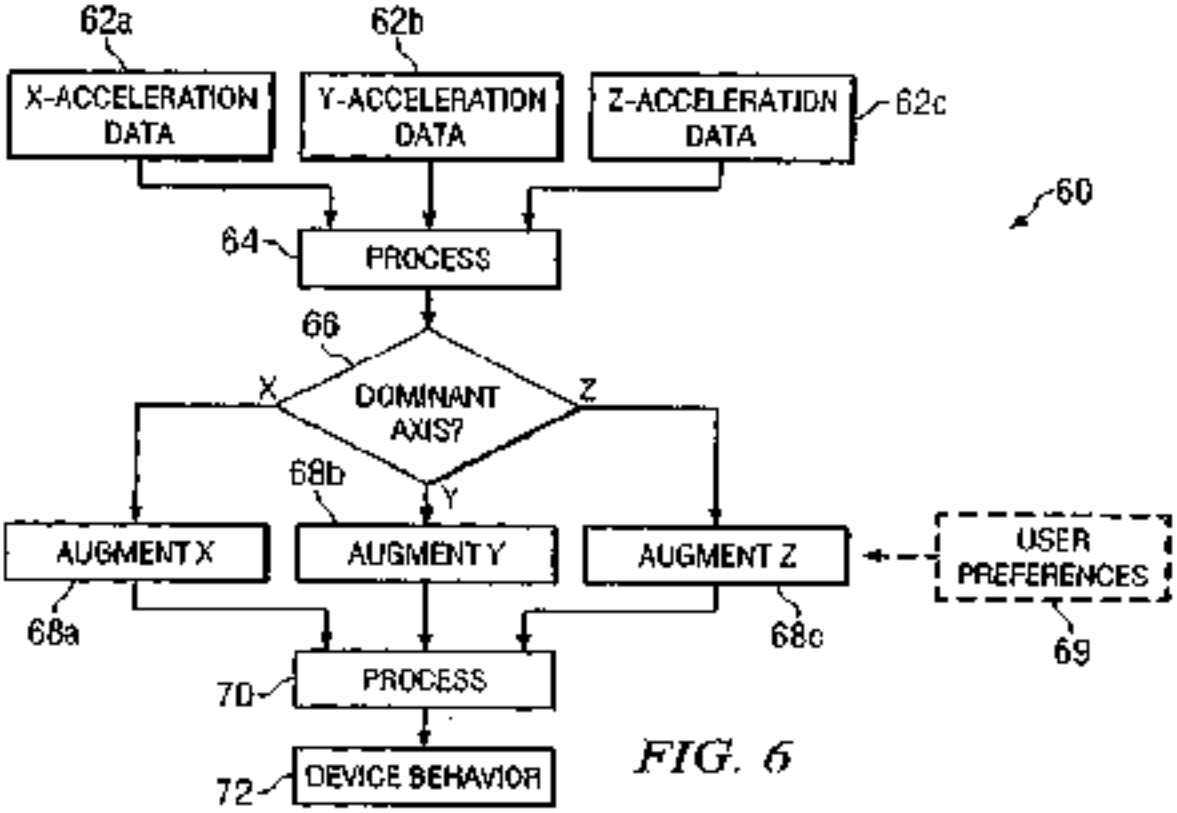


FIG. 6

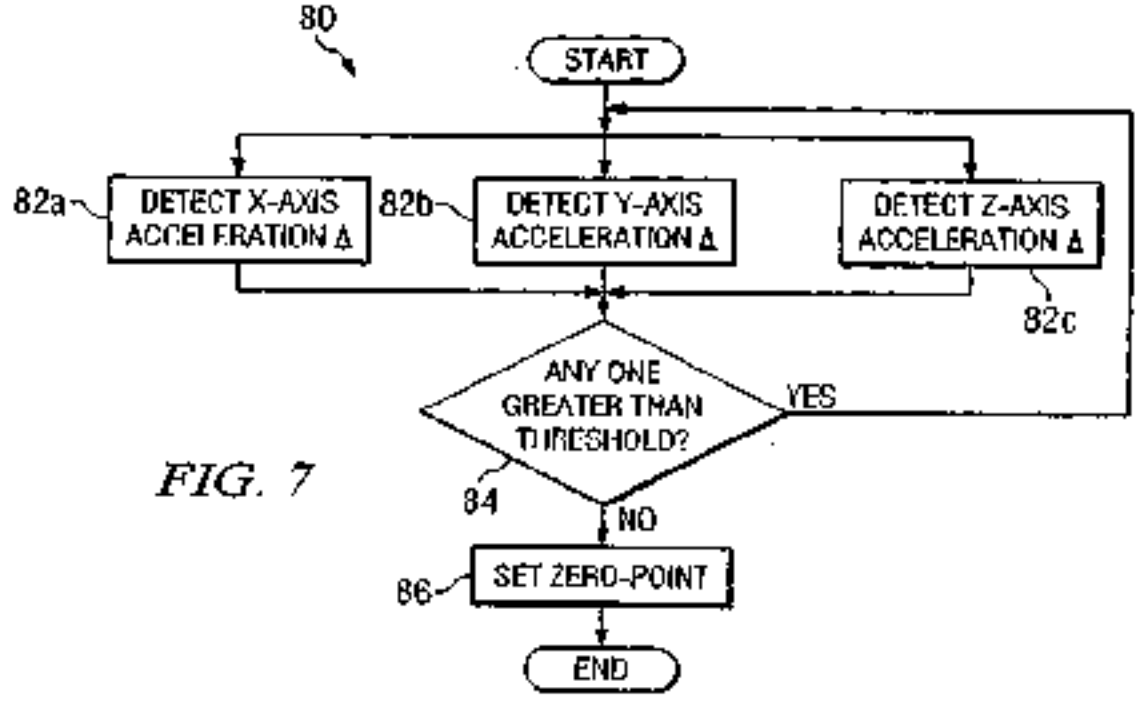


FIG. 7

FITBIT 1002
Fitbit v. Immersion

FIG. 8

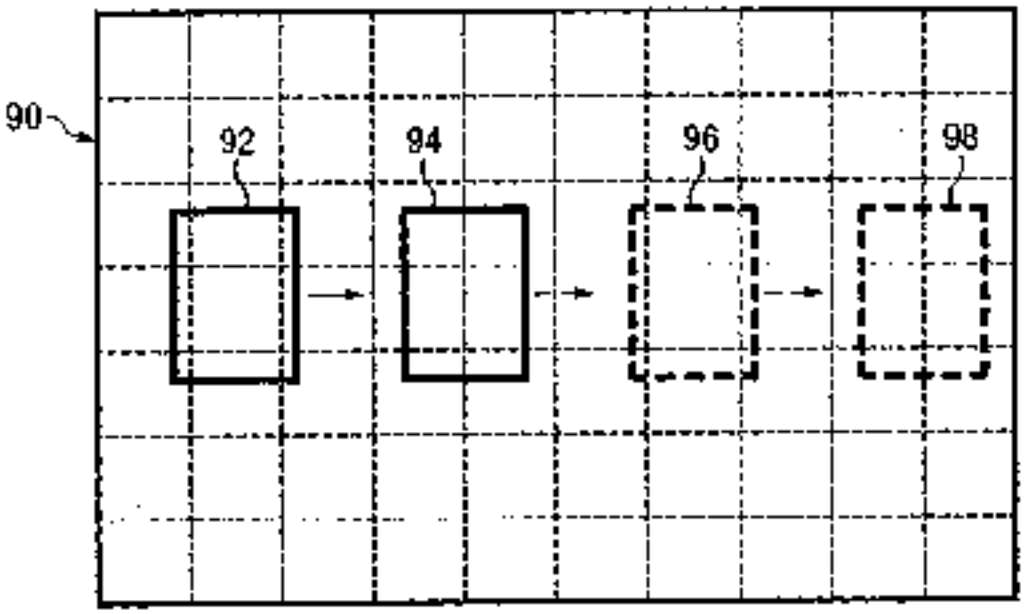
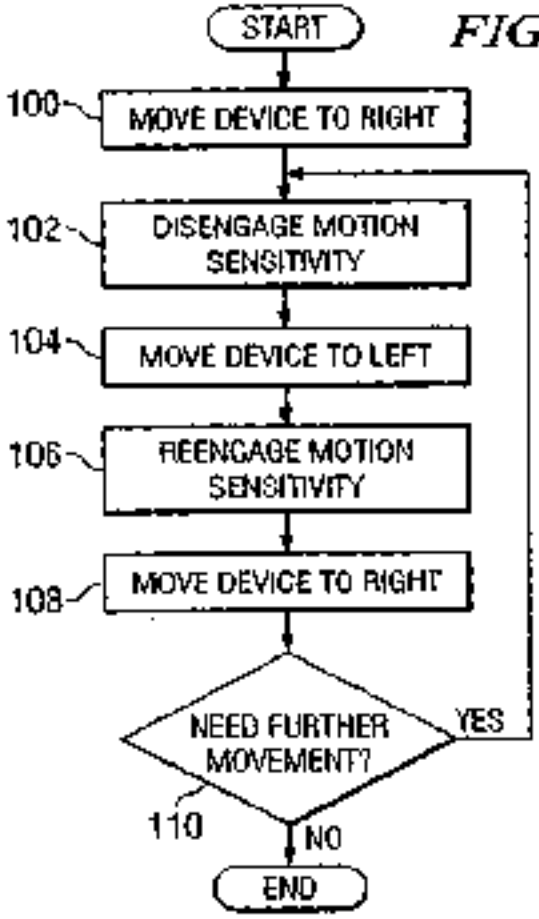


FIG. 9



FITBIT 1002
Fitbit v. Immersion

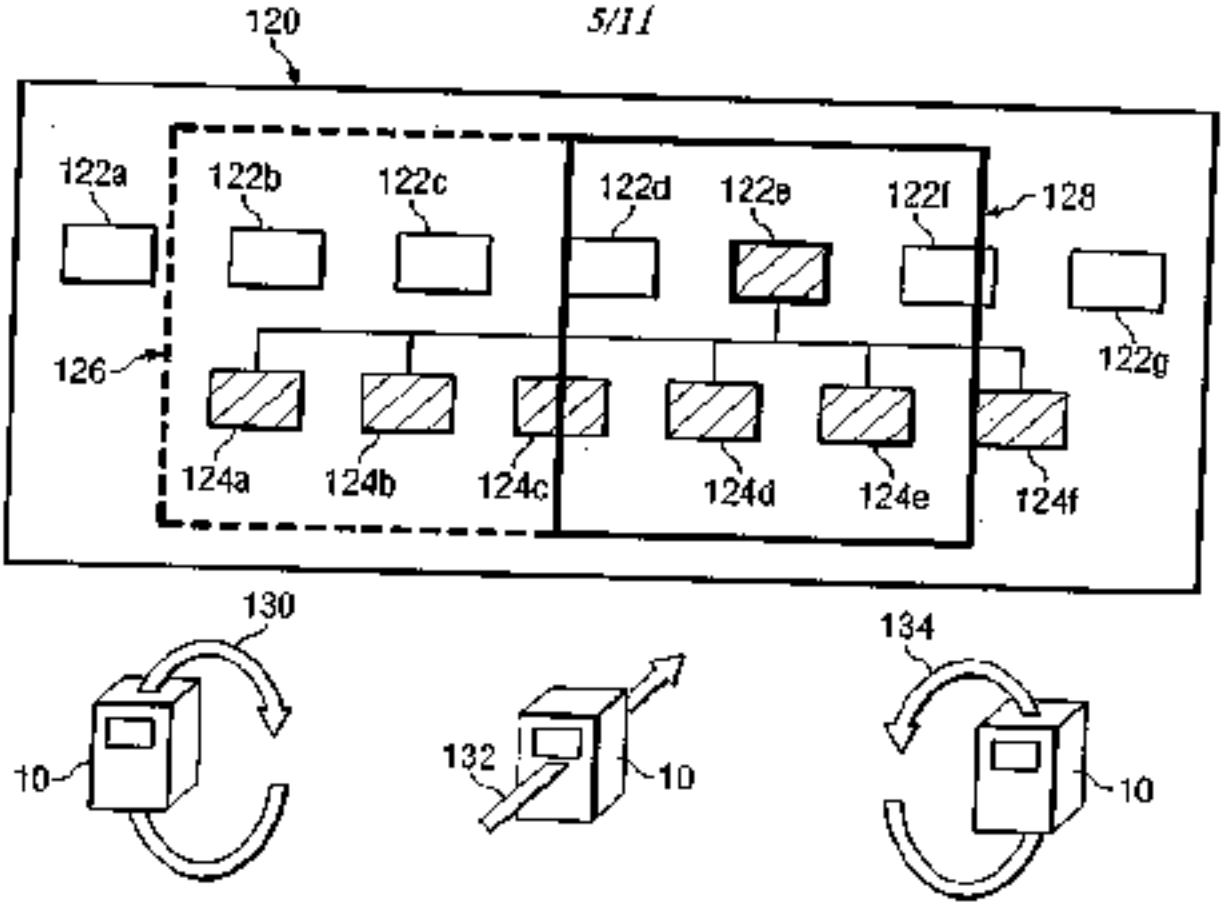


FIG. 10A

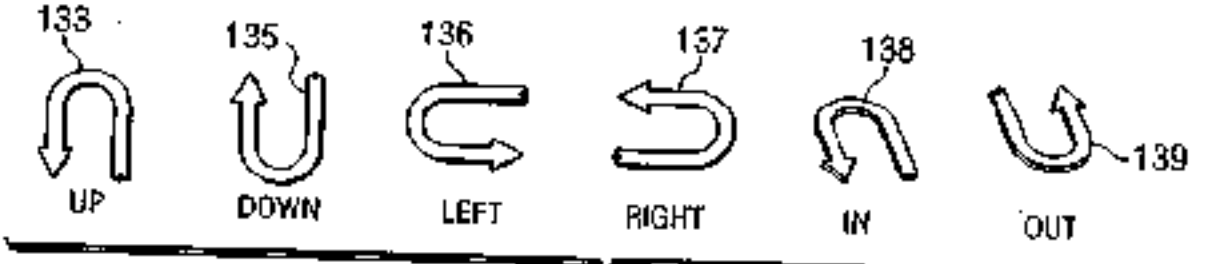


FIG. 10B

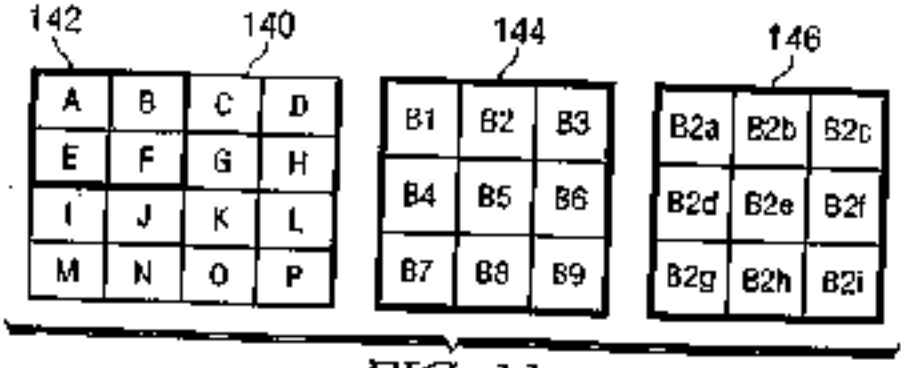


FIG. 11

FITBIT 1002
Fitbit v. Immersion

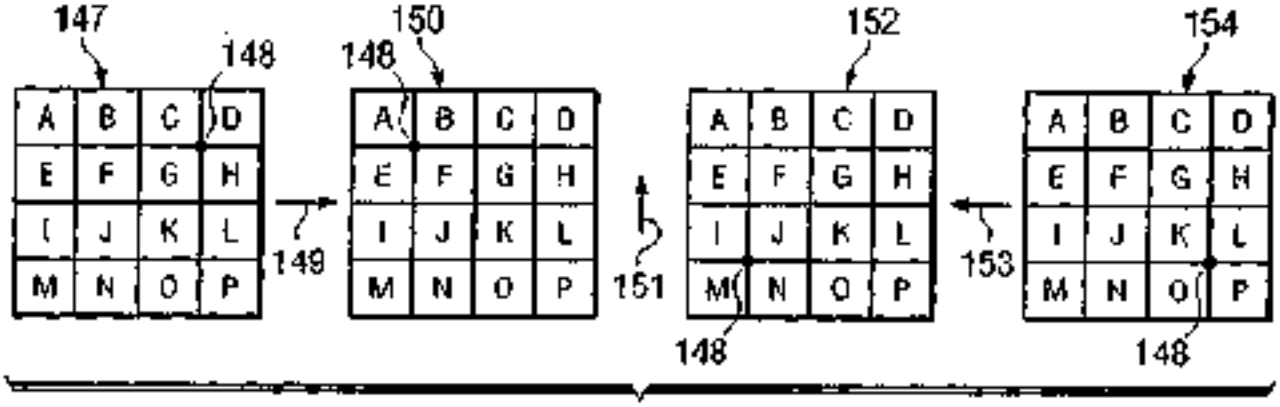
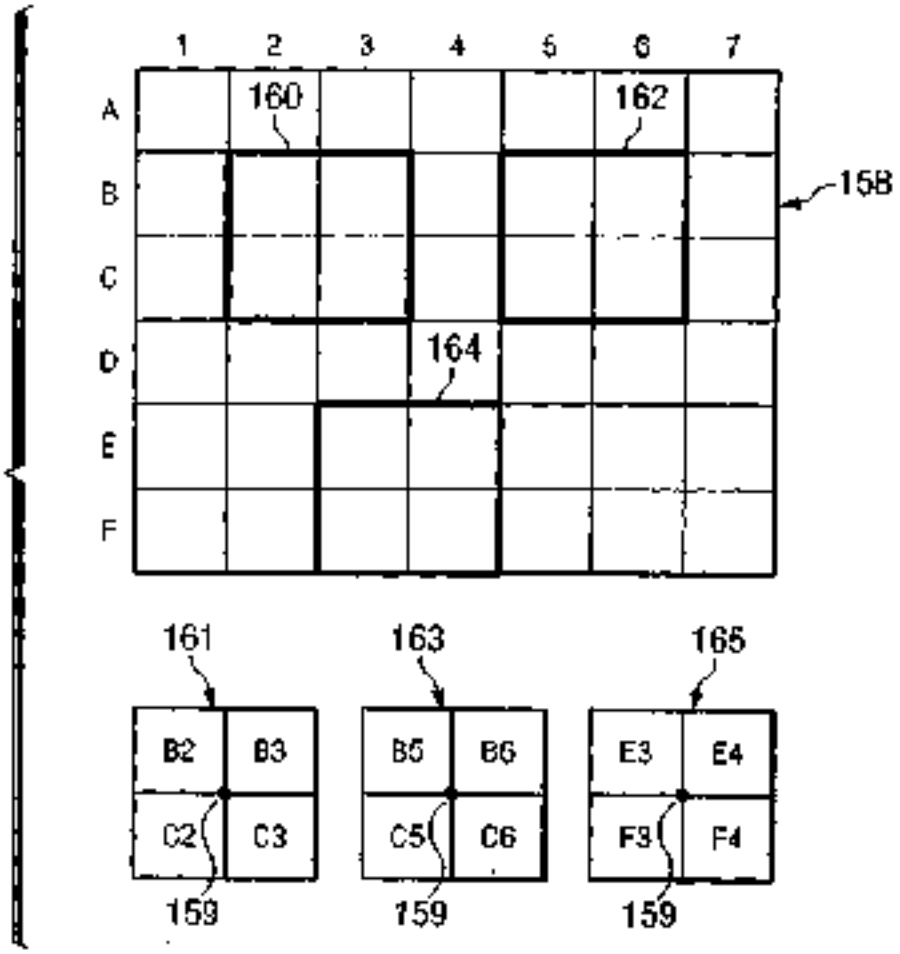


FIG. 12A

FIG. 12B



FITBIT 1002
Fitbit v. Immersion

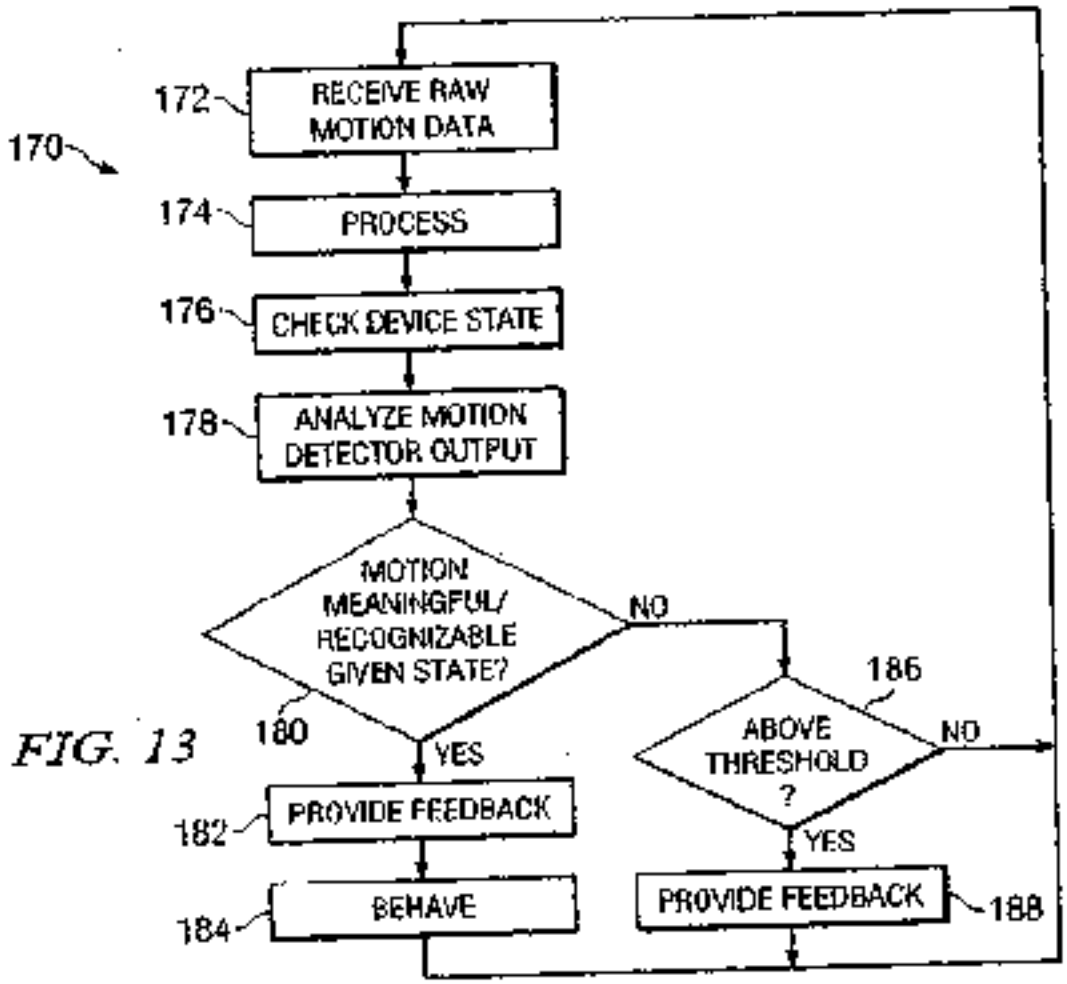


FIG. 13

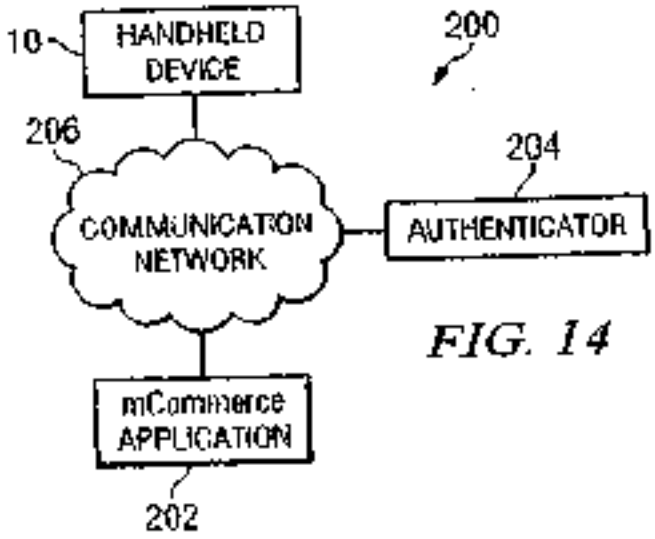


FIG. 14

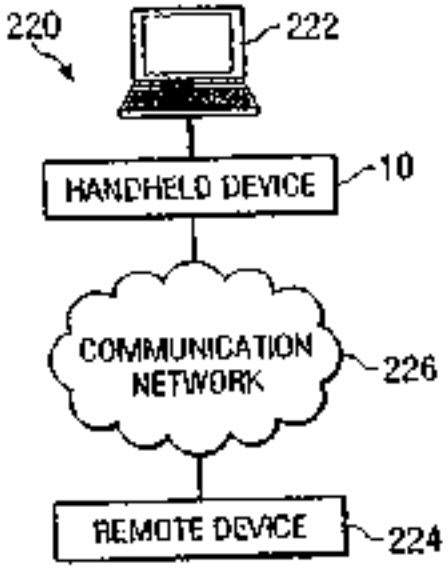


FIG. 15

FITBIT 1002
Fitbit v. Immersion

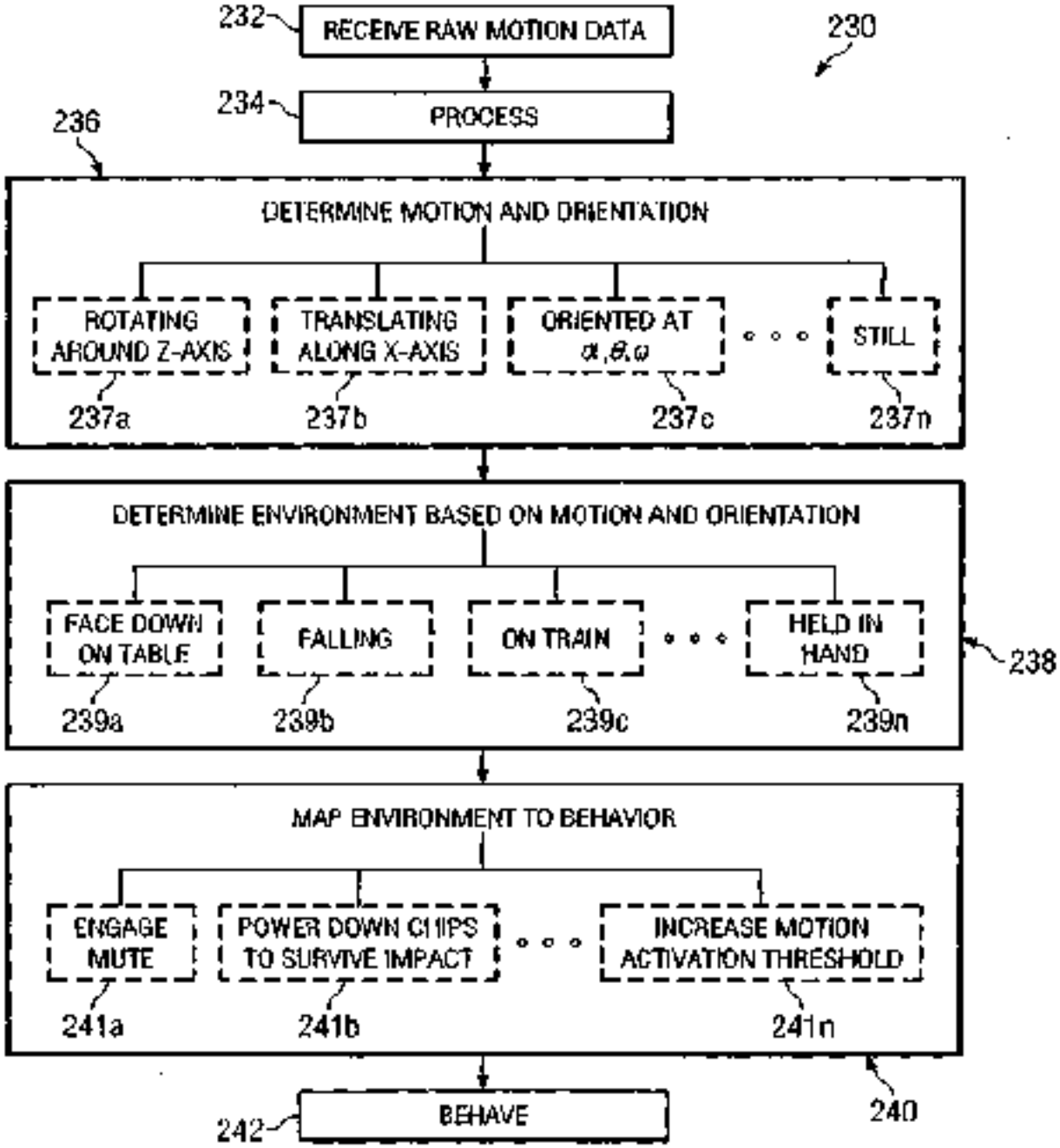


FIG. 16

FITBIT 1002
Fitbit v. Immersion

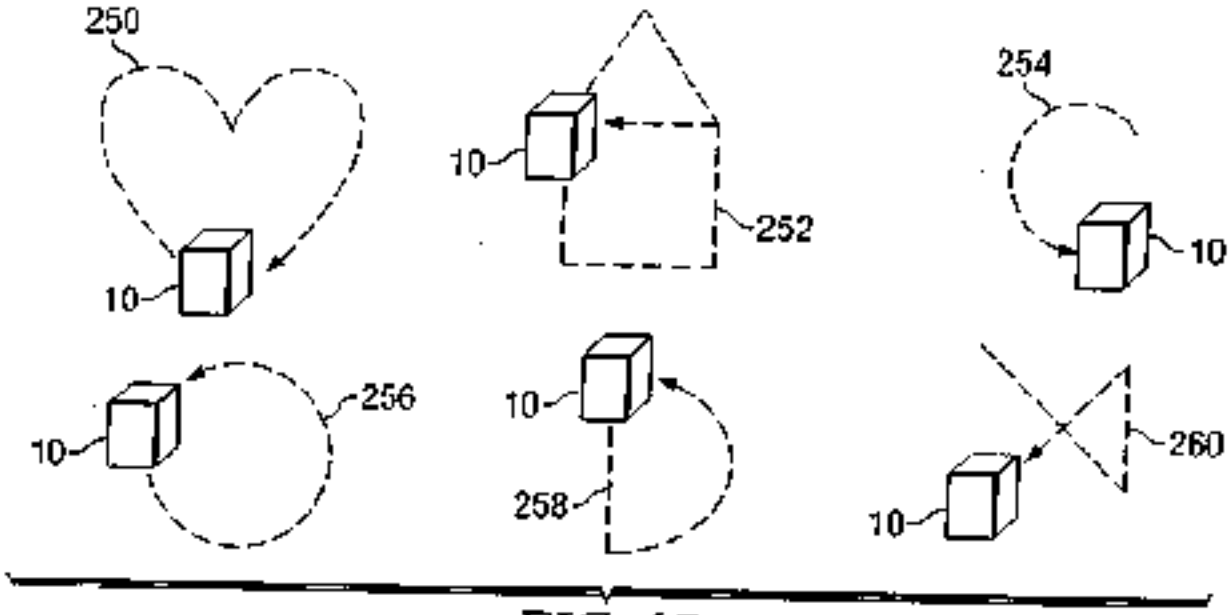


FIG. 17

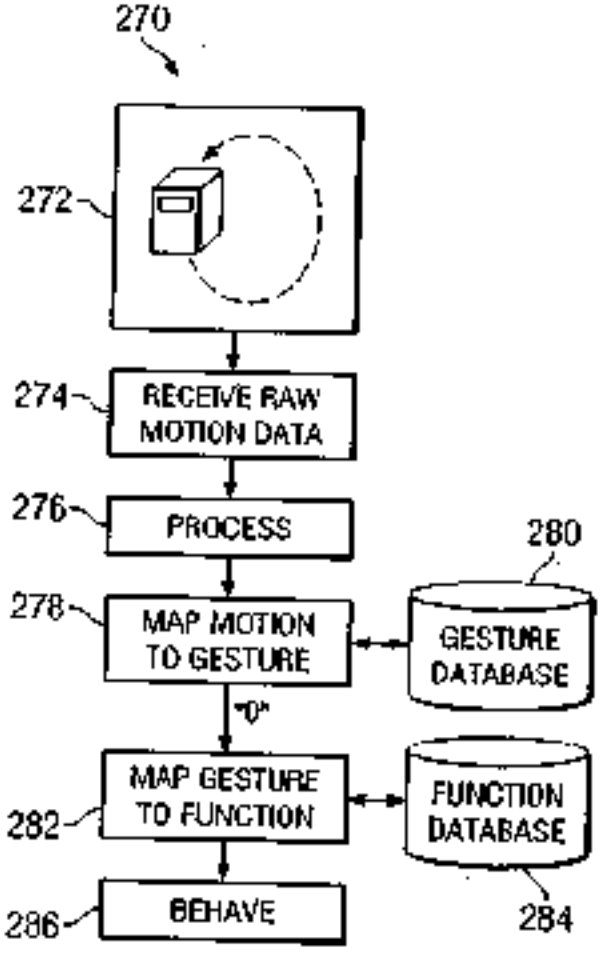


FIG. 18

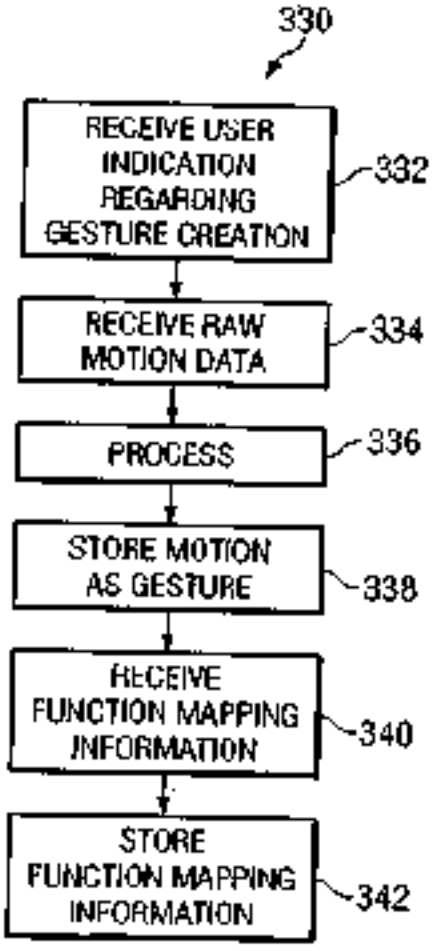


FIG. 21

FITBIT 1002
Fitbit v. Immersion

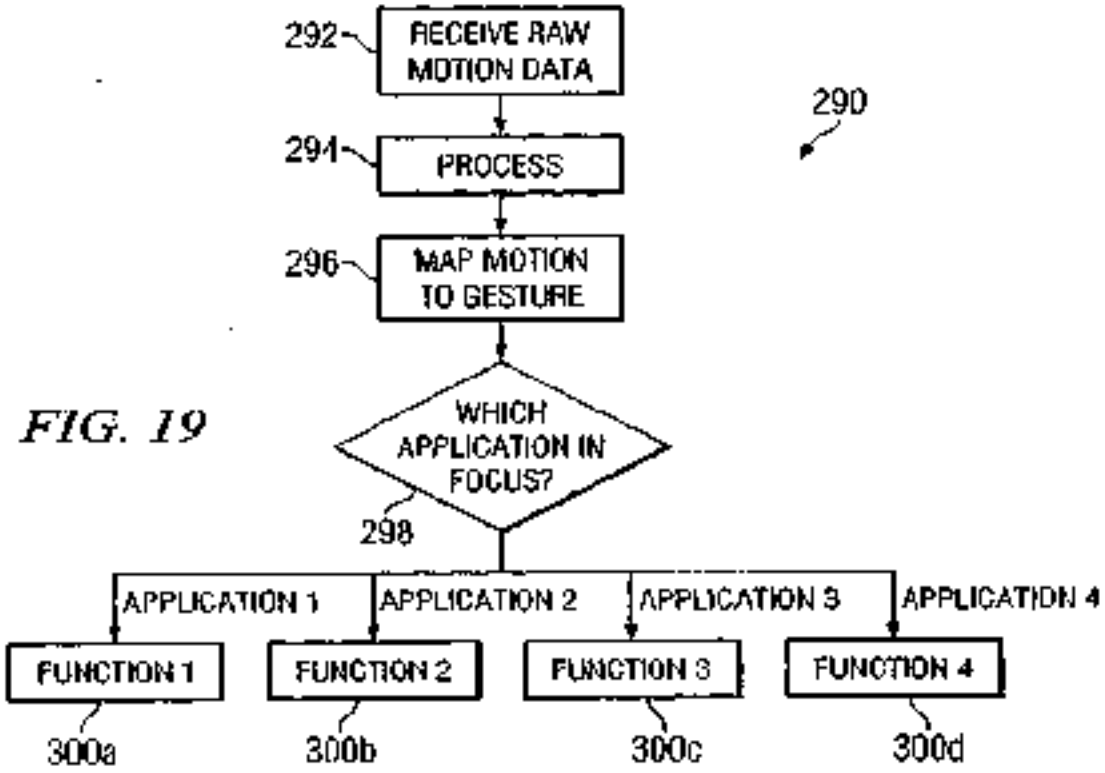


FIG. 19

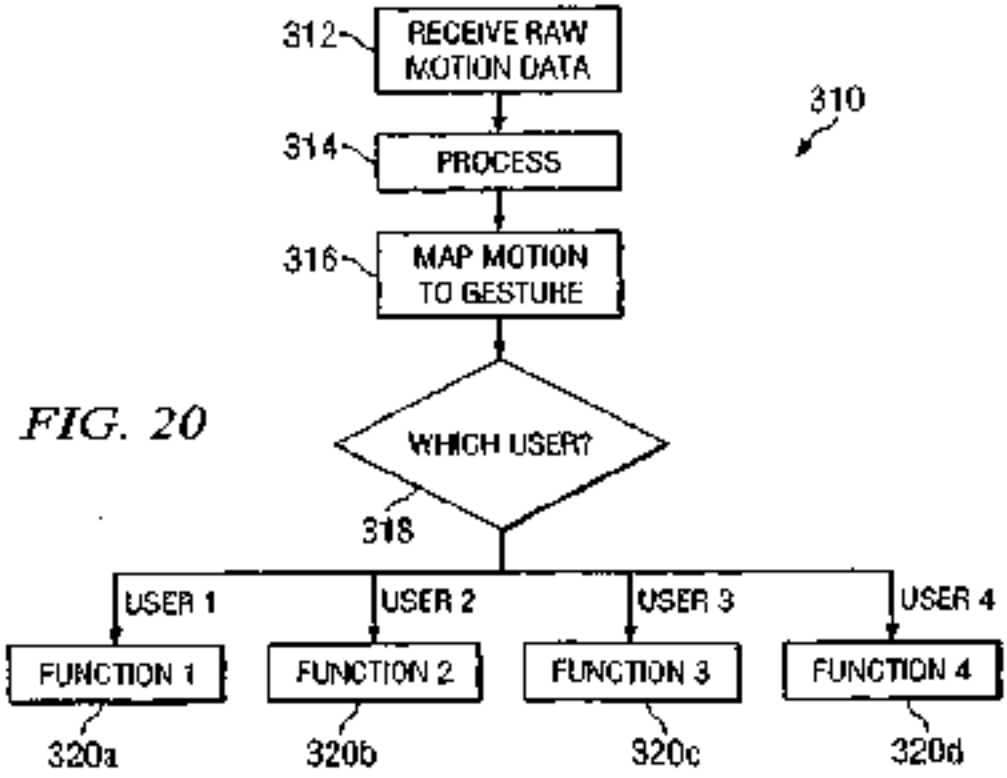


FIG. 20

FITBIT 1002
Fitbit v. Immersion

11/11

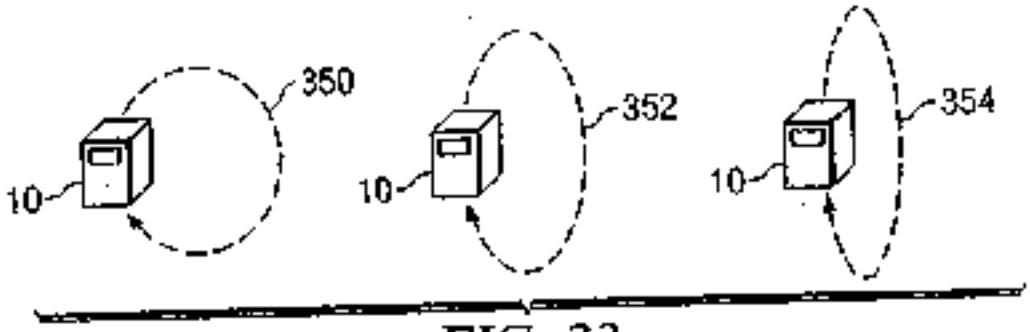


FIG. 22

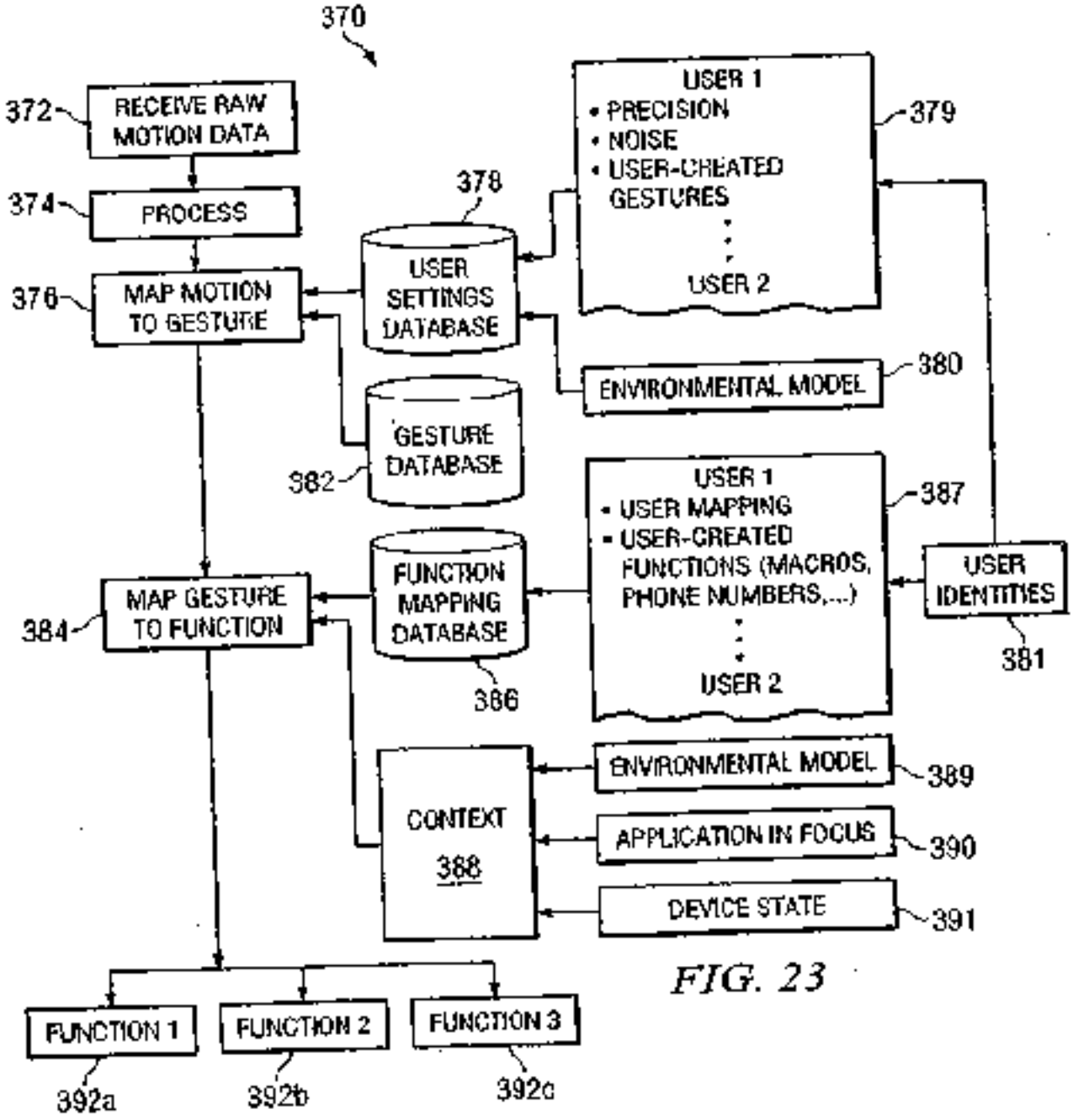


FIG. 23

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To
KILPATRICK STOCKTON LLP
Attn. Gardner, Steven
1001 West Fourth Street
Winston-Salem, NC 27101
STATES-UNIS D'AMERIQUE

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference: IMM351.PCT	Date of mailing (day/month/year): 11/02/2010
International application no.: PCT/US2009/050569	FOR FURTHER ACTION: See paragraphs 1 and 4 below
Applicant: IMMERSION CORPORATION	International filing date (day/month/year): 14/07/2009

1. [x] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70

For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] With regard to any protest against payment of (the) additional fee(s) under Rule 40.2, the applicant is notified that:

[ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

[ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the same time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the PCT Applicant's Guide, National Chapters.

Name and mailing address of the International Searching Authority: European Patent Office, P.B. 5818 Patentlaan 2, NL-2280 HV Rijswijk, Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax (+31-70) 340-3016	Authorized officer: Katrin Sommermeyer

Form PCT/ISA/220 (July 2009) *(See notes on accompanying sheet)*

FITBIT 1002
Fitbit v. Immersion

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Annex B).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority was declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, International Phase, paragraph 296).

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where are to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been filed, see below.

How? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet or sheets containing a complete set of claims in replacement of all the claims previously filed must be submitted.

Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively in Arabic numerals (Section 205(a)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under Article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Annex B).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, International Phase, paragraph 296).

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How? Either by cancelling one or more of the claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet or sheets containing a complete set of claims in replacement of all the claims previously filed must be submitted.

Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively in Arabic numerals (Section 205(a)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference IMN351.PCT	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No. PCT/US2009/050469	International filing date (day/month/year) 14/07/2009	(Earliest) Priority Date (day/month/year) 15/07/2008

Applicant

IMMERSION CORPORATION

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists in total of 6 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report

1. **Basis of the report**

a With regard to the language, the international search was carried out on the basis of:

[X] the international application in the language in which it was filed

[ ] a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. [ ] This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. [ ] With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [X] **Unity of invention is lacking** (see Box No III)

4. With regard to the title,

[X] the text is approved as submitted by the applicant

[ ] the text has been established by this Authority to read as follows:

5. With regard to the abstract,

[X] the text is approved as submitted by the applicant

[ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the drawings,

a. The figure of the drawings to be published with the abstract is figure No. 5A, 5B

[ ] as suggested by the applicant

[ ] as selected by this Authority, because the applicant failed to suggest a figure

[X] as selected by this Authority, because this figure better characterizes the invention

b. [ ] none of the figures is to be published with the abstract

Form PCT/ISA/210 (first sheet) (April 2007)

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2009/050569

A. CLASSIFICATION OF SUBJECT MATTER
INV. H04M1/725 G06F3/01 G06F3/048

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06F H04M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/279476 A1 (OBATA HITOSHI [JP]) 14 December 2006 (2006-12-14) abstract; figures 1a-5c claims 1,5,6 paragraphs [0014] - [0023], [0026], [0028], [0029], [0033], [0037], [0038], [0043], [0046]	1-14
Y	FR 2 910 160 A1 (FRANCE TELECOM [FR]) 20 June 2008 (2008-06-20) the whole document	15-31
Y	US 2007/139366 A1 (DUNKO GREGORY A [US] ET AL) 21 June 2007 (2007-06-21) abstract; figures 1-5b paragraphs [0001], [0003], [0016], [0024] - [0026], [0029] - [0032], [0035] - [0037], [0040] - [0046]	15-31

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier document but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
3 February 2010	11/02/2010
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax (+31-70) 340-3016	Authorized officer Köhn, Andreas

Form PCT/ISA/210 (second sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2 416 962 A (VODAFONE PLC [GB]) 8 February 2006 (2006-02-08) abstract; figures 1,2 page 1, line 17 - page 2, line 13 page 2, line 27 - page 3, line 9 page 3, lines 27 29 page 6, line 17 - page 7, line 27 page 10, lines 19-23 page 11, line 1 - page 16, line 19	1-14
A	US 2006/181510 A1 (FAITH JOE [GB]) 17 August 2006 (2006-08-17) abstract; figures 1-10 paragraphs [0008], [0024] - [0030], [0062] - [0064], [0066], [0067], [0069]	1-9,11
A	US 2003/063128 A1 (SALMIMAA MARJA [FI] ET AL SALMIMAA MARJA [FI] ET AL) 3 April 2003 (2003-04-03) abstract; figures 1-7 paragraphs [0001], [0023], [0026], [0030], [0031], [0034], [0043], [0044], [0049], [0050]	1,5-6,14
A	US 2007/066283 A1 (HAAR ROB V D [FI] ET AL) 22 March 2007 (2007-03-22) abstract; figures 1-6 paragraphs [0001], [0010] - [0013], [0017], [0018], [0027] - [0031], [0034], [0062], [0067], [0072] - [0076], [0082], [0084], [0085], [0088] - [0094]	1,5-6,9, 14
A	WO 2005/103863 A (FUJITSU LTD [JP]; MARVIT DAVID L [US]; ADLER B THOMAS [US]; MATSUMOTO) 3 November 2005 (2005-11-03) abstract; figures 1-23 page 5, lines 2-22 page 17, lines 6-32 page 19, line 10 - page 20, line 19 page 21, lines 21-26 page 32, line 29 - page 33, line 11 page 42, line 17 - page 43, line 27 page 45, lines 15-32 page 47, line 10 - page 48, line 25 page 52, lines 1-5 page 53, lines 14-25 page 54, lines 3-5	1-14
A	US 2006/256074 A1 (KRUM DAVID M [US] ET AL) 16 November 2006 (2006-11-16) abstract; figures 1-3 paragraphs [0012] - [0014], [0016], [0019], [0021], [0026], [0033], [0034], [0036], [0039]	15-31

10

Form PCT/ISA/210 (continuation of record sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2009/050569

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

The International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.

☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.

☒ No protest accompanied the payment of additional search fees.

Form PCT/ISA/210 (continuation of first sheet (2)) (April 2005)

FITBIT 1002
Fitbit v. Immersion

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-14

Invention 1 (claims 1-14) directed towards a method of displaying a message in a user interface of a mobile device (essentially) comprising:
(i) receiving a sensor signal from a sensor of a mobile device, the sensor signal associated with a movement of the mobile device; and
(ii) determining a message to be displayed in a user interface based on the sensor signal and causing the message to be displayed.

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2. claims: 15-26

Invention 2 (claims 15-26) directed towards a method of movement-based communication between mobile devices (essentially) comprising:
(i) receiving a sensor signal from a sensor of a first mobile device, the sensor signal associated with a movement of the first mobile device; and
(iii) transmitting a data signal to a second mobile device; the data signal comprising data associated with the movement of the first mobile device.

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3. claims: 27-31

Invention 3 (claims 27-31) directed towards a system of visually and haptically supported collaboration with mobile devices (essentially) comprising:
(i) receiving a first sensor signal from a first sensor of a first mobile device, the first sensor signal associated with a movement of the first mobile device;
(iv) determining a change in a display signal based on a second sensor signal associated with an interaction with the first mobile device and a first data signal received from a second mobile device, and determining a haptic effect based on the first data signal.

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/US2009/050569

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 2006279476 A1	14-12-2006	JP 2008546360 T		18-12-2008
		WO 2006135833 A2		21-12-2006
FR 2910160 A1	20-06-2008	NONE		
US 2007139366 A1	21-06-2007	EP 1964379 A1		03-09-2008
		WO 2007073402 A1		28-06-2007
GB 2416962 A	08-02-2006	WO 2006013363 A1		09-02-2006
US 2006181510 A1	17-08-2006	GB 2424055 A		13-09-2006
US 2003063128 A1	03-04-2003	CN 1556944 A		22-12-2004
		EP 1430384 A1		23-06-2004
		WO 03029946 A1		10-04-2003
		US 2006053392 A1		09-03-2006
US 2007066283 A1	22-03-2007	WO 2007034297 A2		29-03-2007
		JP 2009509260 T		05-03-2009
		KR 20080063345 A		03-07-2008
WO 2005103863 A	03-11-2005	EP 1728142 A2		06-12-2006
		JP 2007531113 T		01-11-2007
		JP 2008299866 A		11-12-2008
		KR 20060134119 A		27-12-2006
US 2006256074 A1	16-11-2006	EP 1880265 A1		23-01-2008
		WO 2006127270 A1		30-11-2006

Form PCT/ISA/210 (patent family annex) (April 2005)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2008/050669	14.07.2008	15.07.2008

International Patent Classification (IPC) or both national classification and IPC
INV. H04M1/725 G06F3/01 G06F3/048

Applicant
IMMERSION CORPORATION

1 This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2 **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3 For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:

European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0
Fax +49 89 2399 - 4465

Date of completion of this opinion
see form PCT/ISA/210

Authorized Officer

Kühn, Andreas

Telephone No. +49 89 2399-8492

Form PCT/ISA/237 (Cover Sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

Box No. I Basis of the opinion

1 With regard to the language, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed

☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material.

☐ a sequence listing

☐ table(s) related to the sequence listing

b. format of material.

☐ on paper

☐ in electronic form

c. time of filing/furnishing:

☐ contained in the international application as filed.

☐ filed together with the international application in electronic form.

☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5 Additional comments

FITBIT 1002
Fitbit v. Immersion

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit

   ☒ paid additional fees

   ☐ paid additional fees under protest and, where applicable, the protest fee

   ☐ paid additional fees under protest but the applicable protest fee was not paid

   ☐ not paid additional fees

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

   ☐ complied with

   ☒ not complied with for the following reasons:

   see separate sheet

4. Consequently, this report has been established in respect of the following parts of the international application

   ☒ all parts.

   ☐ the parts relating to claims Nos. 1-31

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes	Claims	4, 7-8, 10-11, 13, 15-31
	No:	Claims	1-3, 5-6, 9, 12, 14
Inventive step (IS)	Yes	Claims	
	No:	Claims	1-31
Industrial applicability (IA)	Yes:	Claims	1-31
	No:	Claims	

2. Citations and explanations

see separate sheet

Form PCT/ISA/237 (April 2007)

FITBIT 1002
Fitbit v. Immersion

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item I.

In the following opinion the reasoning is done with regard to **claims 1-31**

Re Item IV.

1 **Lack of Unity**

1.1 The application does not meet the requirements of *Rule* 13.1 PCT with respect to unity of the invention for the reasons given in the following.

1.2 The technical features in **claims 1-31** can be assigned to the following separate so-called inventions:

1.2.1 **Invention 1 (claims 1-14)** directed towards a method of displaying a message in a user interface of a mobile device (essentially) comprising:
(i) receiving a sensor signal from a sensor of a mobile device, the sensor signal associated with a movement of the mobile device; and
(ii) determining a message to be displayed in a user interface based on the sensor signal and causing the message to be displayed.

1.2.2 **Invention 2 (claims 15-26)** directed towards a method of movement-based communication between mobile devices (essentially) comprising:
(i) receiving a sensor signal from a sensor of a first mobile device, the sensor signal associated with a movement of the first mobile device; and
(iii) transmitting a data signal to a second mobile device; the data signal comprising data associated with the movement of the first mobile device.

1.2.3 **Invention 3 (claims 27-31)** directed towards a system of visually and haptically supported collaboration with mobile devices (essentially) comprising:
(i) receiving a first sensor signal from a first sensor of a first mobile device, the first sensor signal associated with a movement of the first mobile device;
(iv) determining a change in a display signal based on a second sensor signal associated with an interaction with the first mobile device and a first data signal received from a second mobile device, and determining a haptic effect based on the first data signal.

1.2.4 The so-called **inventions 1-3** have in common the technical feature **(i)**. However, this feature is already known from prior art document **D5** (US 2006/0161510 A1), which discloses an intuitive motion-based user interface for controlling a hand-held device (see D5 [0008] and [0024]-[0030] with Fig. 3).
The additional features (ii)- (iv) contained in inventions 1-3 are special technical features representing the contribution over the prior art of D5.
No technical relationship can be found between these additional technical features contained in each of said inventions. Moreover, the features (ii)- (iv)

are directed towards solving different problems, namely: starting from D5 the problem to be solved by invention 1 is to enhance the hand-held device of D5 by an intuitive message selection function. The problem to be solved by the second invention is to enhance the teaching of D5 by motion- based communication between hand-held devices, whilst the third invention aims to improve the functionality of the hand-held device of D5 by the possibility of synchronous collaboration with other hand-held devices.

1.2.5 Following the reasoning above regarding **inventions 1-3**, there is no single general inventive concept underlying the entire group of claims of the present application as required Rule 13(1) PCT

Re Item V,

2 **Prior Art**

2.1 Reference is made to the following documents:

D1: US 2006/279476 A1 (OBATA HITOSHI [JP]) 14 December 2006 (2006-12-14)

D2: FR 2 910 160 A1 (FRANCE TELECOM [FR]) 20 June 2008 (2008-06-20)

D3: US 2007/139366 A1 (DUNKO GREGORY A [US] ET AL) 21 June 2007 (2007-06-21)

D4: GB 2 416 962 A (VODAFONE PLC [GB]) 8 February 2006 (2006-02-08)

D5: US 2006/181510 A1 (FAITH JOE [GB]) 17 August 2006 (2006-08-17)

D6: US 2003/063128 A1 (SALMIMAA MARJA [FI] ET AL SALMIMAA MARJA [FI] ET AL) 3 April 2003 (2003-04-03)

D7: US 2007/066283 A1 (HAAR ROB V D [FI] ET AL) 22 March 2007 (2007-03-22)

D8: WO 2005/103863 A (FUJITSU LTD [JP]; MARVIT DAVID L [US]; ADLER B THOMAS [US]; MATSUMOTO) 3 November 2005 (2005-11-03)

D9: US 2006/256074 A1 (KRUM DAVID M [US] ET AL) 16 November 2006 (2006-11-16)

3 **Clarity**

3.1 The application does not meet the requirements of Article 6 PCT, because **claims 1, 2, 15, 18, 20, 23, 24, 27, and 30** are not clear as detailed in the following.

FITBIT 1002
Fitbit v. Immersion

3.2 The expression "determining a message to be displayed in a user interface based at least in part on the at least one sensor signal (associated with a movement of the mobile device)" (portion in parenthesis added) renders independent **claim 1** unclear for two reasons. Firstly, the term "message" appears to be inconsistent with the terminology "virtual message object" used in the description (cf. page 23, line 33 - page 24, line 4). Secondly, the specification leaves the reader in doubt as to where the "message" is displayed, i.e. whether it is displayed in a user interface of the mobile device sensing said movement or in the user interface of another device (e.g. after transmission of corresponding data from the moved mobile device to a connected receiving device). However, from the description at page 23, line 29 - page 24, line 25 it can be understood that a "virtual message object" is determined to be displayed in the user interface of the mobile device which senses the corresponding movement.
Accordingly, for the analysis of novelty and inventive step, the subject-matter of claim 1 will be interpreted in light of the description.

3.3 Independent **claim 15** is unclear as it is obscure to which extend the steps of "receiving a first sensor signal from a first sensor" and "receiving a second sensor signal from a touch-sensitive interface" are related to each other. From the definition of claim 15 it appears that both steps are merely co-located and do not have any relation. Hence, the analysis of novelty and inventive step of the subject-matter of claim 15 will be based on this interpretation.

3.4 Likewise, the objection set-out in paragraph 3.3 applies to independent **claim 27**. In particular, claim 27 specifies "receive a first sensor signal from a first sensor" without defining which action or output is based on said first sensor signal. Thus, the reader is left in doubt about the significance of the first sensor signal with respect to the operation of the claimed system.

3.5 Further, **claim 27** is rendered unclear by the definition "receive a second sensor signal from a second sensor, the second sensor configured to detect an Interaction with the first mobile device" (emphasis added) as its scope appears to be broader than justified by the description and drawings from which it can be understood that the second sensor signal is generated by a touch-sensitive interface of the first mobile device (see page 33, lines 10-11 with Fig. 18).
Accordingly, assesament of novelty and inventive step of claim 27 will be accomplished in light of the description and drawings.

3.6 Moreover, **claim 27** is unclear as it uses the expression "the data signal" which lacks an antecedent.

3.7 Dependent **claim 2** is unclear as the reader has to doubt that "a movement of the mobile device" may be determined by means of a "touch-sensitive input device" as specified in claim 2.

FITBIT 1002
Fitbit v. Immersion

3.8 The expression "following the location of a point of contact between the user and the device" (emphasis added) renders dependent **claim 18** unclear as the reader has to doubt that any contact between the user and the (first mobile) device may be indicated in the display of the first mobile device. Rather, it appears that the trail displayed in the display of the first mobile device follows the location of a point of contact between the user and the touch-sensitive interface of the first mobile device.

3.9 Dependent **claim 20**, which directly refers to claim 19, is unclear as its specification suggests that "displaying a champagne bottle" occurs exclusively in response to the movement of the first mobile device approximating a pouring gesture. This interpretation seems to be supported by the description (cf. page 28, lines 9-14) which discloses the display of a champagne bottle in response to the sensed tilting of a mobile device. However, this interpretation contravenes the definition of claim 1 according to which the change in a display is based on the second sensor signal.

3.10 The expression "wherein the change in the display" (emphasis added) renders dependent **claim 23** unclear as it appears, in the context of claim 21 to which claim 23 refers, that the additional subject-matter of claim 23 rather relates to the "second change in the display" which is based on the second data signal.

3.11 The specification of dependent **claim 24** is unclear as it leaves the reader in doubt about the device (i.e. the first mobile device or the second mobile device) which determines and outputs the haptic effect. However, in light of the superordinate claims it appears that claim 24 refers to the first mobile device. Hence, it seems that the haptic effect is determined at the first mobile device and the actuator configured to output this haptic effect is comprised in said first mobile device.

3.12 Dependent **claim 30** is unclear as it uses the expression "the mobile device" which lacks an antecedent.

3.13 The above-mentioned lack of clarity notwithstanding, and for the sake of efficiency of the procedure, a preliminary opinion regarding novelty and inventive step is given for all claims.

4 Novelty - Independent Claims

4.1 The present application does not meet the requirements of Article 33(1) PCT because the subject-matter of independent **claim 1** (interpreted broadly and in the light of the description) is not new within the meaning of Article 33(2) PCT.

4.2 Document **D1** discloses the subject-matter of **claim 1** as follows (the references in parentheses applying to this document):

FITBIT 1002
Fitbit v. Immersion

A method comprising:
- receiving at least one sensor signal from at least one sensor of a mobile device, the at least one sensor signal associated with a movement of the mobile device (see [0014] and [0016], lines 1-10 as well as claim 6 with Figs. 1a and 1b);
- determining a message to be displayed in a user interface based at least in part on the at least one sensor signal (see [0019] and [0021], lines 1-12); and
- causing the message to be displayed (see [0028], lines 3-9).

5 **Novelty - Dependent Claims**

5.1 Dependent **claims 2, 3, 5, 6, 9, 12, and 14** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (Article 33 (2) PCT), and therefore the criteria of Article 33(1) PCT are not fulfilled.

5.2 Document **D1** discloses all features of dependent **claims 2, 3, 5, 6, 9, 12, and 14** as follows:
- claims 2 and 3: see D1 [0016], lines 1-10 and claim 6
- claims 5 and 6: see D1 [0019] and [0021], lines 1-12 with Fig. 4b
- claims 9 and 12: see D1 [0015], lines 1-6 and [0016] 22-25 as well as [0036], lines 7-11: *message generation according to D1 consist of two interchangeable steps: message composition and selection of the composer state; each step falls within the scope of the wording "a user interaction associated with the message"*
- claim 14: see D1 [0037], lines 13-20.

6 **Inventive Step - Independent Claims**

6.1 The subject - matter of **claims 15 and 27** does not involve an inventive step within the meaning of Article 33 (3) PCT, and therefore the requirements of Article 33(1) PCT are not met.

6.2 Document **D2** is considered to be the closest prior art to the subject - matter of independent **claim 15** and discloses (the references in parentheses applying to this document):

A method comprising:
- receiving a second sensor signal from a touch-sensitive interface of a first mobile device, the second sensor signal associated with a user interaction (see page 2, lines 22-24 and page 4, lines 1-10 with Fig. 1);
- determining a change in a display of the first mobile device based at least in part on the second sensor signal (see page 4, lines 11-12 and page 5, lines 33-36 with Fig. 2); and

- transmitting a first data signal to a second mobile device, the first data signal comprising data associated with the user interaction (see claim 9 and page 6, lines 23-27 with Fig. 2).

6.2.1 The subject-matter of **claim 15** differs from the teaching known from **D2** in that it additionally comprises the step of "receiving a first sensor signal from a first sensor, the first sensor signal associated with a movement of a first mobile device", wherein the first data signal is augmented by data associated with said first sensor signal.

6.2.2 The above-identified difference brings about the technical effect of enhancing the diversity of sharing information between the mobile devices of D2.

6.2.3 The problem to be solved by the distinguishing feature of **claim 15** may therefore be regarded as how to modify the system of **D2** in order to enhance the diversity of sharing information between the mobile devices disclosed in D2.

6.2.4 The solution proposed in **claim 15** cannot be considered to support the presence of an inventive step. Confronted with the above-mentioned problem, the skilled person would search in the field of telecommunication and would find **D3**. D3 provides a solution to this problem by disclosing a possibility of sharing motion-related information between mobile devices. This information is generated by moving a first mobile device which in response transmits said information to a second mobile device where it is processed to produce an effect that may be observed and/ or felt by a party associated with the receiving device (see D3 [0036], [0037], lines 1-11 and [0046] with Figs. 1-3). Since D3 pertains to the same technical field, it would have been obvious for the skilled person, when given the system of **D2**, to incorporate this teaching of D3 in the disclosure of D2, thereby arriving at the subject-matter of claim 15, and solving the posed problem.

6.2.5 Accordingly, the subject-matter of **claim 15** does not involve an inventive step in view of **D2 and D3**.

6.3 Document **D2** is considered to be the closest prior art to the subject - matter of independent **claim 27** and discloses (the references in parentheses applying to this document):

A system comprising, a processor configured to:
- receive a second sensor signal from a second sensor, the second sensor configured to detect an interaction with a first mobile device (see page 2, lines 22-24 and page 4, lines 1-10 with Fig. 1);
- receive a first data signal from a network interface, the network interface configured to receive signals transmitted by a second mobile device ; and
- determine a change in a display signal based at least in part on the data signal and the second sensor signal (see claim 2, page 5, lines 33-36 and page 6, lines 23-27 with Fig. 2).

6.3.1 The subject-matter of **claim 27** differs from the teaching known from **D2** in that it additionally comprises following features F1 and F2:
- F1) receive a first sensor signal from a first sensor, the first sensor configured to detect a movement of the first mobile device; and
- F2) determine a haptic effect based at least in part on the first data signal.

6.3.2 The above-identified differences bring about the following technical effects E1 and E2:
- E1) enhancement of the input diversity; and
- E2) enhancement of the user's perception of data received from a network interface.

6.3.3 The distinguishing features F1 and F2 do not achieve any technical effect in combination. Therefore, two partial problems must be identified and the problem-solution approach has to be applied to each problem independently (see PCT Guidelines Chapter 13.05 and Appendix A13.08.1).

6.3.4 The partial problems P1 and P2 to be solved by the distinguishing features F1 and F2 may be regarded as:
- P1) how to modify the system of D2 in order to enhance its input diversity; and
- P2) how to modify the system of D2 in order to enhance the user's perception of data received from a network interface.

6.3.5 The solutions proposed in **claim** 27 with respect to P1 and P2 cannot be considered to support the presence of an inventive step. Confronted with the above-mentioned problems P1 and P2, the skilled person would search in the field of telecommunication and find **D3** . D3 provides a solution to both problems by sharing motion-related data which at the receiving mobile device may result in a change of the displayed information and the output of a corresponding haptic effect (see D3 [0036], [0037], lines 1-11 and [0046] with Figs. 1-3). Since D3 pertains to the same technical field, it would have been obvious for the skilled person, when given the system of **D2**, to incorporate this teaching of D3 in the disclosure of D2, thereby arriving at the subject-matter of claim 27, and solving the posed problem.

6.3.6 Accordingly, the subject-matter of **claim 27** does not involve an inventive step in view of **D2 and D3**.

6.4 For the sake of completeness, and irrespective of the inventive step objections set-out above for **claims 15 and 27**, it is pointed out that claims 15 and 27 are also lacking an inventive step if in view of **D3 and D2** when starting from document D3 as closest prior art.

FITBIT 1002
Fitbit v. Immersion

7 **Inventive Step - Dependent Claims**

7.1 Dependent **claims 4, 7, 8, 10, 11, 13, 16-26, and 28-31** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Article 33 (3) PCT), and therefore the criteria of Article 33(1) PCT are not fulfilled.

7.2 **D1** does not disclose the additional subject-matter of dependent **claims 4, 10, 11, and 13** which is directed towards further user interactions associated with the displayed message. However, each of the specified possibilities of interaction is merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill. Therefore, the additional features of claims 4, 10, 11, and 13 are not considered to contribute to an inventive step over prior art D1.

7.3 **D1** discloses that by means of a composer state database (106) and composer state database manager (108) basically any input motion may be mapped to any visual, audible or tactile output (see D1 [0019] and [0023]). D1 does not disclose the particular movements and visual cues specified in dependent **claims 7 and 8**. However, the additional subject-matter of claims 7 and 8 refers to non-functional modifications of the prior art D1, and therefore is not considered to involve an inventive activity.

7.4 All additional features of **claims 16-18, 21-23, 29, and 31** are disclosed in **D2** as providing the same advantages as in the present application (see passages cited below). Therefore, the subject-matter of said claims does not involve an inventive activity.
- claims 16 and 29: see D2 page 4, line 4 and page 5, lines 26-30 with Fig. 3
- claim 17: see D2 page 6, lines 25-27
- claim 18: see D2 page 5, lines 33-36 with Fig. 2
- claims 21-23 and 31: see D2 claims 3 and 4 as well as page 6, lines 23-27 with Fig. 2

7.5 Document **D2** does not disclose the additional subject-matter of **claims 19, 24, and 28**. However, all additional features of said claims are disclosed in document **D3** as providing the same advantages as in the present application (see passages cited below). Therefore, the skilled person would regard it as a normal design option to include these features in the teaching of D2 in order to arrive at the subject-matter of claims 19, 24, and 28.
- claim 19: see D3 [0025], lines 5-6; *in light of the description of this application (cf. page 28, lines 10-11) tilting of a mobile device has to be interpreted as a pouring gesture*
- claim 24: see D3 [0043] and [0046]
- claim 28: see D3 [0026] (and D2 page 4, line 4)

FITBIT 1002
Fitbit v. Immersion

7.6 The additional features of **claims 20 and 25** refer to information which is solely defined by its content (cognitive content). Since these features relate exclusively to presentation of information, Rule 39.1(iii) and (v) PCT, they may not contribute to an inventive activity, see PCT Guidelines for Examination chapters 9.07 and 9.11. Accordingly, claims 20 and 25 are not considered inventive over **D2 and D3**.

7.7 The additional subject-matter of **claim 30** refers to a minor and well-known implementation detail, and hence does not support the presence of an inventive step in view of **D2 and D3**.

Re Item VII.

8 Contrary to the requirements of **Rule** 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D9 is not mentioned in the description, nor are these documents identified therein.

8.1 Independent claims **1**, 15, and 27 are not in the two part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

8.2 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Possible steps after receipt of the international search report (ISR) and written opinion of the International Searching Authority (WO-ISA)

General information	For all international applications filed on or after 01/01/2004 the competent ISA will establish an ISR. It is accompanied by the WO-ISA. Unlike the former written opinion of the IPEA (Rule 66.2 PCT), the WO-ISA is not meant to be responded to, but to be taken into consideration for further procedural steps. This document explains about the possibilities.
Amending claims under Art. 19 PCT	Within 2 months after the date of mailing of the ISR and the WO-ISA the applicant may file amended claims under Art. 19 PCT directly with the International Bureau of WIPO. The PCT reform of 2004 did not change this procedure. For further information please see Rule 46 PCT as well as form PCT/ISA/220 and the corresponding Notes to form PCT/ISA/220.
Filing a demand for international preliminary examination	In principle, the WO-ISA will be considered as the written opinion of the IPEA. This should, in many cases, make it unnecessary to file a demand for international preliminary examination. If the applicant nevertheless wishes to file a demand this must be done before expiry of 3 months after the date of mailing of the ISR/WO-ISA or 22 months after priority date, whichever expires later (Rule 54bis PCT). Amendments under Art. 34 PCT can be filed with the IPEA as before, normally at the same time as filing the demand (Rule 66.1 (b) PCT). If a demand for international preliminary examination is filed and no comments/amendments have been received the WO-ISA will be transformed by the IPEA into an IPRP (International Preliminary Report on Patentability) which would merely reflect the content of the WO-ISA. The demand can still be withdrawn (Art. 37 PCT).
Filing informal comments	After receipt of the ISR/WO-ISA the applicant may file informal comments on the WO-ISA directly with the International Bureau of WIPO. These will be communicated to the designated Offices together with the IPRP (International Preliminary Report on Patentability) at 30 months from the priority date. Please also refer to the next box.
End of the international phase	At the end of the international phase the International Bureau of WIPO will transform the WO-ISA or, if a demand was filed, the written opinion of the IPEA into the IPRP, which will then be transmitted together with possible informal comments to the designated Offices. The IPRP replaces the former IPER (international preliminary examination report).
Relevant PCT Rules and more information	Rule 43 PCT, Rule 43bis PCT, Rule 44 PCT, Rule 44bis PCT, PCT Newsletter 12/2003, OJ 11/2003, OJ 12/2003

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	7288009
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	25-MAR-2010
Filing Date:	14-JUL-2009
Time Stamp:	17:09:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	SIDSTransmittal.pdf	37413	no	1

Warnings:	
Information:	

FITBIT 1002
Fitbit v. Immersion

2	Transmittal Letter	SIDSLetter.pdf	181553	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Filed (SB/08)	PTOSB08.pdf	143201	no	2
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Foreign Reference	FR2910160.PDF	614593	no	14
Warnings:					
Information:					
5	Foreign Reference	GB2416962.PDF	958642	no	28
Warnings:					
Information:					
6	Foreign Reference	WO2005103863.pdf	4140707	no	76
Warnings:					
Information:					
7	NPL Documents	ImmersionMM351PCTAppINoPCTUS2009050569SearchReportWrittenOpinion.PDF	453157	no	23
Warnings:					
The page size in the PDF is too large. The pages should be 8.5 x 11 or A4. If this PDF is submitted, the pages will be resized upon entry into the Image File Wrapper and may affect subsequent processing					
Information:					
			Total Files Size (in bytes):	6529466	

FITBIT 1002
Fitbit v. Immersion

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	Conf. No.: 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2629
Serial No. 12/502,702	)	
	)	Examiner: **Unassigned**
Filed: July 14, 2009	)	
	)	

For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Information Disclosure Statement; and
2. Information Disclosure Statement by Applicant (Form PTO/SB/08); and
3. One (1) Non-Patent Reference.

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 16-1435.

Respectfully submitted,

Date: 3/25/2010

Michael T. Morlock
Reg. No. 62,245

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web on 3-25, 2010.

Renée S. Prevette

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	David M. Birnbaum et al.
Appl. No.:	12/502,702
For:	SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES
Filed:	July 14, 2009
Examiner:	Unassigned
Art Unit:	2629
Attorney Docket No:	IMM351 (51851/378586)

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT
(SUBMISSION AFTER FILING OF AN APPLICATION
BUT BEFORE FINAL REJECTION OR NOTICE OF ALLOWANCE
OR CONCURRENTLY WITH A RULE 1.114 RCE APPLICATION)

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms, attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08A are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**

The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☒ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

FR 2,910,160 - English language abstract provided

c. ☒ **ENGLISH LANGUAGE SEARCH REPORT**

An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**

The following additional information is provided for the Examiner's consideration.

FITBIT 1002
Fitbit v. Immersion

FEES

IV ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ concurrently with the filing of a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☒ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☐ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

or

b. ☐ See the statement below. No fee is required.

FITBIT 1002
Fitbit v. Immersion

VI. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)

The undersigned hereby states that

a. ☒ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS; or

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VII. PAYMENT OF FEES (check one box)

☐ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 16-1435 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☒ No fee is required.

FITBIT 1002
Fitbit v. Immersion

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 16-1435.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 16-1435 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted.

KILPATRICK STOCKTON LLP

Date: 3/25/2010

By: _____

Michael T. Morlock (Reg. No. 62,245)
1001 West Fourth Street
Winston-Salem, NC 27101-2400

Attachment(s):

- ☒ PTO/SB/08
- ☒ Documents
- ☐ Fee
- ☐ Other:

FITBIT 1002
Fitbit v. Immersion

PTO/SB/08a (12-09)
Approved for use through 12/31/2009. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
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Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2629
Examiner Name	Richard A. Hjerpe
Attorney Docket Number	IMM351 (51861-378536)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number — Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	US 20030152596	08-28-2003	Serbanescu	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	8221713
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	16-AUG-2010
Filing Date:	14-JUL-2009
Time Stamp:	09:35:41
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	SIDSTransmittal.pdf	36502	no	1

Warnings:	
Information:	

FITBIT 1002
Fitbit v. Immersion

2	Transmittal Letter	SIDSLetter.pdf	204129 879a77578fd7d8153ba573b24c60edf950752cbd	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Filed (SB/08)	PTOSB08.pdf	73732 614f22985e4c574d8ffdd0dd01f66f8871498349	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
			Total Files Size (in bytes):	314423	

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	Conf No.: 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2629
Serial No. 12/502,702	)	
	)	Examiner: **Richard A. Hjerpe**
Filed: July 14, 2009	)	
	)	

For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Information Disclosure Statement Letter; and
2. Information Disclosure Statement by Applicant (Form PTO/SB/08).

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 11-0855.

Respectfully submitted,

Date: 8/16/2010

Michael T. Morlock
Reg. No. 62,245

KILPATRICK STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web on 8-16, 2010.

Renée S. Prevette

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	Conf No.: 6699
Serial No. 12/502,702	Art Unit: 2629
Filed: July 14, 2009	Examiner: Richard A. Hjerpe
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	
Attorney Ref. IMM351 (51851-378586)	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

FITBIT 1002
Fitbit v. Immersion

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☒ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☐ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

FITBIT 1002
Fitbit v. Immersion

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☐ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 11-0855 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☒ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 11-0855.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 11-0855 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 8/16/2010

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):

- [x] PTO/SB/08
- [ ] Documents
- [ ] Fee
- [ ] Other

FITBIT 1002
Fitbit v. Immersion

PTO/SB/08b (08-10)
Approved for use through 03/31/2010 OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number

Substitute for form 1449B/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	Birnbaum et al.
Art Unit	2629
Examiner Name	Richard A. Hjerpe
Attorney Docket Number	IMM351 (57819-379596)

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	1	International Preliminary Report on Patentability mailed January 27, 2011 for corresponding International Application No. PCT/US2009/050673	

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.
[1] Applicant's unique citation designation number (optional). [2] Applicant is to place a check mark here if English language Translation is attached.
This collection of information is required by 37 CFR 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

PCT/US2009/050579

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)

(PCT Rule 44bis.1(c))

To:

GARDNER, Steven
Kilpatrick Stockton LLP
1001 West Fourth Street
Winston-Salem, NC 27101
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year)	
27 January 2011 (27.01.2011)	
Applicant's or agent's file reference	IMMR310.PCT
International application No.	International filing date (day/month/year)
PCT/US2009/050579	14 July 2009 (14.07.2009)
Priority date (day/month/year)	
15 July 2008 (15.07.2008)	
Applicant	
IMMERSION CORPORATION et al	

IMPORTANT NOTICE

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO	Authorized officer
34, chemin des Colombettes 1211 Geneva 20, Switzerland	Nora Lindner
Facsimile No. +41-22 338 82 70	e-mail: pt1.pct@wipo.int

Form PCT/IB/326 (January 2004)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference: IMM310.PCT	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2009/050579	International filing date (day/month/year) 14 July 2009 (14.07.2009)	Priority date (day/month/year) 15 July 2008 (15.07.2008)
International Patent Classification (IPC) (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant IMMERSION CORPORATION		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis (a).

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- [X] Box No. I — Basis of the report
- [X] Box No. II — Priority
- [ ] Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV — Lack of unity of invention
- [X] Box No. V — Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI — Certain documents cited
- [ ] Box No. VII — Certain defects in the international application
- [ ] Box No. VIII — Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis.2).

	Date of issuance of this report: 18 January 2011 (18.01.2011)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Nora Lindner e-mail: pt11.pct@wipo.int

Form PCT/IB/373 (January 2004)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/220 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2009/050579	14.07.2009	15.07.2008

International Patent Classification (IPC) or both national classification and IPC
INV. G06F3/01 G06F3/048 H04M1/725

Applicant
IMMERSION CORPORATION

1. This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [X] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1(b)(i) that written opinions of the International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA	Date of completion of the opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Bianchi, Damiano Telephone No. +49 89 2399-8668

Form PCT/ISA/237 (Cover Sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No. PCT/US2009/060579

Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing:

      ☐ contained in the international application as filed.

      ☐ filed together with the international application in electronic form.

      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Box No. II Priority

1. ☒ The validity of the priority claim has not been considered because the International Searching Authority does not have in its possession a copy of the earlier application whose priority has been claimed or, where required, a translation of that earlier application. This opinion has nevertheless been established on the assumption that the relevant date (Rules 43bis.1 and 64.1) is the claimed priority date.

2. ☐ This opinion has been established as if no priority had been claimed due to the fact that the priority claim has been found invalid (Rules 43bis.1 and 64.1). Thus for the purposes of this opinion, the international filing date indicated above is considered to be the relevant date.

3. Additional observations, if necessary:

Form PCT/ISA/237 (April 2007)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No. PCT/US2009/050579

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	12,21-22
	No:	Claims	1-11, 13-20, 23-29
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-29
Industrial applicability (IA)	Yes:	Claims	1-29
	No:	Claims	

2. Citations and explanations

see separate sheet

Form PCT/ISA/237 (April 2007)

FITBIT 1002
Fitbit v. Immersion

1 Re Item V.

2 The following documents are introduced in the procedure:

D1 WILLIAMSON J, MURRAY-SMITH R, HUGHES S: "Shoogle: Excitatory Multimodal Interaction on Mobile Devices" CHI 2007 PROCEEDINGS - SHAKE, RATTLE & ROLL: NEW FORMS OF INPUT & OUTPUT; 28 April 2007 (2007-04-28) , - 3 May 2007 (2007-05-03) pages 121-124, XP002546378 San Jose, CA, USA

D2 WO 2004/044728 A2 (SONY COMP ENTERTAINMENT INC [JP]) 27 May 2004 (2004-05-27)

D3 WO 2004/075169 A2 (KONINKL PHILIPS ELECTRONICS NV [NL]; PHILIPS CORP [US]; VAN DE SLUIS B) 2 September 2004 (2004-09-02)

3 The subject matter of independent claim 1 is not new in the sense of Article 33(2) PCT.

In accordance with the features of claim 1, document D1 discloses:

A method comprising:

receiving a sensor signal from a sensor configured to sense a physical interaction with a messaging device (see page 121, left column, abstract, "*mobile device*", right column, second paragraph, "*The Shoogle interface uses spatial sensing for natural motion sensing without any external moving parts; the user just shakes, tilts or wobbles the device to stimulate the auditory and vibrotactile feedback*" and right column, third paragraph, "*The user reaches into his or her bag, and shakes the phone*");

determining an interaction between one or more virtual message objects (see page 121, right column, third paragraph, "*virtual 'message balls'*") **and a virtual message environment** (see page 121, right column, third paragraph, "*SMS inbox*"), **the interaction based at least in part on the sensor signal** (see page 121, right column, third paragraph, "*As the user shakes it*") **and a virtual physical parameter of at least one of the one or more virtual message objects** (the virtual physical parameter is represented by the mass of the balls, see also page 123, right column, first paragraph, "*In the SMS message prototype, the mass of each ball is proportional to the length of the message*");

determining a haptic effect based at least in part on the interaction (see page 121, right column, last paragraph to page 122, left column, first paragraph, "*Hearing that one of them is distinctly metallic, and has a deep,*

FITBIT 1002
Fitbit v. Immersion

heavy feeling impact, the user realises that a long text message from a colleague has been received" and page 123, right column, first paragraph, "*Users can also tap the device (detected via capacitive sensing), at which the balls bounce upwards (the only case where the third dimension is considered). They then rain back down in the order of creation, giving a structured view of the contents*"); and

generating a haptic signal configured to cause an actuator (see page 123, right column, last paragraph, "*To enhance the sensations, the internal eccentric motor of the iPaq is used in combination with the VBW32 transducer*") **to output the haptic effect** (see page 121, right column, last paragraph, "*impacts are heard and felt as these balls bounce around*").

Therefore D1 discloses all the features of claim 1, which as a consequence does not satisfy the requirements of Article 33(2) PCT.

4 The disclosure of document D1 is prejudicial to the novelty of independent method claim 11 as well. In particular, the document discloses:

A method comprising:

receiving a new virtual message object signal comprising a new virtual message object (see page 122, left column, first paragraph, "*As messages arrive*" and page 123, left column, fourth paragraph, "*As each ball is generated (e.g. as a message arrives)*");

determining an interaction between the new virtual message object (see page 121, right column, third paragraph, "*virtual "message balls"*") **and a virtual message environment** (see page 121, right column, third paragraph, "*SMS inbox*"), **the interaction based at least in part on the sensor signal** (see page 121, right column, third paragraph, "*As the user shakes it*") **and a virtual physical parameter of the new virtual message object** (the virtual physical parameter is represented by the mass of the balls, see also page 123, right column, first paragraph, "*In the SMS message prototype, the mass of each ball is proportional to the length of the message*");

determining a haptic effect based at least in part on the interaction (see page 121, right column, last paragraph to page 122, left column, first paragraph, "*Hearing that one of them is distinctly metallic, and has a deep, heavy feeling impact, the user realises that a long text message from a colleague has been received*" and page 123, right column, first paragraph, "*Users can also tap the device (detected via capacitive sensing), at which the balls bounce upwards (the only case where the third dimension is considered). They then rain back down in the order of creation, giving a structured view of the contents*"); and

FITBIT 1002
Fitbit v. Immersion

generating a haptic signal configured to cause an actuator (see page 123, right column, last paragraph, "*To enhance the sensations, the internal eccentric motor of the iPaq is used in combination with the VBW32 transducer*") **to output the haptic effect** (see page 121, right column, last paragraph, "*impacts are heard and felt as these balls bounce around*").

As a consequence the requirements of Article 33(2) PCT are not fulfilled.

5 Independent **claims 14 and 15** define computer-readable mediums comprising program code for executing the methods of claims 1 and 11 respectively. As a consequence, the objection regarding lack of novelty formulated for claims 1 and 11 applies to claims 14 and 15 as well.

Thus claims 14 and 15 do not satisfy the requirements of Article 33(2) PCT.

6 Independent **claim 16** defines a system having structural features that correspond to those of method claim 1. The same objection as brought forward for claim 1 is therefore applicable *mutatis mutandis*.

Therefore claim 16 does not satisfy the requirements of Article 33(2) PCT.

7 The dependent claims do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty and/or inventive step. In particular:

7.1 The additional features of claims 2 to 10, 13, 17 to 20 and 23 to 29 are disclosed by document D1.

7.2 Extending the teaching of D1 to an alarm or a reminder as defined in claim 13 would be an obvious option for the skilled person.

7.3 The additional features of claims 21 (a display for showing the virtual message environment) and 22 (the display comprises a touch screen) would be considered by the person skilled in the art as trivial design options.

Thus, the dependent claims do not satisfy the requirements of the PCT with respect to novelty (Article 33(2) PCT) and inventive step (Article 33(3) PCT).

8 The subject matter of claims 1 to 29 is industrially applicable (Article 33(4) PCT).

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	9648103
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	14-MAR-2011
Filing Date:	14-JUL-2009
Time Stamp:	11:23:03
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	PTE Interim Patent Extension filed	IDSTransmittal.pdf	34286	no	1

Warnings:	
Information:	

FITBIT 1002
Fitbit v. Immersion

2	Transmittal Letter	IDSLetter.pdf	201271 ca0aa03f7cf368b6c8b5c149f83cfa9ea8616b67	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Filed (SB/08)	PTOSB08.pdf	64190 aa876694728b4afce43e111dd5540dbcff0fd821	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	NPL Documents	PCTUS2009050579IPRP.pdf	375994 e1e0483c2d1e549c5b9f930b61870b148b3d0bb3	no	8
Warnings:					
Information:					
		Total Files Size (in bytes):	675741		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	Conf No.: 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2629
Serial No. 12/502,702	)	
	)	Examiner: **Richard A. Hjerpe**
Filed: July 14, 2009	)	
	)	

For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Information Disclosure Statement;
2. Information Disclosure Statement by Applicant (Form PTO/SB/08); and
3. One (1) Non-Patent Reference.

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 11-0855.

Respectfully submitted,

Date: 3/13/2011

Michael T. Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing
I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web on March 14, 2011.

Renée S. Prevette

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	)	
	)	Conf No.: 6699
Serial No. 12/502,702	)	
	)	Art Unit: 2629
Filed: July 14, 2009	)	
	)	Examiner: Richard A. Hjerpe
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	)	
Attorney Ref. IMM351 (51851-378586)	)	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

c. ☒ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

FITBIT 1002
Fitbit v. Immersion

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☒ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☐ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☒ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

FITBIT 1002
Fitbit v. Immersion

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☐ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 11-0855 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☒ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 11-0855.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 11-0855 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 3/15/2011

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):

- ☒ PTO/SB/08
- ☒ Documents
- ☐ Fee
- ☐ Other

FITBIT 1002
Fitbit v. Immersion

Approved for use through 07/31/2012. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Substitute for form 1449/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2629
Examiner Name	Shalwala, Bipin H
Attorney Docket Number	IMM351 (51851/378536)

Sheet 1 of

U.S. PATENT DOCUMENTS

Examiner Initial*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 7,468,573	12-23-2008	Dai et al	
		US- 2003/0100969	05-29-2003	Jones	
		US- 2006/0255683	11-16-2006	Suzuki et al.	
		US- 2006/0284849	12-21-2006	Grant et al.	
		US- 2008/0287147	11-20-2008	Grant et al	
		US- 2009/0167509	07-02-2009	Fadell et al.	
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FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No.[1]	Foreign Patent Document Country Code[3] Number[4] Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages Or Relevant Figures Appear	T[6]

Examiner Signature		Date Considered	

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kind Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 (1-800-786-9199) and select option 2.

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	12534091
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	James L. Howard/Renee Prevette
Filer Authorized By:	James L. Howard
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	13-APR-2012
Filing Date:	14-JUL-2009
Time Stamp:	10:07:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	IDSTransmittal.pdf	33708 [redacted]	no	1

Warnings:	
Information:	

FITBIT 1002
Fitbit v. Immersion

2	Transmittal Letter	IDSLetter.pdf	205038 ceeae80d97443412faf4680996421f43790f1e8b6	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	PTOSB08.pdf	92517 e084f495e47c25df7e3545e5c5ff94fc9422c3e5	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
		Total Files Size (in bytes):	331323		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	Conf No.. 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2629
Serial No. 12/502,702	)	
	)	Examiner: **Shalwala, Bipin H.**
Filed: July 14, 2009	)	
	)	
For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES		

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Information Disclosure Statement; and
2. Information Disclosure Statement by Applicant (Form PTO/SB/08).

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 20-1430.

Respectfully submitted,

Date: 4/12/2012

Michael T. Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing
I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web on April 13, 2012.

Renée S. Prevette

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	Conf No.: 6699
Serial No. 12/502,702	Art Unit: 2629
Filed: July 14, 2009	Examiner: Shalwala, Bipin H
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	
Attorney Ref: IMM351 (51851/378586)	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

FITBIT 1002
Fitbit v. Immersion

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☒ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☐ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

FITBIT 1002
Fitbit v. Immersion

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☐ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☒ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 20-1430.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 11-0855 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 4/12/2012

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):

- ☒ PTO/SB/08
- ☒ Documents
- ☐ Fee
- ☐ Other

FITBIT 1002
Fitbit v. Immersion

PLUS Search Results for S/N 12502702, Searched Mon May 07 11:01:10 EDT 2012

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FITBIT 1002
Fitbit v. Immersion

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APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
12/502,702	07/14/2009	David Birnbaum	IMM351 (51851/P7836US0)	6619

3430 1590 06/15/2012

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
WONG, KIN C	

ART UNIT	PAPER NUMBER
2627	

MAIL DATE	DELIVERY MODE
06/15/2012	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	12/502,702	BIRNBAUM ET AL.	
	Examiner	Art Unit	
	K. Wong	2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) 1-31 is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) 1-31 is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other. _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims (1-31) are rejected under 35 U.S.C. 102(b) as being anticipated by Bartlett (6573883).

Regarding claim 27: Bartlett discloses a system (as depicted in figure 5 of Bartlett and see associated descriptions for details) including:

a processor (col. 4, lines 46-63 of Bartlett) configured to:

receive a first sensor signal from a first sensor, the first sensor configured to detect a movement of a first mobile device (col. 6, lines 19-26 of Bartlett);

receive a second sensor signal from a second sensor, the second sensor configured to detect an interaction with the first mobile device (col. 6, lines 19-26 of Bartlett);

receive a first data signal from a network interface, the network interface configured to receive signals transmitted by a second mobile device (col. 6, lines 37-46 of Bartlett);

determine a change in a display signal based at least in part on the data signal and the second sensor signal (col. 6, lines 19-36 of Bartlett); and

FITBIT 1002
Fitbit v. Immersion

determine a haptic effect based at least in part on the first data signal (col. 6, lines 27-36 of Bartlett).

Regarding claim 28: Bartlett teaches that wherein the first sensor and the second sensor are each configured to detect one or more of: contact, pressure, acceleration, inclination, inertia, or location (col. 6, lines 19-26 of Bartlett).

Regarding claim 29: the limitations of wherein the second sensor comprises a touch-screen are considered inherent because in col. 5, lines 5-21 of Bartlett where Bartlett describes the function of a touch display unit.

Regarding claim 30: the limitations of wherein the mobile device further comprises a speaker configured to generate a sound effect coordinated with the haptic effect are considered inherent because in col. 5, lines 5-21 of Bartlett where Bartlett describes the highlighting of the haptic effect that which includes audio (sound) and visual.

Regarding claim 31: Bartlett teaches that wherein the processor is further configured to transmit a second data signal to the network interface, and the network interface is further configured to transmit the second data signal (dialing and/or texting) to the second mobile device (col. 6, lines 37-46 of Bartlett).

Regarding claims 1-16: method claims (1-26) are considered met when the apparatus of Bartlett is been implemented.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fourquin et al (7810247), Kulas (8123614), Moloney (7788032) and Wigdor (7721968) are cited for haptic effect.

FITBIT 1002
Fitbit v. Immersion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to K. Wong whose telephone number is (571)272-7566.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, W. Young can be reached on (571) 272-7582. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. Wong/
Primary Examiner
Art Unit 2627

kw
3 Jun 12

FITBIT 1002
Fitbit v. Immersion

Notice of References Cited	Application/Control No 12/502,702	Applicant(s)/Patent Under Reexamination BIRNBAUM ET AL.	
	Examiner K. Wong	Art Unit 2627	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,573,883	06-2003	Bartlett, Joel F	345/156
*	B	US-7,721,968	05-2010	Wigdor, Daniel	235/472.01
*	C	US-7,799,032	09-2010	Moloney, Dave John	701/472
*	D	US-7,810,247	10-2010	Fourquin et al.	33/366.11
*	E	US-8,123,614	02-2012	Kulas, Charles J.	463/31
	F	US-			
	G	US-			
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	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
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NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Page(s)
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	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM YYYY format are publication dates. Classifications may be US or foreign.

PTO/SB/08a (07-09)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete If Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	Birnbaum et al.
Art Unit	2472
Examiner Name	Unassigned
Attorney Docket Number	IMM361

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number: Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-			
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	1	WO 2004/044728 A2	05-27-2004	Sony Comp Entertainment Inc.		
	2	WO 2004/075169 A2	09-02-2004	Koninkl Philips Electronics NV et al.		
	3	WO 2008/132540 A1	11-06-2008	Nokia Corp. et al		
	4	WO 2009/074185 A1	06-18-2009	Nokia Corp et al.		

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	5	WILLIAMSON, J. et al., Shoogle: Excitatory Multimodal Interaction on Mobile Devices. CHI 2007 Proceedings-Shake, Rattle and Roll: New Forms of Input and Output, 2007, pp. 121-124. XP002549378.	
	6	Patent Cooperation Treaty, International Search Report, International Application No. PCT/US2009/050679, mailed October 21, 2009	

Examiner Signature	/K. Wong/	Date Considered	06/02/2012

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant. [1] Applicant's unique citation designation number (optional). [2] See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. [3] Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). [4] For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. [5] Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. [6] Applicant is to place a check mark here if English language Translation is attached.

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 2 hours to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

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Fitbit v. Immersion

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(Use as many sheets as necessary)

Sheet 1 of 2

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	Birnbaum et al.
Art Unit	2472
Examiner Name	Unassigned
Attorney Docket Number	IMM351

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number - Kind Code[2] (if known)	Publication Date - MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	US-2001/035854 A1	11-01-2001	Rosenberg et al.	
	2	US-2002/177471 A1	11-28-2002	Kaaresoja et al.	
	3	US-2003/0063128 A1	04-03-2003	Salmimaa et al.	
	4	US-2006/0181510 A1	08-17-2006	Faith	
	5	US-2006/0061545 A1	03-23-2006	Hughes et al.	
	6	US-2007/0066283 A1	03-22-2007	Haar et al.	
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		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	7	EP 0 899 650	03-03-1999	Xerox Corp.		
	8	EP 1 401 195	03-24-2004	Samsung Electronics Co. Ltd.		
	9	EP 1 731 983	12-13-2006	Sony Corp.		
	10	GB 2 416 962	02-08-2006	Vodafone PLC		
	11	WO 2005/103863	11-03-2005	Fujitsu Limited		

Examiner Signature	/K. Wong/	Date Considered	06/02/2012

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 2 of 2

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First Named Inventor	Birnbaum et al.
Art Unit	2472
Examiner Name	Unassigned
Attorney Docket Number	IMM351

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	12	BIET, M. et al., Discrimination of Virtual Square Gratings by Dynamic Touch on Friction Based Tactile Displays, Haptic Interfaces for Virtual Environment and Teleoperator Systems, 2008, Symposium, IEEE, Piscataway, NJ, XP 031399918, pp. 41-48, March 2008	
	13	DEWITT, A., Designing Sonification of User Data in Affective Interaction, Master of Science Thesis Stockholm, Sweden, XP 002551469, at http://w3.nada.kth.se/utbildning/grukth/exjobb/rapportlistor/2007/rapporter07/de_witt_anna_07142. as available via the Internet and printed 10-20-2009.	
	14	KAARESOJA, T. et al., Snap-Crackle-Pop: Tactile Feedback for Mobile Touch Screens, Proceedings of the Eurohaptics 2006, XP 002551465, at http://dac.uniw-envy.fr/eurohaptics/upload/cd/papers/f80. as available via the Internet and printed 10-20-09.	
	15	OAKLEY, I. et al., Contact!: Exploring Asynchronous Touch over Distance, Palpable Machines Research Group, Media Lab Europe, XP 007910166, at http://people.cs.vt.edu/~asgupt06/touch%20review%20bibliography/Oak002, as available via the Internet and printed 10-20-2009	
	16	ROVERS, A. et al., HIM: A Framework for Haptic Instant Messaging, CHI 2004 (CHI Conference Proceedings. Human Factors in Computing Systems), XP 002464573 Vienna Austria, April 2004, p. 1313-1316.	
	17	SEKIGUCHI, Y. et al., Haptic Interface using Estimation of Box Contents Metaphor, Proceedings of ICAT 2003, Tokyo, Japan, XP 002551457, at http://www.vrsj.org/ic-at/papers/2003/2003047_00000, as available via the Internet and printed 10-20-2009.	
	18	Patent Cooperation Treaty, International Search Report, International Application No. PCT/US2009/050587, mailed October 29, 2009	
	19	Patent Cooperation Treaty, International Search Report, International Application No. PCT/US2009/050574, mailed October 28, 2009.	
	20	Patent Cooperation Treaty, International Search Report, International Application No. PCT/US2009/050564 mailed October 28, 2009.	
	21	Patent Cooperation Treaty, Invitation to Pay Additional Fees, Application No. PCT/US2009/050569, mailed November 5, 2009	

Examiner Signature	/K. Wong/	Date Considered	03/02/12

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FITBIT 1002
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Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination
	12/502,702	BIRNBAUM ET AL
	Examiner	Art Unit
	K. Wong	2627

SEARCHED			
Class	Subclass	Date	Examiner

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
See East search history report	6/3/12	KW

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BIB DATA SHEET

CONFIRMATION NO. 6699

SERIAL NUMBER	FILING or 371(c) DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
12/502,702	07/14/2009 RULE	345	2627	IMM351 (51851/378586)

APPLICANTS

David Birnbaum, Oakland, CA;
Chris Ullrich, Ventura, CA;
Peter Rubin, Berkeley, CA;
Phong David Ngo, San Francisco, CA;
Lao Kopelow, San Francisco, CA;

**** CONTINUING DATA **************************

This appln claims benefit of 61/080,978 07/15/2008
and claims benefit of 61/080,981 07/15/2008
and claims benefit of 61/080,985 07/15/2008
and claims benefit of 61/080,987 07/15/2008
and claims benefit of 61/148,312 01/29/2009
and claims benefit of 61/181,280 05/26/2009

**** FOREIGN APPLICATIONS **************************

**** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ****
07/23/2009

Foreign Priority claimed	STATE OR COUNTRY	SHEETS DRAWINGS	TOTAL CLAIMS	INDEPENDENT CLAIMS
☐ Yes ☑ No 35 USC 119(a-d) conditions met ☐ Yes ☑ No Verified and Acknowledged /K. WONG/ Examiner's Signature	☐ Met after Allowance Initials	CA	18	31	3

ADDRESS

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101
UNITED STATES

TITLE

Systems And Methods For Transmitting Haptic Messages

FILING FEE RECEIVED	FEES: Authority has been given in Paper	
1792	No._____ to charge/credit DEPOSIT ACCOUNT No._____ for following:	☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit

BIB (Rev. 05/07)

FITBIT 1002
Fitbit v. Immersion

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3304	(gesture or haptic) and (sens$4 or detect$4) and (accelerat$4) and (touch) near3 (screen or display))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	OFF	2012/06/03 10:52
L2	2565	(gesture or haptic) and (sens$4 or detect$4) and (accelerat$4) and (touch) near3 (screen or display)) and (mobile)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/06/03 10:53
L3	2400	(gesture or haptic) and (sens$4 or detect$4) and (accelerat$4) and (touch) near3 (screen or display)) and (mobile) and (processor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/06/03 10:53
L4	1942	(gesture or haptic) and (sens$4 or detect$4) and (accelerat$4) and (touch) near3 (screen or display)) and (mobile) and (processor) and (speaker)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/06/03 10:54
L5	1928	(gesture or haptic) and (sens$4 or detect$4) and (accelerat$4) and (touch) near3 (screen or display)) and (mobile) and (processor) and (speaker) and (interface)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/06/03 10:55
L6	270	(gesture or haptic) and (sens$4 or detect$4) and (accelerat$4) and (touch) near3 (screen or display)) and (mobile) and (processor) and (speaker) and (interface) and (haptic effect)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/06/03 10:55
L8	254	(gesture or haptic) and (sens$4 or detect$4) and (accelerat$4) and (touch) near3 (screen or display)) and (mobile) and (processor) and (speaker) and (interface) and (haptic effect) and (recognition)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/06/03 10:56
L9	24	(gesture or haptic) and (sens$4 or detect$4) and (accelerat$4) and (touch) near3 (screen or display)) and (mobile) and (processor) and (speaker) and (interface) and (haptic effect) and (recognition) and (sound effect)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/06/03 10:56
L11	24	(gesture or haptic) and (sens$4 or detect$4) and (accelerat$4) and (touch)	US-PGPUB; USPAT;	NEAR	ON	2012/06/03 10:57

FITBIT 1002
Fitbit v. Immersion

		near3 (screen or display)) and (mobile) and (processor) and (speaker) and (interface) and (haptic effect) and (recognition) and (sound effect)	USOCR; FPRS; EPO; JPO; DERWENT; IBM TDB			

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L7	270	(gesture or haptic) and (sens$4 or detect$4) and (accelerat$4) and (touch near3 (screen or display)) and (mobile) and (processor) and (speaker) and (interface) and (haptic effect)	US-PGPUB; USPAT; UPAD	NEAR	ON	2012/06/03 10:55
L10	24	(gesture or haptic) and (sens$4 or detect$4) and (accelerat$4) and (touch near3 (screen or display)) and (mobile) and (processor) and (speaker) and (interface) and (haptic effect) and (recognition) and (sound effect)	US-PGPUB; USPAT; UPAD	NEAR	ON	2012/06/03 10:57

6/3/2012 10:59:51 AM

FITBIT 1002
Fitbit v. Immersion

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12502702	BIRNBAUM ET AL.
	Examiner	Art Unit
	K WONG	2627

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE									
Final	Original	06/03/2012									
	1	✓									
	2	✓									
	3	-									
	4	-									
	5	✓									
	6	✓									
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	9	✓									
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	31	-									

PTO/SB/08a (12-09)
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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2629
Examiner Name	Richard A. Hjerpe
Attorney Docket Number	IMM351 (51851-378586)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No [1]	Document Number — Number - Kind Code [2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	US 20030152596	08-28-2003	Serbanescu	

Examiner Signature	/K. Wong/	Date Considered	06/02/2012

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FITBIT 1002
Fitbit v. Immersion

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2629
Examiner Name	Shalwala, Bipin H
Attorney Docket Number	IMM351 (51851/378536)

U.S. PATENT DOCUMENTS

Examiner Initial*	Cite No.[1]	Document Number Number-Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US- 7,468,573	12-23-2008	Dai et al	
		US- 2003/0100969	05-29-2003	Jones	
		US- 2006/0255683	11-16-2006	Suzuki et al.	
		US- 2006/0284849	12-21-2006	Grant et al.	
		US- 2008/0287147	11-20-2008	Grant et al	
		US- 2009/0167509	07-02-2009	Fadell et al.	
		US-			
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FOREIGN PATENT DOCUMENTS

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Examiner Signature	/K. Wong/	Date Considered	06/02/2012

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Fitbit v. Immersion

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Sheet 1 of 2

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	Birnbaum et al.
Art Unit	2472
Examiner Name	Unassigned
Attorney Docket Number	IMM351

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	US-2003/0063128 A1	04-03-2003	Salmimaa et al.	
	2	US-2006/0181510 A1	08-17-2006	Faith	
	3	US-2006/0256074 A1	11-16-2006	Krum et al.	
	4	US-2006/0279476 A1	12-14-2006	Obata	
	5	US-2007/0096283 A1	03-22-2007	Nasr et al.	
	6	US-2007/0139366 A1	06-21-2007	Dunko et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	7	FR 2 910,160	06-20-2008	France Telecom		
	8	GB 2 415 962	02-08-2006	Vodafone PLC		
	9	WO 2005/103863	11-03-2005	Fujitsu Limited		

Examiner Signature	/K. Weng/	Date Considered	06/02/2012

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Fitbit v. Immersion

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 2 of 2

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	Birnbaum et al.
Art Unit	2472
Examiner Name	Unassigned
Attorney Docket Number	IMM351

NON PATENT LITERATURE DOCUMENTS			
Examiner Initials *	Cite No. [1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T [2]
	10	International Search Report and Written Opinion mailed February 11, 2010 for corresponding International Application No. PCT/US2009/050569.	

Examiner Signature	/K. Wong/	Date Considered	06/02/12

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	Birnbaum et al.
Art Unit	2629
Examiner Name	Richard A. Hjerpe
Attorney Docket Number	IMM351 (57819-379596)

NON PATENT LITERATURE DOCUMENTS

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	1	International Preliminary Report on Patentability mailed January 27, 2011 for corresponding International Application No. PCT/US2009/050673	

Examiner Signature	/K. Wong/	Date Considered	05/02/2012

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FITBIT 1002
Fitbit v. Immersion

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2627
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (51851/378588)

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number: Number - Kind Code[2] (if known)	Publication Date: MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date: MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
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NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	1.	BROWN, L.M. and WILLIAMSON, J., "Shake2Talk: Multimodal Messaging for Interpersonal Communication," Oakley, I. and Brewster, S. (eds), HAID 2007, LNCS 4813, pp. 44-55	
	2.	POUPYREV, I. et al., "Ambient Touch: Designing Tactile Interfaces for Handheld Devices," (group ivan@csl.sony.co.jp, shigeaki.maruyama@jp.sony.com http://www.csl.sony.co.jp/IML	
	3.	SMITH, J. et al. "Communicating emotion through a haptic link: Design space and methodology." Int. J. Human-Computer Studies. 2007, 65:376-387	
	4.	SNIBBE, S.S. et al. "Haptic Techniques for Media Control," Proceedings of 14th Annual ACM Symposium on User Interface Software and Technology, Orlando, Florida, November 2001.	
	5.	VERPLANK, B. et al. "THE PLANK: Designing a simple haptic controller." Proceedings of the Conference on New Instruments for Musical Expression, Dublin, Ireland, May 24-26, 2002	
	6.	United States Patent and Trademark Office, Office Action, Application No. 12/502,755 mailed April 25, 2012	
	7.	United States Patent and Trademark Office, Office Action, Application No. 12/502,547, mailed December 12, 2011.	
	8.	United States Patent and Trademark Office, Office Action, Application No. 12/502,705 mailed March 3, 2012	
	9.	United States Patent and Trademark Office, Office Action, Application No. 12/502,780, mailed October 5, 2011	

Examiner Signature		Date Considered	

FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Renee Prevette
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	13467839
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	10-AUG-2012
Filing Date:	14-JUL-2009
Time Stamp:	13:09:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	10429
Deposit Account	201430
Authorized User	KILPATRICK TOWNSEND & STOCKTON, LLP

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FITBIT 1002
Fitbit v. Immersion

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	IDSTransmittal.pdf	37305	no	1
Warnings:					
Information:					
2	Transmittal Letter	IDSLetter.pdf	209223	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	PTOSB08.pdf	74129	no	1
Warnings:					
Information:					
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4	Non Patent Literature	Brown.pdf	1509989	no	12
Warnings:					
Information:					
5	Non Patent Literature	Poupyrev.pdf	2069450	no	10
Warnings:					
Information:					
6	Non Patent Literature	Smith2007.pdf	660836	no	12
Warnings:					
Information:					
7	Non Patent Literature	Snibbe2001.pdf	1430656	no	10
Warnings:					
Information:					
8	Non Patent Literature	Verplank2002.pdf	683473	no	4
Warnings:					
Information:					

FITBIT 1002
Fitbit v. Immersion

9	Non Patent Literature	ImmersionIMM310USOAmailed 4-25-2012.pdf	411591 a0f3f52bbe23e1eff3a1a250c1b8fde54e5189f1	no	21
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Information:					
10	Non Patent Literature	ImmersionIMM312USOAmailed 12-12-2011.pdf	180481 2044ed34fdbe4dace485a636c566d41fb78d0829	no	8
Warnings:					
Information:					
11	Non Patent Literature	ImmersionIMM314USOAmailed 3-6-2012.pdf	8761949 7cf82afdd188fce00e8bc1a4cd69989c56a7a4f1	no	11
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Information:					
12	Non Patent Literature	IMM314USOAmailed10-5-11.pdf	199887 56ac1758def1b689107dca09b317acdf01b4981f	no	9
Warnings:					
Information:					
13	Fee Worksheet (SB06)	fee-info.pdf	30365 284398873fde950fbc2ab14af290a06a1fc02499	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	16259393		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	Conf. No.: 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2627
Serial No. 12/502,702	)	
	)	Examiner: **Wong, Kin C.**
Filed: July 14, 2009	)	
	)	

For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Information Disclosure Statement;
2. Information Disclosure Statement by Applicant (Form PTO/SB/08);
3. Nine (9) Non-patent Literature References; and
4. EFS-Web Payment in the amount of $180.00.

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 20-1430.

Respectfully submitted,

Date: 8/10/2012

Michael T. Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing
I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web on August 10, 2012.

Renée S. Prevette

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	Conf No.: 6699
Serial No. 12/502,702	Art Unit: 2627
Filed: July 14, 2009	Examiner: Wong, Kin C.
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	
Attorney Ref. IMM351 (51851/378586)	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

FITBIT 1002
Fitbit v. Immersion

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☒ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee, see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

FITBIT 1002
Fitbit v. Immersion

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☒ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 20-1430.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 20-1430 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 5/6/2013

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):

- ☒ PTO/SB/08
- ☒ Documents
- ☒ Fee
- ☐ Other

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	David Brinbaum
Application No.	:	12/502,702
For	:	**SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**
Filed	:	July 14, 2009
Examiner	:	Kin C. Wong
Art Unit	:	2627
Confirmation No.	:	6699

Mail Stop **Amendment**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE TO NON-FINAL OFFICE ACTION

Sir:

The following Amendment and Remarks are submitted in response to the Office Action mailed June 15, 2011.

Listing of the Claims begins on page 2 of this paper.

Remarks begin on page 8 of this paper.

FITBIT 1002
Fitbit v. Immersion

LISTING OF THE CLAIMS

1. (Currently Amended) A method comprising:

receiving at least one sensor signal from at least one sensor of a mobile device, the at least one sensor signal associated with a movement of the mobile device;

determining a message to be displayed in a user interface based at least in part on the at least one sensor signal;

determining a haptic effect based in part on the first sensor signal; and

causing the message to be displayed and the haptic effect to be output.

2. (Original) The method of claim 1, wherein the at least one sensor comprises one or more of: an accelerometer, a gyroscope, a touch-sensitive input device, a camera, or a GPS sensor.

3. (Original) The method of claim 1, wherein the at least one sensor comprises a plurality of sensors.

4. (Original) The method of claim 3, wherein a first sensor of the plurality of sensors comprises an accelerometer and a second sensor of the plurality of sensors comprises a touch-screen.

5. (Original) The method of claim 1, wherein the message comprises predefined characteristics.

FITBIT 1002
Fitbit v. Immersion

6. (Original) The method of claim 5, wherein the predefined characteristics comprise: a shape and a haptic effect.

7. (Original) The method of claim 1, wherein:

the movement of the mobile device comprises a movement approximating the shape of a heart; and

the message is in the form of a heart.

8. (Original) The method of claim 1, wherein:

the movement of the mobile device comprises a movement approximating a hammering motion; and

the message is in the form of a nail.

9. (Original) The method of claim 1, further comprising detecting a user interaction associated with the message.

10. (Original) The method of claim 9, wherein the interaction comprises an input on a touch-sensitive input device of the mobile device.

11. (Original) The method of claim 9, wherein the interaction comprises tilting the mobile device.

12. (Original) The method of claim 9, wherein the interaction comprises an input detected by a microphone of the mobile device.

FITBIT 1002
Fitbit v. Immersion

13. (Original) The method of claim 12, wherein the interaction comprises blowing on the microphone.

14. (Original) The method of claim 9, further comprising transmitting a signal associated with the message to a recipient.

15. (Currently Amended) A method comprising:

receiving a first sensor signal from a first sensor, the first sensor signal associated with a movement of a first mobile device;

receiving a second sensor signal from a touch-sensitive interface of the first mobile device, the second sensor signal associated with a user interaction;

determining a change in a display of the first mobile device based at least in part on the second sensor signal; and

transmitting a first data signal to a second mobile device, the first data signal comprising data associated with the user interaction and the movement of the first mobile device; and

determining a haptic effect based at least in part on the first data signal and outputting the haptic effect.

16. (Original) The method of claim 15, wherein the touch-sensitive interface comprises a touch-screen display.

FITBIT 1002
Fitbit v. Immersion

17. (Original) The method of claim 15, wherein the determining a change in the display of the first mobile device and the transmitting a data signal to a second mobile device occur substantially simultaneously.

18. (Original) The method of claim 15, wherein the change in the display of the first mobile device comprises displaying a trail substantially following the location of a point of contact between the user and the device.

19. (Original) The method of claim 15, wherein the movement of the first mobile device comprises a movement substantially approximating a pouring gesture.

20. (Original) The method of claim 19, wherein the change in the display comprises displaying a champagne bottle.

21. (Original) The method of claim 15, further comprising:

receiving a second data signal from the second mobile device;

determining a second change in the display of the first mobile device based at least in part on the second data signal.

22. (Original) The method of claim 21, wherein the second data signal comprises data corresponding to a display of the second mobile device.

FITBIT 1002
Fitbit v. Immersion

23. (Original) The method of claim 21, wherein the change in the display of the first mobile device comprises outputting an image substantially the same as the display of the second mobile device.

24. (Original) The method of claim 21, further comprising:

determining a haptic effect based at least in part on the second data signal; and

transmitting a haptic signal associated with the haptic effect to an actuator configured to output the haptic effect.

25. (Original) The method of claim 24, wherein the haptic effect comprises a haptic effect approximating a champagne cork popping.

26. (Original) The method of claim 24, wherein the haptic effect comprises a haptic effect approximating a collision between a user of the first mobile device and a user of the second mobile device.

27. (Currently Amended) A system comprising:

a processor configured to:

receive a first sensor signal from a first sensor, the first sensor configured to detect a movement of a first mobile device;

receive a second sensor signal from a second sensor, the second sensor configured to detect an interaction with the first mobile device;

receive a first data signal from a network interface, the network interface configured to receive signals transmitted by a second mobile device;

FITBIT 1002
Fitbit v. Immersion

determine a change in a display signal based at least in part on the first data signal and the second sensor signal; and

determine a haptic effect based at least in part on the first data signal; and

outputting the haptic effect.

28. (Original) The system of claim 27, wherein the first sensor and the second sensor are each configured to detect one or more of: contact, pressure, acceleration, inclination, inertia, or location.

29. (Original) The system of claim 27, wherein the second sensor comprises a touch-screen.

30. (Original) The system of claim 27, wherein the mobile device further comprises a speaker configured to generate a sound effect coordinated with the haptic effect.

31. (Original) The system of claim 27, wherein the processor is further configured to transmit a second data signal to the network interface, and the network interface is further configured to transmit the second data signal to the second mobile device.

FITBIT 1002
Fitbit v. Immersion

REMARKS

I. General

This paper is filed in response to the Non-Final Office Action mailed on June 15, 2012. The Office Action rejects all pending claims, specifically, the Office Action rejects claims 1-31 as allegedly anticipated under 35 USC 102(b) by U.S. 6,573,883 to Bartlett ("Bartlett").

In light of the amendments and remarks herein, Applicants respectfully request reconsideration and allowance of all pending claims.

II. Claim Amendments

This paper amends claims 1, 15, and 27 to recite in part limitations similar to "determining a haptic effect based at least in part on the first data signal and outputting the haptic effect." Support for this amendment may be found at least at the claims as filed and paragraph [0051] of the Specification as filed. thus this amendment adds no new matter.

III. 35 USC 102 – Claims 1-31

As an initial matter, Applicants respectfully note that the rejection of claims 1-26 is improper. With regard to these claims, the Office Action states only that "[r]egarding claims 1-16: method claims (1-26) are considered met when the apparatus of Bartlett is been implemented." Office Action, p. 3. Applicants respectfully note that this is an improper omnibus rejection under MPEP § 707.07(d). Applicants respectfully request that any future rejection be fully and clearly stated in order to give Applicants the opportunity to fully respond to the rejection.

The Office Action rejects claims 1-31 as allegedly anticipated under 35 USC 102 by Bartlett. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." MPEP § 2131, quoting *Verdegaal Bros. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed.

FITBIT 1002
Fitbit v. Immersion

Cir. 1987). Applicants respectfully assert that the Office Action has failed to establish that Bartlett discloses each and every limitation of claims 1-31.

With regard to claim 27, Applicants respectfully note that Bartlett does not disclose or suggest a processor configured to "determine a haptic effect based at least in part on the first data signal and outputting the haptic effect." Applicants respectfully note that in the rejection of claim 27 the Office Action cites Bartlett col. 6:27-36. Applicants respectfully note that this passage of Bartlett discloses:

> The display device 700 is used to observe images that are stored in a database. Scrolling position commands are used to scroll from image to image displayed on a display screen 710 until an image of interest is found. A gesture command then activates the displayed image for more detailed viewing. Additional gesture commands serve to "zoom" in to observe the selected image in greater detail or to zoom out to observe a greater portion of the image or the entire image. Position commands, again, serve to scroll the image across the display screen 710.
>
> Bartlett col. 6:27-36

Applicants respectfully note that this does not disclose or suggest a haptic effect. Rather, it discloses a visual effect (e.g. images) and scrolling to view this visual effect. But nowhere does this section of Bartlett disclose a haptic effect. Furthermore, the remainder of Bartlett does not cure this deficiency. Finally, Applicants respectfully note that, as described in the specification at paragraph [0051], a haptic effect is output by, for example, one or more actuators 118.

Accordingly, Applicants respectfully request withdrawal of the 35 USC 102 rejection of claim 27. Applicants further request withdrawal of the 35 USC 102 rejections of claims 28-31, which depend from and further limit claim 27, and are thus allowable for at least the same reasons as claim 27.

Applicants respectfully request withdrawal of the 35 USC 102 rejection of claim 1, which Applicants have amended to recite a similar limitation to that recited by claim 27. Accordingly, Applicants respectfully assert claim 1 is allowable for at least the same reasons as claim 27. Applicants further request withdrawal of the 35 USC 102 rejections of claims 2-14, which depend from and further limit claim 1, and are thus allowable for at least the same reasons as claim 1.

FITBIT 1002
Fitbit v. Immersion

Applicants respectfully request withdrawal of the 35 USC 102 rejection of claim 15, which Applicants have amended to recite a similar limitation to that recited by claim 27. Accordingly, Applicants respectfully assert claim 15 is allowable for at least the same reasons as claim 27. Applicants further request withdrawal of the 35 USC 102 rejections of claims 16-26, which depend from and further limit claim 15, and are thus allowable for at least the same reasons as claim 15.

IV. Prior Art Made of Record and Not Relied Upon

At page 3, the Office Action lists references which were made of record and not relied upon. Applicants respectfully traverse the characterization and relevance of these references as prior art or otherwise, and respectfully reserves the right to present such arguments and other material should the Examiner maintain rejection of Applicants' claims, based upon the references made of record and not relied upon or otherwise.

CONCLUSION

Applicants respectfully assert that in view of the amendments and remarks above, all pending claims are allowable and Applicants respectfully request the allowance of all claims.

Should the Examiner have any comments, questions, or suggestions of a nature necessary to expedite the prosecution of the application, or to place the case in condition for allowance, the Examiner is courteously requested to telephone the undersigned at the number listed below.

Respectfully submitted,

Date: 9/17/2012

Michael Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7391 (voice)
(336) 734-2756 (fax)

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	13768086
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Dee Jones
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	17-SEP-2012
Filing Date:	14-JUL-2009
Time Stamp:	17:52:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	IMM351Transmittal.pdf	44094	no	2

Warnings:	
Information:	

FITBIT 1002
Fitbit v. Immersion

2	Amendment/Req. Reconsideration-After Non-Final Reject	IMM351Response.pdf	343435 21c0de12d3b416e4f10aa0711eb0e0199e380ceb	no	10

Warnings:	
Information:	
Total Files Size (in bytes):	387529

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	)	
	)	Conf No.: 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2627
Serial No. 12/502,702	)	
	)	Examiner: **Wong, Kin C.**
Filed: July 14, 2009	)	
	)	

For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Transmittal; and
2. Amendment and Response to Non-Final Office Action.

Shown below are the fees for the presentation of the amended claims:

	Claims Remaining	Highest # Previously Paid For	Extra	Rate	Fee
TOTAL	31	31	0	$ 60	$ 0
Ind. Cls.	3	3	0	$250	$ 0
Multiple Dependent Claim Added..... NO					
				TOTAL	$ 0

US2008 3830587 1

FITBIT 1002
Fitbit v. Immersion

The Commissioner is hereby authorized to charge any additional fees required by this action, or credit any overpayment, to Deposit Account Number 20-1430.

Respectfully submitted,

Date: 9/17/2012

Michael T. Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing
I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web on September 17, 2012

Dee Jones

PTO/SB/06 (07-06)
Approved for use through 1/31/2007. OMB 0651-0032
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PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	To be Mailed
12/502,702	07/14/2009	☐

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	x $ =		OR	x $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	x $ =			x $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

AMENDMENT 09/17/2012	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)	OR	OTHER THAN SMALL ENTITY RATE ($)	ADDITIONAL FEE ($)
Total (37 CFR 1.16(i))	* 31	Minus	** 31	= 0	x $ =		OR	x $50=	0
Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	x $ =		OR	x $250=	0
☐ Application Size Fee (37 CFR 1.16(s))									
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
					TOTAL ADDT'L FEE		OR	TOTAL ADDT'L FEE	0

AMENDMENT		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x $ =		OR	x $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x $ =		OR	x $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADDT'L FEE		OR	TOTAL ADDT'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/MARGARET BYARS/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2689
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (51851/378598)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number: Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20050184696	08-25-2005	Anastas et al.	
	2.	20050218867	09-29-2005	Mirnat et al.	
	3.	20070242056	10-18-2007	Engelhardt et al.	
	4.	20090167701	07-02-2009	Ronkainen	
	5.	6,800,824	10-12-2004	Enlibbe et al.	
	6.	7,191,191	03-13-2007	Peurach et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
						X

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	7.	Office Action mailed September 11, 2012 for corresponding United States Application Serial No. 12/502,758	

Examiner Signature		Date Considered	

FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Renee Prevette
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt	
EFS ID:	13916348
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	05-OCT-2012
Filing Date:	14-JUL-2009
Time Stamp:	10:41:45
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	13129
Deposit Account	201430
Authorized User	KILPATRICK TOWNSEND & STOCKTON, LLP

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

FITBIT 1002
Fitbit v. Immersion

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	IDSTransmittal.pdf	35721	no	1
Warnings:					
Information:					
2	Transmittal Letter	IDSLetter.pdf	199213	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	PTOSB08.pdf	54086	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Non Patent Literature	IMM3130Amailed91112.pdf	21087857	no	19
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	30865	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	21407842		

FITBIT 1002
Fitbit v. Immersion

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	Conf. No.: 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2627
Serial No. 12/502,702	)	
	)	Examiner: **Wong, Kin C.**
Filed: July 14, 2009	)	
	)	

For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Information Disclosure Statement;
2. Information Disclosure Statement by Applicant (Form PTO/SB/08);
3. One (1) Non-patent Literature Reference; and
4. EFS-Web Payment in the amount of $180.00.

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 20-1430.

Respectfully submitted,

Date: 10/4/2012

Michael T. Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing
I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web on October 5, 2012.

Renée S. Prevette

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	Conf No.: 6699
Serial No. 12/502,702	Art Unit: 2627
Filed: July 14, 2009	Examiner: Wong, Kin C.
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	
Attorney Ref. IMM351 (51851/378586)	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

FITBIT 1002
Fitbit v. Immersion

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☒ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

FITBIT 1002
Fitbit v. Immersion

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☒ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 20-1430.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 20-1430 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 10/4/2012

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):

- ☒ PTO/SB/08
- ☒ Documents
- ☒ Fee
- ☐ Other

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2689
Examiner Name	Wong, Kin C
Attorney Docket Number	IMM351 (51851/378596)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20070152984	07-05-2007	Ording et al	
	2.	20060020843	01-26-2006	Wojnicki	
	3.	20090100384	04-16-2009	Louch	
	4.	20090309825	12-17-2009	Sobegren et al	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.*	Foreign Patent Document Country Code[2] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[1]
						X

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	5.	Office Action mailed September 25, 2012 for corresponding United States Application Serial No. 12/697,030.	

Examiner Signature		Date Considered	

FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Renee Prevette
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	14041497
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	22-OCT-2012
Filing Date:	14-JUL-2009
Time Stamp:	14:35:15
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	1002
Deposit Account	201430
Authorized User	KILPATRICK TOWNSEND & STOCKTON, LLP

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

FITBIT 1002
Fitbit v. Immersion

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	IDSTransmittal.pdf	37356	no	1
Warnings:					
Information:					
2	Transmittal Letter	IDSLetter.pdf	207583	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	PTOSB08.pdf	60736	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Non Patent Literature	IMM341OAmailed9262012.pdf	21812195	no	23
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	30365	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	22148235		

FITBIT 1002
Fitbit v. Immersion

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	Conf. No.: 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2689
Serial No. 12/502,702	)	
	)	Examiner: **Wong, Kin C.**
Filed: July 14, 2009	)	
	)	

For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Information Disclosure Statement;
2. Information Disclosure Statement by Applicant (Form PTO/SB/08);
3. One (1) Non-patent Literature Reference; and
4. EFS-Web Payment in the amount of $180.00.

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 20-1430.

Respectfully submitted,

Date: 10/18/2012

Michael T. Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing
I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web on October 22, 2012.

Renée S. Prevette

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M Birnbaum et al.	)	
	)	Conf No.: 6699
Serial No. 12/502,702	)	
	)	Art Unit: 2689
Filed: July 14, 2009	)	
	)	Examiner: Wong, Kin C.
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	)	
Attorney Ref. IMM351 (51851/378586)	)	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

FITBIT 1002
Fitbit v. Immersion

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☒ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS:

FITBIT 1002
Fitbit v. Immersion

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☒ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 20-1430.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 20-1430 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 10/19/12

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):

- ☒ PTO/SB/08
- ☒ Documents
- ☒ Fee
- ☐ Other

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
12/502,702	07/14/2009	David Birnbaum	IMM351 (51851/P7836US0)	6619

3430 1590 11/13/2012

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
WONG, KIN C	

ART UNIT	PAPER NUMBER
2628	

MAIL DATE	DELIVERY MODE
11/13/2012	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	12/502,702	BIRNBAUM ET AL.	
	Examiner	Art Unit	
	K. Wong	2688	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 September 2012*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-31* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-31* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

4) ☐ Other: _____.

FITBIT 1002
Fitbit v. Immersion

This is a response to amendment filed on 9/17/12.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

FITBIT 1002
Fitbit v. Immersion

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims (1-31) are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims (1-29) of copending Application No. 12/502755 (submitted by applicant in IDS {8/10/12}). Although the conflicting claims are not identical, they are not patentably distinct from each other because of variation of wordings (i.e., claims (1, 2 and 10) of 12/502702 vs. claims (1, 4 and 7) of co-pending 12/502755).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims (1-31) are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims (1-23) of copending Application No. 12/502647 (submitted by applicant in IDS). Although the conflicting claims are not identical, they are not patentably distinct from each other because of variation of wordings (i.e., claims (1,2, 5 and 10) vs. claims (1-4) of copending 12/502647).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

FITBIT 1002
Fitbit v. Immersion

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims (1-31) are rejected under 35 U.S.C. 102(b) as being anticipated by Bartlett (6573883).

Regarding claim 27: Bartlett discloses a system (as depicted in figure 5 of Bartlett and see associated descriptions for details) including:

a processor (col. 4, lines 46-63 of Bartlett) configured to:

receive a first sensor signal from a first sensor, the first sensor configured to detect a movement of a first mobile device (col. 6, lines 19-26 of Bartlett);

receive a second sensor signal from a second sensor, the second sensor configured to detect an interaction with the first mobile device (col. 6, lines 19-26 of Bartlett);

receive a first data signal from a network interface, the network interface configured to receive signals transmitted by a second mobile device (col. 6, lines 37-46 of Bartlett);

determine a change in a display signal based at least in part on the first data signal and the second sensor signal (col. 6, lines 19-36 of Bartlett);

determine a haptic (sensing user touch or physical contact interface) effect based at least in part on the first data signal (col. 6, lines 27-36 of Bartlett); and

FITBIT 1002
Fitbit v. Immersion

outputting the haptic effect (as illustrated in figures 5 and 6 of Bartlett and see associated descriptions for details).

Regarding claim 28: Bartlett teaches that wherein the first sensor and the second sensor are each configured to detect one or more of: contact, pressure, acceleration, inclination, inertia, or location (col. 6, lines 19-26 of Bartlett).

Regarding claim 29: the limitations of wherein the second sensor comprises a touch-screen are considered inherent because in col. 1, lines 30-62 and col. 5, lines 5-21 of Bartlett where Bartlett describes the function of a touch display unit.

Regarding claim 30: the limitations of wherein the mobile device further comprises a speaker configured to generate a sound effect coordinated with the haptic effect are considered inherent because in col. 5, lines 5-21 of Bartlett where Bartlett describes the highlighting of the haptic effect that which includes audio (sound) and visual.

Regarding claim 31: Bartlett teaches that wherein the processor is further configured to transmit a second data signal to the network interface, and the network interface is further configured to transmit the second data signal (dialing and/or texting) to the second mobile device (col. 6, lines 37-46 of Bartlett).

Regarding claims 1-16: method claims (1-26) are considered met when the apparatus of Bartlett is been implemented.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

FITBIT 1002
Fitbit v. Immersion

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims (10, 16 and 29) are rejected under 35 U.S.C. 103(a) as being unpatentable over Bartlett (6573883) in view of Cho et al (8306576).

The reason for Bartlett is stated in above. If Bartlett does not have the touch screen, then, Cho et al is considered for teaching the touch screen (col. 5, lines 32-36 of Cho et al).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the touch screen into Bartlett and as taught by Cho et al. The rationale is as follow: one of ordinary skill in the art would have been motivated to provide a user of easy or recognition of variations of display images and sense of touch as suggested in col. 1, lines 48-52 of Cho et al.

Response to Arguments

Applicant's arguments filed 9/17/12 have been fully considered but they are not fully persuasive because the arguments are directed to the new amended claims.

Regarding to Bartlett: applicant asserted that Bartlett fails to disclose the touch sensing; and thus, further asserted that Bartlett fails to have the haptic effect. Applicant is directed to figure 5 of Bartlett and the associated descriptions for details.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

FITBIT 1002
Fitbit v. Immersion

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Cho et al (8306756) could be read in claims (col. 1, lines 46-67 of Cho et al). but not used as a stand-alone office action because of the redundancy and the broadest interpretation of the claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to K. Wong whose telephone number is (571)272-7566.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, W. Young can be reached on (571) 272-7582. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

FITBIT 1002
Fitbit v. Immersion

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. Wong/
Primary Examiner
Art Unit 2688

kw
10 Nov 12

FITBIT 1002
Fitbit v. Immersion

Notice of References Cited	Application/Control No. 12/502,702	Applicant(s)/Patent Under Reexamination BIRNBAUM ET AL.	
	Examiner K. Wong	Art Unit 2698	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-8,306,576	11-2012	Cho et al.	455/567
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2627
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (51851/378588)

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number: Number - Kind Code[2] (if known)	Publication Date: MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date: MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
						X

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	1.	BROWN, L.M. and WILLIAMSON, J., "Shake2Talk: Multimodal Messaging for Interpersonal Communication," Oakley, I. and Brewster, S. (eds), HAID 2007, LNCS 4813, pp. 44-55	
	2.	POUPYREV, I. et al., "Ambient Touch: Designing Tactile Interfaces for Handheld Devices," (group ivan@csl.sony.co.jp, shigeaki.maruyama@jp.sony.com http://www.csl.sony.co.jp/IML	
	3.	SMITH, J. et al. "Communicating emotion through a haptic link: Design space and methodology." Int. J. Human-Computer Studies. 2007, 65:376-387	
	4.	SNIBBE, S.S. et al. "Haptic Techniques for Media Control," Proceedings of 14th Annual ACM Symposium on User Interface Software and Technology, Orlando, Florida, November 2001.	
	5.	VERPLANK, B. et al. "THE PLANK: Designing a simple haptic controller." Proceedings of the Conference on New Instruments for Musical Expression, Dublin, Ireland, May 24-26, 2002	
	6.	United States Patent and Trademark Office, Office Action, Application No. 12/502,755 mailed April 25, 2012	
	7.	United States Patent and Trademark Office, Office Action, Application No. 12/502,547, mailed December 12, 2011.	
	8.	United States Patent and Trademark Office, Office Action, Application No. 12/502,705 mailed March 3, 2012	
	9.	United States Patent and Trademark Office, Office Action, Application No. 12/502,780, mailed October 5, 2011	

Examiner Signature	/K. Wong/	Date Considered	11/10/2012

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.W./

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2689
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (51851/378598)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number: Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20050184696	08-25-2005	Anastas et al.	
	2.	20050218867	09-29-2005	Mirnat et al.	
	3.	20070242056	10-18-2007	Engelhardt et al.	
	4.	20090167701	07-02-2009	Ronkainen	
	5.	6,800,824	10-12-2004	Entibe et al.	
	6.	7,181,191	02-13-2007	Peurach et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
						X

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[7]
	7.	Office Action mailed September 11, 2012 for corresponding United States Application Serial No. 12/502,758	

Examiner Signature	/K Wong/	Date Considered	11/15/2012

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.W./

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2689
Examiner Name	Wong, Kin C
Attorney Docket Number	IMM351 (51851/378596)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number: Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	20070152984	07-05-2007	Ording et al	
	2.	20080020843	01-24-2008	Walmsley	
	3.	20090100384	04-16-2009	Louch	
	4.	20090309825	12-17-2009	Sobegren et al	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.*	Foreign Patent Document: Country Code[2] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[1]
						X

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	5.	Office Action mailed September 25, 2012 for corresponding United States Application Serial No. 12/697,030.	

Examiner Signature	/K. Wong/	Date Considered	11/19/2012

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.W./

FITBIT 1002
Fitbit v. Immersion

Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination	
	12/502,702	BIRNBAUM ET AL	
	Examiner	Art Unit	
	K. Wong	2688	

SEARCHED			
Class	Subclass	Date	Examiner

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
See East search history report	11/10/2012	KW

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	686	(touch near2 (screen or display)) and (gui) and (haptic) and (haptic near3 (effect or feedback)) and (accelerat$4)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/11/10 15:20
L2	676	(touch near2 (screen or display)) and (gui) and (haptic) and (haptic near3 (effect or feedback)) and (accelerat$4) and (sensor)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/11/10 15:20
L3	643	(touch near2 (screen or display)) and (gui) and (haptic) and (haptic near3 (effect or feedback)) and (accelerat$4) and (sensor) and (speaker)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/11/10 15:21
L4	75	(touch near2 (screen or display)) and (gui) and (haptic) and (haptic near3 (effect or feedback)) and (accelerat$4) and (sensor) and (speaker) and (sound effect)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/11/10 15:21
L5	11	(touch near2 (screen or display)) and (gui) and (haptic) and (haptic near3 (effect or feedback)) and (accelerat$4) and (sensor) and ((sound effect) near3 haptic)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/11/10 15:22

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	11	(touch near2 (screen or display)) and (gui) and (haptic) and (haptic near3 (effect or feedback)) and (accelerat$4) and (sensor) and ((sound effect) near3 haptic)	US-PGPUB; USPAT; UPAD	NEAR	ON	2012/11/10 15:22

11/10/2012 3:23:18 PM

FITBIT 1002
Fitbit v. Immersion

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	3	(touch near2 (screen or display)) and (gui) and (haptic) and (haptic near3 (effect or feedback)) and (accelerat$4) and (sensor) and (interactive near3 icon)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/11/10 16:15
L2	3	(screen or display)and (gui and (haptic) and (haptic near3 (effect or feedback)) and (accelerat$4) and (sensor) and (interactive near3 icon)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2012/11/10 16:17

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L3	3	(screen or display)and (gui) and (haptic) and (haptic near3 (effect or feedback)) and (accelerat$4) and (sensor) and (interactive near3 icon)	US-PGPUB; USPAT; USPAD	NEAR	ON	2012/11/10 16:17

11/10/2012 4:17:34 PM

FITBIT 1002
Fitbit v. Immersion

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12502702	BIRNBAUM ET AL.
	Examiner	Art Unit
	K WONG	2627

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	+	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	06/03/2012	11/10/2012							
	1	✓	✓							
	2	✓	✓							
	3	✓	✓							
	4	✓	✓							
	5	✓	✓							
	6	✓	✓							
	7	✓	✓							
	8	✓	✓							
	9	✓	✓							
	10	✓	✓							
	11	✓	✓							
	12	✓	✓							
	13	✓	✓							
	14	✓	✓							
	15	✓	✓							
	16	✓	✓							
	17	✓	✓							
	18	✓	✓							
	19	✓	✓							
	20	✓	✓							
	21	✓	✓							
	22	✓	✓							
	23	✓	✓							
	24	✓	✓							
	25	✓	✓							
	26	✓	✓							
	27	✓	✓							
	28	✓	✓							
	29	✓	✓							
	30	✓	✓							
	31	✓	✓							

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete If Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M Birnbaum
Art Unit	2688
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (51851/378586)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number — Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	2005/0179617	08-18-2005	Matsui et al.	
	2.	2006/0279542	12-14-2006	Flack et al.	
	3.	2007/0247442	10-25-2007	Andre et al.	
	4.	2008/0300055	12-04-2008	Lutnick et al.	
	5.	5,666,499	09-09-1997	Baudel et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Foreign Patent Document — Country Code[3] - number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	6	International Search Report and Written Opinion mailed March 23, 2010 for corresponding International Patent Application PCT/US2010/022928.	
	7.	International Preliminary Report on Patentability mailed August 11, 2011 for corresponding International Patent Application PCT/US2010/022928.	
	8.	International Preliminary Report on Patentability mailed January 27, 2011 for corresponding International Patent Application PCT/US2009/050569.	
	9.	International Preliminary Report on Patentability mailed January 27, 2011 for corresponding International Patent Application PCT/US2009/050564.	
	10.	International Preliminary Report on Patentability mailed January 27, 2011 for corresponding International Patent Application PCT/US2009/050574.	
	11.	International Preliminary Report on Patentability mailed January 27, 2011 for corresponding International Patent Application PCT/US2009/050537.	

Examiner Signature		Date Considered	

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: STEVEN GARDNER
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference: IMM344PCT	Date of mailing (day/month/year): 23 MAR 2010
International application No: PCT/US2010/022528	FOR FURTHER ACTION: See paragraphs 1 and 4 below
Applicant: IMMERSION CORPORATION	International filing date (day/month/year): 29 January 2010

1 ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes, 1211 Geneva 20, Switzerland, Facsimile No.: +41 22 338 82 70

For more detailed instructions, see the notes on the accompanying sheet.

2 ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3 ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the complete file for review by the review body constituted by the Assembly of the International Patent Organization.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4 Reminders

Shortly after the expiration of 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination may be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise, the applicant must, within 20 months from the priority date, perform the acts required to enter the national phase before those designated Offices.

In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/ISA/220 and, for details about the applicable time limits, Office by Office, see the PCT Applicant's Guide, Volume II, National Chapters and the WIPO publication.

Name and mailing address of the ISA/US: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450, Facsimile No. 571-273-3201	Authorized officer: Brahm R. Copenheaver, Telephone No. 571-272-7774

Form PCT/ISA/220 (January 2004) (See over and accompanying sheet)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference: IMM344/PCT	FOR FURTHER ACTION	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
International application No: PCT/US2010/022528	International filing date (day/month/year): 29 January 2010	(Earliest) Priority Date (day/month/year): 29 January 2009
Applicant: IMMERSION CORPORATION		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☐ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. ☐ This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. ☐ Certain claims were found unsearchable (see Box No. II).

3. ☐ Unity of invention is lacking (see Box No. III).

4. With regard to the title,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

a. The figure of the drawings to be published with the abstract is Figure No. 1

☒ as suggested by the applicant.

☐ as selected by this Authority, because the applicant failed to suggest a figure.

☐ as selected by this Authority, because this figure better characterizes the invention.

b. ☐ none of the figures is to be published with the abstract.

Form PCT/ISA/210 (first sheet) (July 2009)

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2010/022078

A. CLASSIFICATION OF SUBJECT MATTER
IPC(8) - G06F 3/041 (2010.01)
USPC - 345/173
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
IPC(8) - G06F 3/041 (2010.01)
USPC - 345/173

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase; Google Patents

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ... Y	US 2008/0309634 A1 (HOTELLING et al) 04 December 2008 (04.12.2008) entire document	12-15, 17 ... 1-11, 16
X ... Y	US 2007/0152984 A1 (ORDING et al) 05 July 2007 (05.07.2007) entire document	18, 19 ... 20
Y	US 2006/0197753 A1 (HOTELLING) 07 September 2006 (07.09.2006) entire document	1-11
Y	US 2005/0179617 A1 (MATSUO et al) 18 August 2005 (18.08.2005) entire document	16, 20
Y	US 5,666,499 A (BAKER et al) 09 September 1997 (09.09.1997) entire document	2
Y	US 2007/0247442 A1 (ANDRE et al) 25 October 2007 (25.10.2007) entire document	20

Further documents are listed in the continuation of Box C.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search
10 March 2010

Date of mailing of the international search report
23 MAR 2010

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

Authorized officer:
Blaine R. Copenheaver
PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774

Form PCT/ISA/210 (second sheet) (July 2009)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: STEVEN GARDNER
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing (day/month/year): 23 MAR 2010

Applicant's or agent's file reference: IMM341PCT

FOR FURTHER ACTION: See paragraph 2 below

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2010/022429	29 January 2010	29 January 2009

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - G06F 3/041 (2010.01)
USPC - 345/173

Applicant: IMMERSION CORPORATION

1. This opinion contains indications relating to the following items:

- [X] Box No. I — Basis of the opinion
- [ ] Box No. II — Priority
- [ ] Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV — Lack of unity of invention
- [X] Box No. V — Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI — Certain documents cited
- [ ] Box No. VII — Certain defects in the international application
- [ ] Box No. VIII — Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer:
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	10 March 2010	Blaine R. Copenheaver PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (July 2009)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No: PCT/US2010/022656

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:

☒ the international application in the language in which it was filed.

☐ a translation of the international application into [illegible] which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a)).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:

a (means)

☐ on paper

☐ in electronic form.

b (time)

☐ in the international application as filed

☐ together with the international application in electronic form

☐ subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Form PCT/ISA/237 (Box No. I) (July 2009)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2009/000000

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Statement

Novelty (N)	Claims	1-11, 16, 18, 20	YES
	Claims	12-15, 17, 19	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	None	NO

2 Citations and explanations

Claims 12-15 and 17 are not novel under PCT Article 33(2) as being anticipated by Ording.

Regarding claim 12, a user device (para. 0011, network) comprising: a sensor device (light sensor, para. 0015-0016, motion sensor, accelerometer, para. 0016) configured to receive a sensor signal (para. 0016, motion sensor); determine a command (para. 0025) associated with the graphical user interface based upon, (para. 0026, graphical user interface ("GUI"), para. 0028, GUI, para. 0029, at least in part, on the determined orientation a function to be executed based, at least in part, on the command (para. 0030-0031, portrait view and landscape orientation, para. 0029), command(s) executed (para. 0029, in-flight actions).

Regarding claim 13, (could disclose the method of claim 12, wherein the graphical user interface comprises a virtual physical space (para. 0048, virtual reality environment, para. 0027) virtual game space 51, the

Regarding claim 14, (could disclose the method of claim 13 wherein the virtual physical space comprises a first virtual physical space (para. 0048, virtual reality environment, para. 0027) virtual game space 51, the graphical user interface comprises a first graphical user interface (para. 0018, graphical user interface ("GUI")), and processor is further configured to receive a signal from a second device (Fig. 1, 24 second user input device 18) configured to manipulate the second device to the first virtual physical space (para. 0758, multiple users may access the first person cyber-physical system. the second device comprising a second graphical user interface corresponding a second virtual physical space (para. 0787, second gaming system) connect the first virtual physical space to the second virtual physical space (para. 0787, first gaming system is connected with second gaming system) based on a second user input (para. 0788, second detect signal; para. 0804, the second sensor signal indicating a second movement of the device (para. 0218, motion sensor para. 0488), and determine an interaction between the first graphical user interface (para. 0418, graphical user interface ("GUI")) and the second virtual physical space (para. 0787, first gaming system is connected with second gaming system) based on the second movement (para. 0748, motion sensor, para. 0804).

Regarding claim 15, (could disclose the method of claim 14, wherein the command comprises a selection of a virtual physical object (para. 0788, selection of objects within the second virtual physical space (para. 0787, second gaming system).

Regarding claim 17, (could disclose the method of claim 14 wherein the function comprises a view switch to view the contents of a virtual physical object (para. 0788, present information corresponding to gaming activities, para. 0837, para. 0841, para. 0834)

Claim 18 is/are novel under PCT Article 33(2) as being anticipated by Ording et al., hereinafter referred to as Ording.

Regarding claim 18, Ording discloses A system (para. 0036, portable multifunction device (fig. 1, 100), depicts a device with a touchpad, a touch-sensitive display disclosed in the following text. 2021, the touch-sensitive display ("GUI") configured to display a graphical user interface (para. 0029, GUI interfaces with a display) comprising a plurality of symptoms arranged on the sensor (fig. 3, depicts a volume control dial on the face of a watch, para. 0004, stop wheels used to adjust the volumes, depict a first contact and a second contact with the touch-sensitive display (para. 0041, one or more processing with the display system) generate a first input signal based on the first contact (para. 0011, adjust the parameter based on the numbers) and a second input signal based on the second contact (para. 0041, adjust the parameter based on the second contact) a processor (para. 0037, processor) disposed in the housing and in communication with the touch-sensitive display (para. 0011), the processor configured to receive the first input signal from the touch-sensitive display, the first input signal comprising a first parameter associated with the first contact (para. 0011, adjusting a first parameter corresponding to the first contact) from a plurality of commands associated with a graphical user interface (para. 0037, displaying the value of the parameter being adjusted), whereas the plurality of commands comprising the value (displays and adjusting the value) counterbalance (para. 0039, if the graphical object 302 is almost then the user can place one or more fingers along the circumference of the displayed image a rotating or rotating motion in a clockwise or counterclockwise direction to adjust the parameter), receive the second input signal from the touch-sensitive display, the second input signal comprising a second parameter associated with the second contact (para. 0041, displaying a function (e.g. the selected) based on the second command (para. 0011, displaying options associated with second contact), and execute the function (para. 0011, making adjustment accordingly to second location).

Form PCT/ISA/237 (Box No. V) (July 2009)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2010/022525

Box No. II

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Claims 1-3, 6-8, and 11 lack an inventive step under PCT Article 33(3) as being obvious over Ludwick et al. hereinafter referred to as Ludwick, in view of Flack et al., hereinafter referred to as Flack.

Regarding claim 1, Ludwick discloses a device (para. 0003, device comprising a housing; para. 0024, housing configured to be grasped by a user; para. 0062, user holds; a display disposed on the housing (para. 0027, display). The display is configured to display a graphical user interface (para. 0018, graphical user interface ("GUI"); para. 0456, GUI; para. 0488, GUI; a sensor (para. 0053, sensor), the sensor configured to detect a movement of the housing in a degree of freedom (para. 0060, movement of device; para. 0063, movement of wristband detected by sensor); a processor disposed in the housing (para. 0238, processor) and in communication with the display (para. 0237, display) and the sensor (para. 0060, the processor (para. 0244) configured to receive a sensor signal from the sensor (para. 0215; 0216, sensor signal received), the sensor signal comprising a parameter associated with the movement (para. 0219, sensor signal comprises a command (para. 0221) associated with the graphical user interface (para. 0519, graphical user interface ("GUI"); para. 0488, GUI; para. 0489, GUI), at least in part, on the parameter; determine a characteristic to be associated based, at least in part, on the movement (para. 0253-0254, random game and determine actions, and execute the function (para. 0221, commands used in game; para. 0235, using screen, but a function of the particulars of a sensor disposed in the housing).
However, Flack in discussing cellular phones and mobile devices with motion driven control (like) displays a device disposed on a charging (fig. 4, item 116, motion sensors; para. 0088). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the aforementioned improvements of Flack with the device of Ludwick for the purpose of sensing motion of a mobile device initiated by a user (Abstract – Flack).

Regarding claim 2, Ludwick in view of Flack discloses the device of claim 1, Ludwick further discloses wherein the graphical user interface comprises a virtual physical space (para. 0040, virtual reality environment; para. 0039, virtual game space 3).

Regarding claim 4, Ludwick in view of Flack discloses the device of claim 3, Ludwick further discloses wherein the virtual physical space comprises a plurality of virtual physical objects (para. 0284, objects in the graphical environment; para. 0256, computer generated objects).

Regarding claim 5, Ludwick in view of Flack discloses the device of claim 3, but Ludwick is silent on wherein the virtual physical space comprises a two-dimensional virtual physical space.
However, Flack in discussing cellular phones and mobile devices with motion driven control (like) discloses a two-dimensional virtual physical space (para. 0088, 2-D display) (Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the aforementioned improvements of Flack with the device of Ludwick for the purpose of sensing motion of a mobile device initiated by a user (Abstract – Flack).

Regarding claim 6, Ludwick in view of Flack discloses the device of claim 3, further wherein displaying the virtual physical space comprises a three-dimensional virtual physical space (para. 0079, three-dimensional space).

Regarding claim 7, Ludwick in view of Flack discloses the device of claim 1, further comprising an actuator (para. 0241, actuator) and wherein the processor (para. 0244), is further configured to generate an actuator signal based on the movement and to output the actuator signal to the actuator to cause the actuator to output a haptic effect (para. 0243, para. 0284, tactile feedback).

Regarding claim 8, Ludwick in view of Flack discloses the device of claim 3, further wherein displaying the virtual physical space comprises a first virtual physical space (para. 0040, virtual reality environment, para. 0576, virtual game space 9); the graphical user interface comprises a first graphical user interface (para. 0519, graphical user interface ("GUI")), and processor is further configured to receive a signal from a second device (fig. 1, 18 second user with device 19); establishing a request to connect the second device to the first virtual physical space (para. 0797, multiple users may access the first gaming system (virtual space)), the second device executing a second graphical user interface comprising a second virtual physical space (para. 0797, second gaming system) connect the first virtual physical space to the second virtual physical space (para. 0797, first gaming system is in communication with second gaming system), receive a second sensor signal from the second device (para. 0179, second sensor signal; para. 0484, the second sensor signal indicating a physical orientation of the device (para. 0219, Another device, item 0884)); and determine an interaction between the first graphical user interface (para. 0519, graphical user interface ("GUI")) and the second virtual physical space (para. 0797, first gaming system is in communication with second gaming system) based on the second movement (para. 0235, motion sensor; para. 0884)

Regarding claim 11, Ludwick in view of Flack discloses the device of claim 8, Ludwick further discloses wherein the computer comprises a display of a virtual physical object (para. 0788, plasma or display within the virtual physical space (para. 0797, virtual gaming system)).

Regarding claim 12, Ludwick in view of Flack discloses the device of claim 8, Ludwick further discloses wherein the function comprises a view function to view the contents of a virtual physical object (para. 0788, present information corresponding to gaming activities; para. 0837; para. 0841; para. 0834).

Form PCT/ISA/237 (Supplemental Box) (July 2009)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2010/000

Supplemental Box

In view of the reasons given in the preceding box no international search report will be established.

Claim 1 lacks an inventive step under PCT Article 33(3) as being obvious over Lutnick in view of Rekimoto further view of Beeck et al. Reasonable reasons listed in the Remarks.

Regarding claim 2, Lutnick in view of Rekimoto discloses the claims of claim 1, but does not explicitly disclose wherein the graphical user interface comprises a gear shift pattern and a gear shift knob. The gear shift knob corresponds with the gear shift pattern.
However, Beeck in discussing computer-based graphical interfaces with touch sensitive displays discloses a graphical user interface (GUI) comprises a gear shift pattern and a gear shift knob (col. 2, ln. 8-15, "gear shift" pattern using pointer device), the gear shift knob movable with in a gear shift pattern (col. 1, ln. 2-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the aforementioned improvements of Beeck for the purpose of providing enhanced user interactivity (col. 1, ln. 5-8 - Beeck).

Claim 3 lacks an inventive step under PCT Article 33(3) as being obvious over Lutnick in view of Rekimoto et al. Reasonable reasons listed in the Remarks.

Regarding claim 3, Lutnick in view of Rekimoto discloses the claims of claim 2, further wherein the graphical user interface comprises a copy function (para. 0390, copy function), but Lutnick is silent on to move the virtual physical object from the second virtual physical space to the first virtual physical space, or to copy the visual physical object from the second virtual physical space to the first virtual physical space.
However, Wakita in discussing a mixed reality space image generation method and mixed reality system (title) discloses copying a virtual physical object from one virtual physical space to another virtual physical space (para. 0011-0013). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the aforementioned improvements of Wakita for the purpose of generating a mixed reality space image by superimposing a virtual space image onto a real space image (para. 0001 - Wakita).

Claim 4 lacks an inventive step under PCT Article 33(3) as being obvious over Lutnick in view of Wakita.

Regarding claim 4, Lutnick discloses the method of claim 3, further wherein the graphical user interface comprises a move function or a copy function (para. 0390, copy function), but Lutnick is silent on to move the virtual physical object from the second virtual physical space to the first virtual physical space, or to copy the visual physical object from the second virtual physical space to the first virtual physical space.
However, Wakita in discussing a mixed reality space image generation method and mixed reality system (title) discloses copying a virtual physical object from one virtual physical space to another virtual physical space (para. 0011-0013). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the aforementioned improvements of Wakita for the purpose of generating a mixed reality space image by superimposing a virtual space image onto a real space image (para. 0001 - Wakita).

Claim 10 lacks an inventive step under PCT Article 33(3) as being obvious over Cutting.

Regarding claim 10, Cutting discloses a system (abst. 3D display system) comprising: a housing (fig. 1, 105, objects a device within a housing); a touch-sensitive display disposed in the housing (102, 280, the touch-sensitive display (102) configured for display a graphical user interface (para. 0038, GUI interface within a display comprising a first viewing of a simulated depth dimension (para. 0041-0042, graphics module 838 includes various known software components for rendering, animating and displaying graphical objects on a display surface); select a first contact and a second contact with the touch-sensitive display (para. 0041, one or more contacts with the display surface); generate a first signal based on the first contact (para. 0011, adjust the parameter based on first contact); and a second signal based on the second contact (para. 0011, adjust the parameter based on the second contact); a processor (fig. 1, 100, processor) disposed in the housing and in communication with the touch-sensitive display (para. 0007, the processor configured for receive the user input signal from the touch-sensitive display, the first input signal comprising a first gesture associated with the first contact (para. 0011, determine a first characteristic of a plurality of gestures associated with a graphical user interface based on the gesture; para. 0007, determine the value of the parameter being adjusted), wherein the gesture comprises scrolling in a first direction along the displayed depth dimension (para. 0048, scrolling para. 0063-0065, graphics module 838 includes various known software components for rendering, animating and displaying graphical objects on a display surface); receive the second input signal from the touch-sensitive display, the second input signal comprising a second parameter associated with the second contact (para. 0041); determine a function to be performed based on the second characteristic (para. 0011, detecting motion associated with second contact, and controls the function (para. 0011, making adjustment according to second motion), but is silent on and simulating in a second direction along the simulated depth dimension.
However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform scrolling of a second direction (para. 0048, scrolling of opposite direction) based on the first scrolling direction, but in which only explicit details are set, for the purpose of allowing multiple selections of operations.

Form PCT/ISA/237 (Supplemental Box) (July 2009)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2010/022539

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of

Claim 20 lacks an inventive step under PCT Article 33(3) as being obvious over Ording in view of Andre et al., hereinafter referred to as Andre

Regarding claim 20, Ording discloses a system (para. 0002, entire) comprising a housing (Fig. 1, 100, device 2 enclosed within a housing), a touch-sensitive display disposed in the housing (Fig. 2(A), the touch-sensitive display (102) configured to display a graphical user interface (para. 0029, GUI) interface within a display comprising a viewing perimeter (para. 0061-0062, graphics module 4(3) includes various known software components for rendering, animating and displaying graphical objects on a display surface); detect a first contact and a second contact with the touch-sensitive display (para. 0041, one or more contacts with the display surface), generate a first input signal based on the first contact (para. 0041, adjust the parameter based on first contact) and a second input signal based on the second contact (para. 0041, adjust the parameter based on the second contact), wherein the first contact and the second contact are detected simultaneously (para. 0007, gesture) disposed in the housing and communicated with the touch-sensitive display (para. 0007), the processor configured to: receive the first input signal from the touch-sensitive display, the first input signal comprising a first parameter associated with the first contact (para. 0041), identify a plurality of objects based on the first parameter (para. 0217, determine the value of the parameter being adjusted), receive the second input signal from the touch-sensitive display, the second input signal comprising a second parameter associated with the second contact (para. 0041), determine a function to be executed based on the second command (para. 0041, detecting motion associated with second contact), and execute the function (para. 0041, during adjustment operation is detected motion), that is operable to determine at least partial on the first parameter.

However, Andre is discussing activating virtual keys of a touch-screen virtual keyboard (title), displays determining a letter based on the first parameter (para. 0008-0009; para. 0(g)). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the aforementioned improvements of Andre with the system of Ording for the purpose of selling a virtual keyboard (para. 0008 – Andre).

Claims 1-19 do not appear to violate any of PCT Article 33(1-4), and must have industrial applicability because the subject matter claimed can be made or used in industry.

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FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

GARDNER, Steven
Kilpatrick Stockton LLP
1001 West Fourth Street
Winston-Salem, North Carolina 27101
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year)
11 August 2011 (11.08.2011)

Applicant's or agent's file reference
IMM341PCT

IMPORTANT NOTICE

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2010/022928	29 January 2010 (29.01.2010)	29 January 2009 (29.01.2009)

Applicant
IMMERSION CORPORATION et al

The International Bureau transmits herewith a copy of the International preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

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Form PCT/IB/326 (January 2004)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference IMM341PCT	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2010/022528	International filing date (day/month/year) 29 January 2010 (29.01.2010)	Priority date (day/month/year) 29 January 2009 (29.01.2009)
International Patent Classification (IPC) (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant IMMERSION CORPORATION		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- [X] Box No. I — Basis of the report
- [ ] Box No. II — Priority
- [ ] Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV — Lack of unity of invention
- [X] Box No. V — Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI — Certain documents cited
- [ ] Box No. VII — Certain defects in the international application
- [ ] Box No. VIII — Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2) before the expiration of 30 months from the priority date (Rule 44bis.2).

	Date of issuance of this report 02 August 2011 (02.08.2011)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Beate Giffo-Schmitt e-mail: pt01.pct@wipo.int

Form PCT/IB/373 (January 2004)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: STEVEN GARDNER
KILPATRICK STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing (day/month/year)	23 MAR 2010

Applicant's or agent's file reference	FOR FURTHER ACTION
IMM344PCT	See paragraph 2 below

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2010/022528	29 January 2010	29 January 2009

International Patent Classification (IPC) or both national classification and IPC
IPC(8) - G06F 3/041 (2010.01)
USPC - 345/173

Applicant IMMERSION CORPORATION

1 This opinion contains indications relating to the following items:

- [X] Box No. I Basis of the opinion
- [ ] Box No. II Priority
- [ ] Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV Lack of unity of invention
- [X] Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI Certain documents cited
- [ ] Box No. VII Certain defects in the international application
- [ ] Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of the International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/US	Date of completion of this opinion	Authorized officer
Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-3201	10 March 2010	Name: R. Depumpong PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774

Form PCT/ISA/237 (cover sheet) (July 2009)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No. PCT/US2010/022528

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:
   - [X] the international application in the language in which it was filed.
   - [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. [ ] This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a)).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of a sequence listing filed or furnished:
   a (Copies)
   - [ ] on paper:
   - [ ] in electronic form

   b (Time)
   - [ ] in the international application as filed;
   - [ ] together with the international application in electronic form;
   - [ ] subsequently to this Authority for the purposes of search.

4. [ ] In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

Form PCT/ISA/237 (Box No. I) (July 2009)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2010/022528

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-11, 15, 16, 20	YES
	Claims	12-14, 17, 18	NO
Inventive step (IS)	Claims	None	YES
	Claims	1-20	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	None	NO

2. Citations and explanations

Claims 12-18 and 1-11 lack novelty under PCT Article 33(2) as being anticipated by Lynch.

Regarding claim 12, Lynch discloses a method (para. 0011, method) comprising: receive a sensor signal over the sensor (para. 0216-0218, motion sensor network, the sensor signal comprising a parameter associated with the movement (para. 0218, motion sensor) determine a command (para. 0221) associated with the graphical user interface object (para. 0219, graphical user interface ("GUI"); para. 0458, GUI; para. 0460, GUI), at least in part, on the parameter; determine a location in the simulated space, at least in part, on the command (para. 0223-0228, conduct game and determine action), and execute the function (para. 0227, commands used to game, para. 0460, using action)

Regarding claim 13, Lynch discloses the method of claim 12, wherein the graphical user interface comprises a virtual physical space (para. 0848, virtual reality environment; para. 0878, Virtual Game Space 8).

Regarding claim 14, Lynch discloses the method of claim 13, wherein the virtual physical space comprises a first virtual physical object (para. 0848, virtual reality environment; para. 0878, virtual game space 8); the graphical user interface comprises a first graphical user interface (para. 0219, graphical user interface ("GUI")), and processor is further configured by: receive a signal from a second device (fig. 1, M second user with device 15) indicating a request to connect the second device to the first virtual physical space (para. 0247, multiple users may access the first gaming system (virtual space)), the second device executing a second graphical user interface comprising a second virtual physical space (para. 0747, second gaming system); connect the first virtual physical space to the second virtual physical space (para. 0747, first gaming system is in communication with second gaming system), receive a second device signal from the second device (para. 0219, second sensor signal; para. 0884), the second sensor signal indicating a second movement of the device (para. 0216, motion sensor; para. 0884); and determine an interaction between the first graphical user interface (para. 0219, graphical user interface ("GUI")) and the second virtual graphical device (para. 0747, first gaming system is in communication with second gaming system) based on the second movement (para. 0218, motion sensor; para. 0884)

Regarding claim 15, Lynch discloses the method of claim 14, wherein the movement comprises a selection of a virtual physical object (para. 0748, selection of objects within the second virtual physical space (para. 0781, second gaming system).

Regarding claim 17, Lynch discloses the method of claim 14, wherein the location comprises a view function to view the contents of a virtual physical object (para. 0748, present information corresponding to gaming software; para. 0807; para. 0841; para. 0834)

Claim 18 lacks novelty under PCT Article 33(2) as being anticipated by Ording et al., hereinafter referred to as Ording.

Regarding claim 18, Ording discloses a system (para. 0009, system) comprising: a housing (fig. 1, 100, depicts a device with a housing); a touch-sensitive display disposed in the housing (102, 202, the multi-touch sensitive display (102) configured to: display a graphical user interface (para. 0009, GUI (user interface within a display) comprising a wheel having a plurality of locations arranged on the wheel (fig. 3, display a virtual control 309 in the form of a wheel, para. 0098, click-wheel used to adjust the volume), detect a first contact and a second contact with the touch-sensitive display (para. 0011, one or more contacts with the display surface), generate a first input signal based on the first contact (para. 0011, adjust the parameter based on the sensed contact) and a second input signal based on the second contact (para. 0011, adjust the parameter based on the sensed contact); a processor (para. 0007, processor) disposed in the housing and in communication with the touch-sensitive display (para. 0007), the processor configured to: receive the first input signal from the touch-sensitive display, the first input signal comprising a first parameter associated with the first contact (para. 0011, determine a first command from a plurality of commands associated with a graphical user interface based on the parameter (para. 0832, determine the value of the parameter being adjusted), wherein the plurality of commands comprises rotating the wheel clockwise and rotating the wheel counterclockwise (para. 0809, if the gesture object 309 is a touch that the user can place and move fingers along the circumference of the track pad (refer a rotating or rotating motion in a clockwise or counterclockwise direction to adjust the parameter); receive the second input signal from the touch-sensitive display, the second input signal comprising a second parameter associated with the second contact (para. 0011); determine a function to be executed based on the second command (para. 0011, detecting motion associated with second contact), and execute the function (para. 0011, making adjustment corresponding to second motion).

Form PCT/ISA/237 (Box No. V) (July 2009)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US2010/022528

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of

Claims 1-3, 6, and 11 lack an inventive step under PCT Article 33(3) as being obvious over Lutnick et al., hereinafter referred to as Lutnick, in view of Flack et al., hereinafter referred to as Flack.

Regarding claim 1, Lutnick discloses a device (para. 0005, device) comprising a housing (para. 0034, housing) configured to be grasped by a user (para. 0402, handheld); a display disposed in the housing (para. 0027, display), the display configured to display a graphical user interface (para. 0046, graphical user interface ("GUI"); para. 0430, GUI; para. 0460, GUI); a sensor (para. 0053, sensor), the sensor configured to detect a movement of the housing in a degree of freedom space (para. 0054, movement or device; para. 0053, movement of validated detected by sensor); a processor disposed in the housing (para. 0029, processor) and in communication with the display (para. 0027, display) and the sensor (para. 0053), the processor (para. 0214) configured to: receive a sensor signal from the sensor (para. 0214-0218, motion sensor) received, the sensor signal comprising a parameter associated with the movement (para. 0218, motion sensor); determine a converged space (0221) associated with the graphical user interface based (para. 0214, graphical user interface ("GUI"); para. 0446, GUI; para. 0460, GUI); at least in part, on the parameter; determine a function to be executed based, at least in part, on the command (para. 0202-0204, sensor data and determine which the function (para. 0201, workflow used in game; para. 0223, taking action), but is silent on the particulars of a sensor disposed in the housing
However, Flack, in disclosing cellular phones and mobile devices with motion sensor devices (title) discloses a sensor disposed in a housing (fig. 4, item 118, motion sensor; para. 0039). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the aforementioned improvements of Flack with the device of Lutnick for the purpose of tracking motion of a mobile device utilized by a user (Abstract - Flack).

Regarding claim 2, Lutnick in view of Flack discloses the device of claim 1, Lutnick further discloses wherein the graphical user interface comprises a virtual physical space (para. 0040, virtual reality environment; para. 0578, virtual game space 6).

Regarding claim 3, Lutnick in view of Flack discloses the device of claim 2, Lutnick further discloses wherein the virtual physical space comprises a plurality of virtual physical objects (para. 0084, objects in the graphical environment; para. 0208, computer generated objects).

Regarding claim 5, Lutnick in view of Flack discloses the device of claim 3, but Lutnick is silent on wherein the virtual physical space comprises a two-dimensional virtual physical space.
However, Flack, in disclosing cellular phones and mobile devices with motion sensor devices (title) discloses a two-dimensional virtual physical space (para. 0052, 2-D object viewing). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the aforementioned improvements of Flack with the device of Lutnick by the purpose of tracking motion of a mobile device utilized by a user (Abstract - Flack).

Regarding claim 6, Lutnick in view of Flack discloses the device of claim 5, Lutnick further discloses wherein the virtual physical space comprises a three-dimensional virtual physical space (para. 0579, three-dimensional space).

Regarding claim 7, Lutnick in view of Flack discloses the device of claim 1, Lutnick further discloses generating an actuator (para. 0241, vibrator) and wherein the processor (para. 0214), processor) is further configured to generate an actuator signal based on the movement and to output the actuator signal to the actuator to cause the actuator to output a haptic effect (para. 0218; para. 0854, haptic feedback).

Regarding claim 8, Lutnick in view of Flack, discloses the device of claim 3, Lutnick further discloses wherein the virtual physical space comprises a first graphical user interface (para. 0040, virtual reality environment; para. 0578, virtual game space 6), the graphical user interface comprises a first graphical user interface (para. 0214, graphical user interface ("GUI"), and processor is further configured to: receive a signal from a second device (fig. 1, F4 second user with device 12) indicating a request to connect the second device to the first virtual physical space (para. 0167, multiple users may access the first gaming system (virtual space)), the second device executing a second graphical user interface comprising a second virtual physical space (para. 0167, second gaming system) second the first virtual physical space to the second virtual physical space (para. 0167, first gaming system is in communication with second gaming system); receive a second sensor signal from the sensor (para. 0179, second sensor signal data 0884), the second sensor signal indicating a second movement of the device (para. 0214, motion sensor; para. 0884), and determine an interaction between the first graphical user interface (para. 0446, graphical user interface ("GUI"), and the second virtual physical space (para. 0167, first gaming system is in communication with second gaming system) based on the second movement (para. 0218, motion sensor; para. 0884).

Regarding claim 9, Lutnick in view of Flack discloses the device of claim 8, Lutnick further discloses selection (or grouping) comprises a selection of a virtual graphical object (para. 0760, selection of objects) within the second virtual physical space (para. 0167, second gaming system).

Regarding claim 11, Lutnick in view of Flack discloses the device of claim 8, Lutnick further discloses wherein the location comprises a view location to view the contents of a virtual physical object (para. 0760, present information corresponding to gaming activities; para. 0827; para. 0841; para. 0856).

Form PCT/ISA/237 (Supplemental Box) (July 2009)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No. PCT/US2010/022528

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of

Claim 1 lacks an inventive step under PCT Article 33(3) as being obvious over Lynch in view of Flank in view of Bauder et al., hereinafter referred to as Bauder.

Regarding claim 2, Lynch in view of Flank discloses the device of claim 1, but Lynch is silent on wherein the graphical user interface comprises a gear shift pattern and a gear shift knob, the gear shift knob movable within the gear shift pattern.
However, Bauder in discussing prior art teaches graphical interfaces with new content (like) displays a graphical user interface (120) comprises a gear shift pattern and a gear shift knob (col. 7, ln. 8-15, "gear-shift" pattern using pointer device), the gear shift knob movable within a gear shift pattern (col. 7, ln. 2-15). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention as appreciate the aforementioned improvements as taught by the purpose of providing enhanced user interfaces (col. 1, ln. 54 - Bauder).

Claim 10 lacks an inventive step under PCT Article 33(3) as being obvious over Lynch in view of Flank in view of Isaac et al., hereinafter referred to as Isaac.

Regarding claim 10, Lynch discloses the device of claim 8. Lynch further discloses wherein the function comprises a move function or a copy function (para. 0080, copy function), but Lynch is silent on copying the virtual physical object from the second virtual physical space to the first virtual physical location in copying the virtual physical object from the second virtual physical object to the first virtual physical space.
However, Isaac in discussing a mixed reality space image generation method and mixed reality system (title) discloses copying a virtual physical object from one virtual physical space to another virtual physical space (paras. 0011-0013). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the aforementioned improvements of Isaac for the purpose of generating a mixed reality space image by superimposing a virtual space image onto a real space image (para. 0005 - Isaac).

Claim 18 lacks an inventive step under PCT Article 33(3) as being obvious over Lynch in view of Isaac.

Regarding claim 18, Lynch discloses the method of claim 16, wherein further discloses wherein the function comprises a move function or a copy function (para. 0080, copy function), but Lynch is silent on to copy the virtual physical object from the second virtual physical space to the first virtual physical space or to copy the virtual physical object from the second virtual physical space to the first virtual physical space.
However, Isaac in discussing a mixed reality space image generation method and mixed reality system (title) discloses copying a virtual physical object from one virtual physical space to another virtual physical space (paras. 0011-0013). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the aforementioned improvements of Isaac for the purpose of generating a mixed reality space image by superimposing a virtual space image onto a real space image (para. 0005 - Isaac).

Claim 19 lacks an inventive step under PCT Article 33(3) as being obvious over Lynch.

Regarding claim 19, Lynch discloses a system (para. 0025, system) comprising: a housing (fig. 1, 100) display a device with a touchpad, a touch-sensitive display (depicted in the housing (102, 202). the touch-sensitive display (102) configured to display a graphical user interface (para. 0025, GUI interface) while displaying a first perspective in a simulated depth dimension (para. 0081-0082, graphics module 328 includes various known software components for rendering, animating and displaying graphical objects on a display surface); detect a first contact and a second contact with the touch-sensitive display (para. 0041, one or more contacts with the display surface), generate a first input signal based on the first contact (para. 0011, adjust the parameter based on first contact) and a second input signal based on the second contact (para. 0011, adjust the parameter based on the second contact); a processor (para. 0002, processor) displayed in the housing and in communication with the touch-sensitive display (para. 0097), the processor configured to: receive the first input signal from the touch-sensitive display, the first input signal comprising a first parameter associated with the first contact (para. 0011); determine a first command (para. 0011, adjust the parameter based on the second contact); a processor (para. 0002, processor) displayed in the housing and in communication with the touch-sensitive display (para. 0097), the processor configured to: receive the first input signal from the touch-sensitive display, the first input signal comprising a first parameter associated with the first contact (para. 0011); determine a first command (para. 0011, adjust the parameter based on the first contact); determine a plurality of commands associated with a graphical user interface based on the parameter (para. 0037, determine the value of the parameter being adjusted), wherein the plurality of commands comprises scrolling in a first direction along the simulated depth dimension (para. 0086, scrolling; para. 0081-0082, graphics module 328 includes various known software components for rendering, animating and displaying graphical objects on a display surface); receive the second input signal from the touch-sensitive display, the second input signal comprising a second parameter associated with the second contact (para. 0041); determine a function to be executed based on the second command (para. 0011, decoding motion associated with second contact), and execute the function (para. 0011, making adjustment corresponding to second command), such as also performing in a second direction along the displayed depth dimension.
However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to perform scrolling of a device in a second direction, since mere duplication of essential working parts/steps involves only routine skill in the art, for the purpose of allowing multiple selections of parameters.

Form PCT/ISA/237 (Supplemental Box) (July 2009)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No PCT/US2010/022628

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.
Continuation of:

Claim 30 lacks an inventive step under PCT Article 33(3) as being obvious over Cieplinski in view of Ando et al., hereinafter referred to as Ando

Regarding claim 30, Cieplinski discloses a system (para. 0026, system) comprising: a housing (fig. 1, 150, depicts a device with a housing); a touch-sensitive display disposed in the housing (102, 202, the touch-sensitive display (102) configured to display a graphical user interface (para. 0026, GUI interacts with a display comprising a drawing pad (para. 0031-0034), graphics module (28) includes various known software components for rendering, animating and displaying graphical objects on a display surface), coupled a first actuator and a second actuator with the touch-sensitive display (para. 0041, one or more contacts with the display surface), generate a first touch signal based on the first contact (para. 0041, output the parameter based on first contact) and a second touch signal based on the second contact (para. 0041, adjust the parameter based on the second contact), processor (para. 0027, processor) disposed in the housing and in communication with the touch-sensitive display (para. 0027), the processor configured to: receive the first touch signal from the touch-sensitive display, the first touch signal corresponding to a first parameter associated with the first contact (para. 0041); identify a plurality of objects based on the first parameter (para. 0037, determine the value of the parameter being adjusted); receive the second touch signal from the touch-sensitive display, the second touch signal corresponding to a second parameter associated with the second contact (para. 0041); determine a location in the selected based on the second command (para. 0041, detecting motion associated with related contact), and execute the function (para. 0041, making adjustment according to second contact), but is silent on determining a tactile based on the first parameter.
However, Ando in disclosing accessing virtual keys of a touch-sensor virtual keyboard (tap) caching determining a tactile based on the first parameter (para. 0005-0007, para. 0023). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the aforementioned improvements of Ando with the system of Cieplinski for the purpose of utilizing a virtual keyboard (para. 0008 – Ando).

Claims 1-29 meet the criteria set out in PCT Article 33(4) and have been found industrial applicability because the subject matter claimed can be made or used in industry.

Form PCT/ISA/237 (Supplemental Box) (July 2009)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

PCT/US2009/050569

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To

GARDNER, Steven
Kilpatrick Stockton LLP
1001 West Fourth Street
Winston-Salem, North Carolina 27101
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year)
27 January 2011 (27.01.2011)

Applicant's or agent's file reference
IMM351/PCT

IMPORTANT NOTICE

International application No.
PCT/US2009/050569

International filing date (day/month/year)
14 July 2009 (14.07.2009)

Priority date (day/month/year)
15 July 2008 (15.07.2008)

Applicant
IMMERSION CORPORATION et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

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Form PCT/IB/326 (January 2004)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference IMM351 PCT	FOR FURTHER ACTION	See Para 4 below
International application No PCT/US2009/050068	International filing date (day/month/year) 14 July 2009 (14.07.2009)	Priority date (day/month/year) 15 July 2008 (15.07.2008)
International Patent Classification (IPC) See relevant information in Form PCT/IB/373		
Applicant IMMERSION CORPORATION		

1 This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44bis.1(a).

2 This REPORT consists of a total of 10 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

1. This report contains indications relating to the following items:

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☒	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis.2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Date of mailing of this report 10 January 2011 (10.01.2011) Authorized officer Simin Baharlou e-mail: pt01.pct@wipo.int

Form PCT/IB/373 (January 2004)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2009/050589	14.07.2009	15.07.2008

International Patent Classification (IPC) or both national classification and IPC
INV. H04M1/725 G06F3/01 G06F3/048

Applicant
IMMERSION CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than the one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 ter that written opinions of the International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of the opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax +49 89 2399 - 4465	see form PCT/ISA/210	Köhn, Andreas Telephone No. +49 89 2399-[illegible]

Form PCT/ISA/237 (Cover Sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2009/050569

Box No. 1 Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any nucleotide and/or amino acid sequences disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing:

      ☐ contained in the international application as filed.

      ☐ filed together with the international application in electronic form.

      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

FITBIT 1002
Fitbit v. Immersion

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit,

   ☑ paid additional fees

   ☐ paid additional fees under protest and, where applicable, the protest fee

   ☐ paid additional fees under protest but the applicable protest fee was not paid

   ☐ not paid additional fees

2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees

3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is

   ☐ complied with

   ☒ not complied with for the following reasons:

   see separate sheet

4. Consequently, this report has been established in respect of the following parts of the international application:

   ☒ all parts.

   ☐ the parts relating to claims Nos. 1-31

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	4, 7-8, 10-11, 13, 15-31
	No:	Claims	1-2, 5-6, 9, 12, 14
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-31
Industrial applicability (IA)	Yes:	Claims	1-31
	No:	Claims	

2. Citations and explanations

see separate sheet

Form PCT/ISA/237 (April 2007)

FITBIT 1002
Fitbit v. Immersion

Box No. VI Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item I.

In the following opinion the reasoning is done with regard to **claims 1-31**.

Re Item IV.

1 **Lack of Unity**

1.1 The application does not meet the requirements of Rule 13.1 PCT with respect to unity of the invention for the reasons given in the following.

1.2 The technical features in **claims 1-31** can be assigned to the following separate so-called inventions:

1.2.1 **Invention 1 (claims 1-14)** directed towards a method of displaying a message in a user interface of a mobile device (essentially) comprising:
(i) receiving a sensor signal from a sensor of a mobile device, the sensor signal associated with a movement of the mobile device; and
(ii) determining a message to be displayed in a user interface based on the sensor signal and causing the message to be displayed.

1.2.2 **Invention 2 (claims 15-26)** directed towards a method of movement-based communication between mobile devices (essentially) comprising:
(i) receiving a sensor signal from a sensor of a first mobile device, the sensor signal associated with a movement of the first mobile device; and
(iii) transmitting a data signal to a second mobile device, the data signal comprising data associated with the movement of the first mobile device.

1.2.3 **Invention 3 (claims 27-31)** directed towards a system of visually and haptically supported collaboration with mobile devices (essentially) comprising:
(i) receiving a first sensor signal from a first sensor of a first mobile device, the first sensor signal associated with a movement of the first mobile device;
(iv) determining a change in a display signal based on a second sensor signal associated with an interaction with the first mobile device and a first data signal received from a second mobile device, and determining a haptic effect based on the first data signal.

1.2.4 The so- called **inventions 1-3** have in common the technical feature (i). However, this feature is already known from prior art document **D5** (US 2006/0181510 A1), which discloses an intuitive motion-based user interface for controlling a hand-held device (see D5 [0008] and [0024]-[0030] with Fig. 3).
The additional features (ii)- (iv) contained in inventions 1-3 are special technical features representing the contribution over the prior art of D5.
No technical relationship can be found between these additional technical features contained in each of said inventions. Moreover, the features (ii)- (iv)

FITBIT 1002
Fitbit v. Immersion

are directed towards solving different problems, namely: starting from D5 the problem to be solved by invention 1 is to enhance the hand-held device of D5 by an intuitive message selection function. The problem to be solved by the second invention is to enhance the teaching of D5 by motion- based communication between hand-held devices, whilst the third invention aims to improve the functionality of the hand-held device of D5 by the possibility of synchronous collaboration with other hand-held devices.

1.2.5 Following the reasoning above regarding inventions 1-3, there is no single general inventive concept underlying the entire group of claims of the present application as required Rule 13(1) PCT.

Re Item V.

2 **Prior Art**

2.1 Reference is made to the following documents:

D1: US 2006/279476 A1 (OBATA HITOSHI [JP]) 14 December 2006 (2006-12-14)

D2: FR 2 910 160 A1 (FRANCE TELECOM [FR]) 20 June 2008 (2008-06-20)

D3: US 2007/139366 A1 (DUNKO GREGORY A [US] ET AL) 21 June 2007 (2007-06-21)

D4: GB 2 416 962 A (VODAFONE PLC [GB]) 8 February 2006 (2006-02-08)

D5: US 2006/181510 A1 (FAITH JOE [GB]) 17 August 2006 (2006-08-17)

D6: US 2003/063128 A1 (SALMIMAA MARJA [FI] ET AL SALMIMAA MARJA [FI] ET AL) 3 April 2003 (2003-04-03)

D7: US 2007/066283 A1 (HAAR ROB V D [FI] ET AL) 22 March 2007 (2007-03-22)

D8: WO 2006/103853 A (FUJITSU LTD [JP]; MARVIT DAVID L [US]; ADLER B THOMAS [US]; MATSUMOTO) 3 November 2005 (2005-11-03)

D9: US 2006/256074 A1 (KRUM DAVID M [US] ET AL) 16 November 2006 (2006-11-16)

3 **Clarity**

3.1 The application does not meet the requirements of Article 6 PCT, because **claims 1, 2, 15, 18, 20, 23, 24, 27, and 30** are not clear as detailed in the following.

FITBIT 1002
Fitbit v. Immersion

3.2 The expression "determining a message to be displayed in a user interface based at least in part on the at least one sensor signal (associated with a movement of the mobile device)" (portion in parentheses added) renders independent claim 1 unclear for two reasons. Firstly, the term "message" appears to be inconsistent with the terminology "virtual message object" used in the description (cf. page 23, line 33 - page 24, line 4). Secondly, the specification leaves the reader in doubt as to where the "message" is displayed, i.e. whether it is displayed in a user interface of the mobile device sensing said movement or in the user interface of another device (e.g. after transmission of corresponding data from the moved mobile device to a connected receiving device). However, from the description at page 23, line 29 - page 24, line 25 it can be understood that a "virtual message object" is determined to be displayed in the user interface of the mobile device which senses the corresponding movement.
Accordingly, for the analysis of novelty and inventive step, the subject-matter of claim 1 will be interpreted in light of the description.

3.3 Independent claim 15 is unclear as it is obscure to which extend the steps of "receiving a first sensor signal from a first sensor" and "receiving a second sensor signal from a touch-sensitive interface" are related to each other. From the definition of claim 15 it appears that both steps are merely co-located and do not have any relation. Hence, the analysis of novelty and inventive step of the subject-matter of claim 15 will be based on this interpretation.

3.4 Likewise, the objection set-out in paragraph 3.3 applies to independent claim 27. In particular, claim 27 specifies "receive a first sensor signal from a first sensor" without defining which action or output is based on said first sensor signal. Thus, the reader is left in doubt about the significance of the first sensor signal with respect to the operation of the claimed system.

3.5 Further, claim 27 is rendered unclear by the definition "receive a second sensor signal from a second sensor, the second sensor configured to detect an interaction with the first mobile device" (emphasis added) as its scope appears to be broader than justified by the description and drawings from which it can be understood that the second sensor signal is generated by a touch-sensitive interface of the first mobile device (see page 33, lines 10-11 with Fig. 18).
Accordingly, assessment of novelty and inventive step of claim 27 will be accomplished in light of the description and drawings.

3.6 Moreover, claim 27 is unclear as it uses the expression "the data signal" which lacks an antecedent.

3.7 Dependent claim 2 is unclear as the reader has to doubt that "a movement of the mobile device" may be determined by means of a "touch-sensitive input device" as specified in claim 2.

FITBIT 1002
Fitbit v. Immersion

3.8 The expression "following the location of a point of contact between the user and the device" (emphasis added) renders dependent claim 18 unclear as the reader has to doubt that any contact between the user and the (first mobile) device may be indicated in the display of the first mobile device. Rather, it appears that the trail displayed in the display of the first mobile device follows the location of a point of contact between the user and the touch-sensitive interface of the first mobile device.

3.9 Dependent claim 20, which directly refers to claim 19, is unclear as its specification suggests that "displaying a champagne bottle" occurs exclusively in response to the movement of the first mobile device approximating a pouring gesture. This interpretation seems to be supported by the description (cf. page 28, lines 9-14) which discloses the display of a champagne bottle in response to the sensed tilting of a mobile device. However, this interpretation contravenes the definition of claim 1 according to which the change in a display is based on the second sensor signal.

3.10 The expression "wherein the change in the display" (emphasis added) renders dependent claim 23 unclear as it appears, in the context of claim 21 to which claim 23 refers, that the additional subject-matter of claim 23 rather relates to the "second change in the display" which is based on the second data signal.

3.11 The specification of dependent claim 24 is unclear as it leaves the reader in doubt about the device (i.e. the first mobile device or the second mobile device) which determines and outputs the haptic effect. However, in light of the superordinate claims it appears that claim 24 refers to the first mobile device. Hence, it seems that the haptic effect is determined at the first mobile device and the actuator configured to output this haptic effect is comprised in said first mobile device.

3.12 Dependent claim 30 is unclear as it uses the expression "the mobile device" which lacks an antecedent.

3.13 The above-mentioned lack of clarity notwithstanding, and for the sake of efficiency of the procedure, a preliminary opinion regarding novelty and inventive step is given for all claims.

4 Novelty - Independent Claims

4.1 The present application does not meet the requirements of Article 33(1) PCT because the subject-matter of independent claim 1 (interpreted broadly and in the light of the description) is not new within the meaning of Article 33(2) PCT.

4.2 Document D1 discloses the subject-matter of claim 1 as follows (the references in parentheses applying to this document):

A method comprising:
- receiving at least one sensor signal from at least one sensor of a mobile device, the at least one sensor signal associated with a movement of the mobile device (see [0014] and [0018], lines 1-10 as well as claim 6 with Figs. 1a and 1b);
- determining a message to be displayed in a user interface based at least in part on the at least one sensor signal (see [0019] and [0021], lines 1-12); and
- causing the message to be displayed (see [0028], lines 3-9).

5 Novelty - Dependent Claims

5.1 Dependent **claims 2, 3, 5, 6, 9, 12, and 14** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (Article 33 (2) PCT), and therefore the criteria of Article 33(1) PCT are not fulfilled.

5.2 Document D1 discloses all features of **dependent claims 2, 3, 5, 6, 9, 12, and 14** as follows:
- claims 2 and 3: see D1 [0018], lines 1-10 and claim 6
- claims 5 and 6: see D1 [0019] and [0021], lines 1-12 with Fig. 4b
- claims 9 and 12: see D1 [0015], lines 1-6 and [0018] 22-25 as well as [0038], lines 7-11, *message generation according to D1 consist of two interchangeable steps: message composition and selection of the composer state; each step falls within the scope of the wording "a user interaction associated with the message"*
- claim 14: see D1 [0037], lines 13-20.

6 Inventive Step - Independent Claims

6.1 The subject - matter of **claims 15 and 27** does not involve an inventive step within the meaning of Article 33 (3) PCT, and therefore the requirements of Article 33(1) PCT are not met.

6.2 Document D2 is considered to be the closest prior art to the subject - matter of independent **claim 15** and discloses (the references in parentheses applying to this document):

A method comprising:
- receiving a second sensor signal from a touch-sensitive interface of a first mobile device, the second sensor signal associated with a user interaction (see page 2, lines 22-24 and page 4, lines 1-10 with Fig. 1);
- determining a change in a display of the first mobile device based at least in part on the second sensor signal (see page 4, lines 11-12 and page 5, lines 33-36 with Fig. 2); and

FITBIT 1002
Fitbit v. Immersion

- transmitting a first data signal to a second mobile device, the first data signal comprising data associated with the user interaction (see claim 3 and page 6, lines 23-27 with Fig. 2).

6.2.1 The subject-matter of claim 15 differs from the teaching known from D2 in that it additionally comprises the step of "receiving a first sensor signal from a first sensor, the first sensor signal associated with a movement of a first mobile device", wherein the first data signal is augmented by data associated with said first sensor signal.

6.2.2 The above-identified difference brings about the technical effect of enhancing the diversity of sharing information between the mobile devices of D2.

6.2.3 The problem to be solved by the distinguishing feature of claim 15 may therefore be regarded as how to modify the system of D2 in order to enhance the diversity of sharing information between the mobile devices disclosed in D2.

6.2.4 The solution proposed in claim 15 cannot be considered to support the presence of an inventive step. Confronted with the above-mentioned problem, the skilled person would search in the field of telecommunication and would find D3. D3 provides a solution to this problem by disclosing a possibility of sharing motion-related information between mobile devices. This information is generated by moving a first mobile device which in response transmits said information to a second mobile device where it is processed to produce an effect that may be observed and/or felt by a party associated with the receiving device (see D3 [0035], [0037], lines 1-11 and [0046] with Figs. 1-3). Since D3 pertains to the same technical field, it would have been obvious for the skilled person, when given the system of D2, to incorporate this teaching of D3 in the disclosure of D2, thereby arriving at the subject-matter of claim 15, and solving the posed problem.

6.2.5 Accordingly, the subject-matter of claim 15 does not involve an inventive step in view of D2 and D3.

6.3 Document D2 is considered to be the closest prior art to the subject-matter of independent claim 27 and discloses (the references in parentheses applying to this document):

A system comprising: a processor configured to:
- receive a second sensor signal from a second sensor, the second sensor configured to detect an interaction with a first mobile device (see page 2, lines 22-24 and page 4, lines 1-10 with Fig. 1);
- receive a first data signal from a network interface, the network interface configured to receive signals transmitted by a second mobile device ; and
- determine a change in a display signal based at least in part on the data signal and the second sensor signal (see claim 2, page 5, lines 33-36 and page 8, lines 23-27 with Fig. 2).

FITBIT 1002
Fitbit v. Immersion

6.3.1 The subject-matter of claim 27 differs from the teaching known from D2 in that it additionally comprises following features F1 and F2:
- F1) receive a first sensor signal from a first sensor, the first sensor configured to detect a movement of the first mobile device; and
- F2) determine a haptic effect based at least in part on the first data signal.

6.3.2 The above-identified differences bring about the following technical effects E1 and E2:
- E1) enhancement of the input diversity; and
- E2) enhancement of the user's perception of data received from a network interface.

6.3.3 The distinguishing features F1 and F2 do not achieve any technical effect in combination. Therefore, two partial problems must be identified and the problem-solution approach has to be applied to each problem independently (see PCT Guidelines Chapter 13.05 and Appendix A13.08.1).

6.3.4 The partial problems P1 and P2 to be solved by the distinguishing features F1 and F2 may be regarded as:
- P1) how to modify the system of D2 in order to enhance its input diversity; and
- P2) how to modify the system of D2 in order to enhance the user's perception of data received from a network interface.

6.3.5 The solutions proposed in claim 27 with respect to P1 and P2 cannot be considered to support the presence of an inventive step. Confronted with the above-mentioned problems P1 and P2, the skilled person would search in the field of telecommunication and find D3. D3 provides a solution to both problems by sharing motion-related data which at the receiving mobile device may result in a change of the displayed information and the output of a corresponding haptic effect (see D3 [0036], [0037], lines 1-11 and [0046] with Figs. 1-3). Since D3 pertains to the same technical field, it would have been obvious for the skilled person, when given the system of D2, to incorporate the teaching of D3 in the disclosure of D2, thereby arriving at the subject-matter of claim 27, and solving the posed problem.

6.3.6 Accordingly, the subject-matter of claim 27 does not involve an inventive step in view of D2 and D3.

6.4 For the sake of completeness, and irrespective of the inventive step objections set-out above for claims 15 and 27, it is pointed out that claims 15 and 27 are also lacking an inventive step if in view of D3 and D2 when starting from document D3 as closest prior art.

FITBIT 1002
Fitbit v. Immersion

7 **Inventive Step - Dependent Claims**

7.1 Dependent **claims 4, 7, 8, 10, 11, 13, 16-26, and 28-31** do not contain any features which, in combination with the features of any claim to which they refer, **meet** the requirements of the PCT in respect of inventive step (Article 33 (3) PCT), and therefore the criteria of Article 33(1) PCT are not fulfilled.

7.2 **D1** does not disclose the additional subject-matter of dependent **claims 4, 10, 11, and 13** which is directed towards further user interactions associated with the displayed message. However, each of the specified possibilities of interaction is merely one of several straightforward possibilities from which the skilled person would select, in accordance with circumstances, without the exercise of inventive skill. Therefore, the additional features of claims 4, 10, 11, and 13 are not considered to contribute to an inventive step over prior art D1.

7.3 **D1** discloses that by means of a composer state database (106) and composer state database manager (108) basically any input motion may be mapped to any visual, audible or tactile output (see D1 [0019] and [0023]). D1 does not disclose the particular movements and visual cues specified in dependent **claims 7 and 8**. However, the additional subject-matter of claims 7 and 8 refers to non-functional modifications of the prior art D1, and therefore is not considered to involve an inventive activity.

7.4 **All additional features of claims 15-16, 21-23, 29, and 31** are disclosed in **D2** as providing the same advantages as in the present application (see passages cited below). Therefore, the subject-matter of said claims does not involve an inventive activity.
- claims 15 and 29: see D2 page 4, line 4 and page 5, lines 26-30 with Fig. 3
- claim 17: see D2 page 6, lines 25-27
- claim 16: see D2 page 5, lines 33-36 with Fig. 2
- claims 21-23 and 31: see D2 claims 3 and 4 as well as page 6, lines 23-27 with Fig. 2

7.5 Document **D2** does not disclose the additional subject-matter of **claims 19, 24, and 28**. However, **all** additional features of said claims are disclosed in document **D3** as providing the same advantages as in the present application (see passages cited below). Therefore, the skilled person would regard it as a normal design option to include these features in the teaching of D2 in order to arrive at the subject-matter of claims 19, 24, and 28.
- claim 19: see D3 [0025], lines 5-6; *in light of the description of this application (cf. page 28, lines 10-11) tilting of a mobile device has to be interpreted as a pouring gesture*
- claim 24: see D3 [0043] and [0046]
- claim 28: see D3 [0026] (and D2 page 4, line 4)

FITBIT 1002
Fitbit v. Immersion

7.6 The additional features of **claims 20 and 25** refer to information which is solely defined by its content (cognitive content). Since these features relate exclusively to presentation of information, Rule 39.1(iii) and (v) PCT, they may not contribute to an inventive activity, see PCT Guidelines for Examination chapters 9.07 and 9.11. Accordingly, claims 20 and 25 are not considered inventive over **D2 and D3**.

7.7 The additional subject-matter of **claim 30** refers to a minor and well-known implementation detail, and hence does not support the presence of an inventive step in view of **D2 and D3**.

Re Item VII

8 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D9 is not mentioned in the description, nor are these documents identified therein.

8.1 Independent claims 1, 15, and 27 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

8.2 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING
TRANSMITTAL OF COPY OF INTERNATIONAL
PRELIMINARY REPORT ON PATENTABILITY
(CHAPTER I OF THE PATENT COOPERATION
TREATY)
(PCT Rule 44bis.1(c))

To:

GARDNER, Steven
Kilpatrick Stockton LLP
1001 West Fourth Street
Winston-Salem, NC 27101
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year)	
27 January 2011 (27.01.2011)	
Applicant's or agent's file reference	IMMERSION
080312.PCT	

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2009/050684	14 July 2009 (14.07.2009)	15 July 2008 (15.07.2008)

Applicant

IMMERSION CORPORATION et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO	Authorized officer
34, chemin des Colombettes 1211 Geneva 20, Switzerland	Sinnin Baharlou
Facsimile No. +41 22 338 82 70	e-mail: pt09.pt@wipo.int

Form PCT/IB/326 (January 2004)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference IMM312 PCT	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2009/050504	International filing date (day/month/year) 14 July 2009 (14.07.2009)	Priority date (day/month/year) 15 July 2008 (15.07.2008)
International Patent Classification (IPC) or national classification and IPC See relevant information in Form PCT/ISA/237		
Applicant IMMERSION CORPORATION		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44.1(a).

2. This REPORT consists of a total of 9 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter II applies).

3. This report contains indications relating to the following items.

☒	Box No. I	Basis of the report
☐	Box No. II	Priority
☐	Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
☐	Box No. IV	Lack of unity of invention
☒	Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
☐	Box No. VI	Certain documents cited
☒	Box No. VII	Certain defects in the international application
☐	Box No. VIII	Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices on its behalf within 30 months from the priority date (Rule 44bis.2).

	Date of issuance of this report 18 January 2011 (18.01.2011)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Simin Baharlou e-mail: pt09.pct@wipo.int

Form PCT/IB/373 (January 2004)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2009/050584	14.07.2009	15.07.2008

International Patent Classification (IPC) or both national classification and IPC
INV. H04M1/725 G06F3/01 G06F3/048

Applicant
IMMERSION CORPORATION

1 This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Kölbl, Andreas Telephone No. +49 89 2399-8492

Form PCT/ISA/237 (Cover sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2000/050564

Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a)).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ on paper

      ☐ in electronic form:

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form.

      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

FITBIT 1002
Fitbit v. Immersion

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	8-10,17-19
	No:	Claims	1-7,11-16,20-23
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-23
Industrial applicability (IA)	Yes:	Claims	1-23
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VI Certain defects in the international application

The following defects in the form or contents of the international application have been noted.

see separate sheet

FITBIT 1002
Fitbit v. Immersion

Re Item V.

1 **Prior Art**

1.1 Reference is made to the following documents:

D1: GB-A-2 416 962 (VODAFONE PLC [GB]) 8 February 2006 (2006-02-08)
D2: EP-A-1 401 185 (SAMSUNG ELECTRONICS CO LTD [KR]) 24 March 2004 (2004-03-24)
D3: WILLIAMSON J ET AL: "Shoogle, Excitatory Multimodal Interaction on Mobile Devices" 28 April 2007 (2007-04-28), CHI 2007 PROCEEDINGS - SHAKE, RATTLE & ROLL: NEW FORMS OF INPUT & OUTPUT, SAN JOSE, CA, USA, PAGE(S) 121 - 124 , XP002549378
D4: US 2002/177471 A1 (KAARESOJA TOPI [FI] ET AL) 28 November 2002 (2002-11-28)
D5: US 2007/066283 A1 (HAAR ROB V D [FI] ET AL) 22 March 2007 (2007-03-22)
D6: EP-A-1 731 993 (SONY CORP [JP]) 13 December 2006 (2006-12-13)

2 **Clarity**

2.1 The application does not meet the requirements of Article 6 PCT, because **claims 1, 8, 10-12** are not clear as detailed in the following.

2.2 The term "virtual physical parameter" (emphasis added) is unclear and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of **claim 1** unclear.
For the analysis of novelty and inventive step, the technical meaning of the above-mentioned term will be interpreted broadly such that any "parameter" will be considered as falling within the scope of said expression.

2.3 Likewise, the objection set out in paragraph 2.2 above applies to independent **claims 11 and 12** which use the term "vetual physical property".

2.4 Further, independent **claims 1, 11, and 12** are unclear as the term "virtual message

FITBIT 1002
Fitbit v. Immersion

object" (emphasis added) is vague and leaves open to which technical features it refers. However, in light of the description it appears, that a "virtual message object" refers to the representation of a message which may be created by a messaging device (cf. description at page 3, lines 16-17 or page 5, lines 1-3). Hence, for the assessment of novelty and inventive step, any representation of a message object will be considered as falling within the scope of the term "virtual message object".

2.5 Dependent **claims 8 and 10** use the expression "the virtual physical property" (emphasis added) which lacks an antecedent since the term was not introduced by claim 1 to which claims 8 and 10 refer.

2.6 The expression "receive a sensor signal from a sensor configured to sense an interaction with a messaging device" renders independent **claim 12** is unclear as it appears that neither the sensor nor the messaging device form part of the claimed system. However, in light of the description and drawings (cf. page 6, line 23 - page 7, line 15 with Fig. 1) it appears that said sensor and messaging device are essential for reaching the technical effect of this application.

2.7 The above-mentioned lack of clarity notwithstanding, and for the sake of efficiency of the procedure, a preliminary opinion regarding novelty and inventive step is given for all claims.

3 Novelty - Independent Claims

3.1 The present application does not meet the requirements of Article 33(1) PCT because the subject-matter of independent **claims 1, 11, and 12** (interpreted broadly and in the light of the description) is not new within the meaning of Article 33(2) PCT.

3.2 Document **D1** discloses the subject-matter of **claim 1** as follows (the references in parentheses applying to this document):

"A method comprising:
receiving a sensor signal from a sensor configured to sense an interaction with a messaging device (see page 6, line 27 - page 7, line 3 and page 11, lines 15 - 22 with Fig. 2);

FITBIT 1002
Fitbit v. Immersion

determining a virtual physical parameter of a virtual message object based at least in part on the sensor signal (see page 1, lines 17-24 and page 11, lines 24-26 as well as page 12, lines 3-7; *as disclosed in D1 the encoded data, representative of the received sensor signal, is transmitted together with a corresponding electronic representation of a message, and hence (following the interpretation according to paragraphs 2.2 and 2.4 above) can be considered as a "virtual physical parameter" of a "virtual message object"*);
determining a haptic effect based at least in part on the virtual physical parameter; and generating a haptic signal configured to cause an actuator to output the haptic effect (see page 12, lines 7-13)"

3.3 **Claims 11 and 12** are of the category "computer program product claim" or "system claim", respectively, and correspond to the method claimed in claim 1, therefore mutatis mutandis the same novelty objections arise as for claim 1.

4 Novelty - Dependent Claims

4.1 Dependent **claims 2-7, 13-16, and 20-23** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (Article 33(2) PCT), and therefore the criteria of Article 33(1) PCT are not fulfilled.

4.2 Document **D1** discloses all features of dependent **claims 2-7, 13-16, and 20-23** as follows:
- claim 2: see D1 page 7, lines 20-27 and page 12, lines 7-12 with Fig. 2
- claims 3, 4, 14, and 15: see D1 page 6, line 27 - page 7, line 1
- claims 5-7 and 20-22: see D1 page 7, lines 1-3; *pressure applied to pressure sensor 23 is considered as falling within the scope of a "two dimensional gesture comprising a finger position or a finger gesture"*
  claim 13: see D1 page 11, lines 16-26
- claim 16: see D1 page 6, lines 13-15 with Fig. 2
- claim 23: see D1 page 6, lines 16-17 and page 13, lines 20-23

5. Inventive Step - Independent Claims

FITBIT 1002
Fitbit v. Immersion

5.1 For the sake of completeness and irrespective of the novelty objection set out in paragraph 3 above, it is pointed out that **claims 1, 11, and 12** would also lack an inventive step (Article 33(3) PCT) vis-à-vis **D1** if the vague term "virtual physical parameter" or "virtual physical property", respectively (cf. paragraphs 2.2 and 2.3) was interpreted in light of a passage in the description (cf. page 4, lines 26-30), according to which it appears that this term could refer to a parameter determining the (e.g. haptic) feedback of a "virtual message object" such that it models a physical metaphor. In this case, claim 1 differs from D1, which discloses a possibility for generating messages with arbitrarily customized haptic effects by means of gesture input (see passages cited in paragraph 3.2 above), in that it associates the haptic effect with a physical metaphor such that the content of the haptically presented information is easily interpretable by a human whose mind is familiar with corresponding auditory signals from his physical environment. However, this differentiating subject-matter apparently has no technical character as it is directed towards the presentation of information characterized solely by the content of the information. Therefore, this subject-matter is not considered to support the solution of a technical problem, and hence cannot contribute to an inventive step over closest prior art D1 (cf. PCT Guidelines Appendix A13.08.1 to Chapter 13). In consequence, the criteria of Article 33(1) PCT are not met.

6 **Inventive Step - Dependent Claims**

6.1 Dependent **claims 2-10 and 17-19** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Article 33(3) PCT), and therefore the criteria of Article 33(1) PCT are not fulfilled.

6.2 In light of the reasoning provided in paragraph 5.1 above, it appears that the additional subject-matter of **claims 6, 9, 16, and 19** relate to the mere presentation of information and therefore is not considered to contribute to an inventive step over **D1**.

6.3 The additional subject-matter of **claim 10** is directed toward the determination of the haptic effect based at least in part on e.g. the length of a message. This feature is not disclosed in closest prior art **D1**. However, the distinguishing feature is known from

FITBIT 1002
Fitbit v. Immersion

D3 as providing the same advantages as in the present application (see D3 column 2, line 39 - column 3, line 5 and column 5, line 43 - column 6, line 14 with Figs. 3 and 4;. Therefore, it would have been obvious for the skilled person to incorporate this teaching of D3 into the disclosure of D1, thereby arriving at the subject-matter of claim 10 without exercise of an inventive activity.

6.4 The additional subject-matter of claim 17 is considered to refer to a minor, well-known implementation detail and therefore does not contribute to an inventive step over D1.

Re Item VII.

7 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D6 is not mentioned in the description, nor are these documents identified therein.

7.1 Independent claims 1, 11, and 12 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

7.2 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

FITBIT 1002
Fitbit v. Immersion



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Fitbit v. Immersion

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)
(PCT Rule 44bis.1(c))

To:

GARGHISI, Steven
Kilpatrick Stockton LLP
1001 West Fourth Street
Winston-Salem, NC 27101
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year)
27 January 2011 (27.01.2011)

Applicant's or agent's file reference
IMM313 PCT

IMPORTANT NOTICE

International application No.
PCT/US2009/050574

International filing date (day/month/year)
14 July 2009 (14.07.2009)

Priority date (day/month/year)
15 July 2008 (15.07.2008)

Applicant
IMMERSION CORPORATION et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

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Facsimile No. +41 22 338 82 70

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Form PCT/IB/326 (January 2004)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference IMM313.PCT	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2009/050674	International filing date (day/month/year) 14 July 2009 (14.07.2009)	Priority date (day/month/year) 15 July 2008 (15.07.2008)
International Patent Classification (IPC) (8th edition unless otherwise indicated) See relevant information in Form PCT/ISA/237		
Applicant IMMERSION CORPORATION		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 13 sheets, including this cover sheet.

   In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

   - [X] Box No. I — Basis of the report
   - [ ] Box No. II — Priority
   - [ ] Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - [ ] Box No. IV — Lack of unity of invention
   - [X] Box No. V — Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - [ ] Box No. VI — Certain documents cited
   - [X] Box No. VII — Certain defects in the international application
   - [ ] Box No. VIII — Certain observations on the international application

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis.2).

	Date of issuance of this report: 18 January 2011 (18.01.2011)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer: Simin Baharlou e-mail: pt09.pct@wipo.int

Form PCT/IB/373 (January 2004)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2008/050574	14.07.2009	15.07.2008

International Patent Classification (IPC) or both national classification and IPC
INV. G06F3/01 G06F3/048 H04N21/725

Applicant
IMMERSION CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax: +49 89 2399 - 4465	Form PCT/ISA/210	Kühn, Andreas Telephone No. +49 89 2399-8362

Form PCT/ISA/237 (Cover Sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a)).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing

      ☐ contained in the international application as filed

      ☐ filed together with the international application in electronic form.

      ☐ furnished subsequently to this Authority for the purposes of search

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5 Additional comments:

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No. PCT/US2009/060574

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	3-7,9,13,20
	No:	Claims	1,2,8,10-12,14-19,21
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1,21
Industrial applicability (IA)	Yes:	Claims	1-21
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Form PCT/ISA/237 (last sheet) (April 2007)

FITBIT 1002
Fitbit v. Immersion

Re Item V.

1 Prior Art

1.1 Reference is made to the following documents:

D1: TOPI KAARESOJA, LORNA M. BROWN, JUKKA LINJAMA: "Snap-Crackle-Pop: Tactile Feedback for Mobile Touch Screens" INTERNET ARTICLE, [Online] July 2006 (2006-07), XP002551485 Proceedings of the Eurohaptics 2006, July 2006 Retrieved from the Internet: URL:http://lsc.univ-evry.fr/~eurohaptics/upload/cd/papers/f80.pdf> [retrieved on 2009-10-20]

D2: US 2001/035854 A1 (ROSENBERG LOUIS B [US] ET AL) 1 November 2001 (2001-11-01)

D3: WILLIAMSON J ET AL: "Shoogle: Excitatory Multimodal Interaction on Mobile Devices" 28 April 2007 (2007-04-28), PROCEEDINGS OF THE SIGCHI CONFERENCE ON HUMAN FACTORS IN COMPUTING SYSTEMS 2007, CHI 2007 2007 ASSOCIATION FOR COMPUTING MACHINERY US; [CONFERENCE ON HUMAN FACTORS IN COMPUTING SYSTEMS], NEW YORK, NY : ACM, PAGE(S) 121 - 124 , XP002549378 ISBN: 978-1-59593-593-9

D4: ANNA DE WITT: "Designing Sonification of User Data in Affective Interaction" MASTER OF SCIENCE THESIS STOCKHOLM, SWEDEN 2007, [Online] 2007, XP002551486 Retrieved from the Internet: URL:http://w3.nada.kth.se/utbildning/grukth/exjobb/rapportlistor/2007/rapporter07/de_witt_anna_07142.pdf> [retrieved on 2009-10-20]

D5: YURCHIRO SEKIGUCHI, KOICHI HIROTA, MICHITAKA HIROSE: "Haptic Interface Using "Estimation of Box Contents" Metaphor" INTERNET ARTICLE, [Online] 3 December 2003 (2003-12-03), XP002551487 Proceedings of ICAT 2003, December 3-5, Tokyo, Japan Retrieved from the Internet: URL:http://www.vrsj.org/ic-at/papers/2003/ 00947_00000.pdf> [retrieved on 2009-10-20]

D6: US 2006/061545 A1 (HUGHES STEPHEN [IE] ET AL) 23 March 2006 (2006-03-23).

D7: BIET M ET AL: "Discrimination of Virtual Square Gratings by Dynamic Touch on Friction Based Tactile Displays" 13 March 2008 (2008-03-13), HAPTIC

FITBIT 1002
Fitbit v. Immersion

INTERFACES FOR VIRTUAL ENVIRONMENT AND TELEOPERATOR SYSTEMS, 2006. HAPTICS 2006. SYMPOSIUM ON, IEEE, PISCATAWAY, NJ, USA, PAGE(S) 41 - 48 , XP031339918 ISBN: 978-1-4244-2006-6

It is noted that document D1 is not provided with a publication date. However, document D7 containing a reference to D1 (see D7, reference 12 at column 14 as well as column 7, line 38 - column 8, line 2) discloses that D1 was published at the Eurohaptics Conference in July 2006. Consequently, D1 will be considered as prior art available to the public at the priority date of the present application, and hence relevant for the assessment of novelty and inventive step (Article 33(1)-(3) PCT).

2 Clarity

2.1 The application does not meet the requirements of Article 6 PCT, because **claims 1, 3, 4, 8-10, 15, and 16** are not clear as detailed in the following.

2.2 The definitions of the invention given in independent **claims 1, 15, and 16** appear to relate effectively to the same subject-matter and to differ from each other only with regard to the terminology and the level of generalisation used for the definition of the features of said subject-matter. In particular, claim 1 specifies "determining a haptic effect based at least in part on [...] the interaction with the graphical user interface" (emphasis added), whereas claims 15 and 16 specify to "determine a haptic effect based at least in part on [...] the type of interaction". Said differences in the independent claims 1, 15, and 16 render the set of claims as a whole unclear.

2.3 Further, independent **claims 15 and 16** are rendered unclear as the reader is left in doubt about the difference in terms of technical features between a "type of interaction" and "a mode of interaction" (emphasis added). According to common understanding, both terms appear to relate to the same subject-matter.

2.4 The term "virtual physical parameter" (emphasis added) is unclear and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of dependent **claim 3** unclear.
For the analysis of novelty and inventive step, the technical meaning of the above-mentioned term will be interpreted broadly, such that any "parameter" will be

considered as falling within the scope of said vague term.

2.5 Dependent claim 4 is unclear as the expression "the virtual message object comprises a token" (emphasis added) is vague and leaves open to which technical features it refers. However, in light of the description it appears that the term "token" refers to "a type of virtual object that includes predefined parameters" (cf. description at page 6, lines 22-23 or page 15, lines 19-20). Therefore, for the analysis of novelty and inventive step, the subject-matter of claim 4 will be interpreted accordingly.

2.6 The term "passive mode of interaction" (emphasis added) is vague, thereby rendering the definition of the subject-matter of dependent claim 8 unclear. However, in light of the description it can be understood that "in a passive mode of interaction, a user may interact only with a virtual object without interacting with a virtual environment or causing the virtual object to interact with other objects in the virtual environment" (cf. description at page 11, lines 28-30). Therefore, the assessment of novelty and inventive step of claim 8 will be based upon this interpretation.

2.7 Likewise, the vague expression "active mode of interaction" (emphasis added) renders dependent claim 10 unclear. For novelty and inventive step the subject-matter of claim 10 will be interpreted in light of the description from which it can be understood that "in an active mode of interaction [...] a user may direct interactions between one or more virtual objects and other virtual objects and/or the virtual environment" (cf. description at page 11, lines 26-28).

2.8 The subject-matter of dependent claim 9 is not sufficiently supported by the description as required by Article 6 PCT as its scope is broader than justified by the description and drawings. According to the specification of claim 9 which depends on claim 4, the haptic feedback effect generated in any mode of interaction may "comprise one or more of: feedback representing texture, feedback representing tension, or feedback representing grip". However, from the description it can be understood that e.g. a "texture profile is a data store comprising parameters that define the object's reaction to user interaction in the passive mode of interaction (cf. description at page 5, lines 7-9; emphasis added).
For the analysis of novelty and inventive step, the subject-matter of claim 9 will be interpreted in light of the description.

FITBIT 1002
Fitbit v. Immersion

2.9 The above-mentioned lack of clarity notwithstanding, and for the sake of efficiency of the procedure, a preliminary opinion regarding novelty and inventive step is given for all claims.

3 Novelty - Independent Claims

3.1 The present application does not meet the requirements of Article 33(1) PCT because the subject-matter of independent **claims 1, 15, and 16** (interpreted broadly and in the light of the description) is not new within the meaning of Article 33(2) PCT.

3.2 Document D1 discloses the subject-matter of **claim 1** as follows (the references in parentheses applying to this document):

"A method comprising: receiving a first signal from a sensor, the first signal associated with a mode of interaction with a graphical user interface (see column 3, lines 22-25, or alternatively column 4, lines 6-10); receiving a second signal associated with an interaction with the graphical user interface (see column 3, lines 26-30 with Fig. 3, or alternatively column 4, lines 11-12); determining a haptic feedback effect based at least in part on the mode of interaction with the graphical user interface and the interaction with the graphical user interface; and generating a haptic signal configured to cause an actuator to output the haptic feedback effect (see column 3, lines 30-36 and column 2, lines 3-5, or alternatively column 4, lines 13-23 and column 2, lines 3-5 with Fig. 4)."

3.3 **Claims 15 and 16** are of the category "computer program product claim" and "system claim", respectively, and appear to correspond to the method claimed in claim 1 (cf. interpretation given in **paragraph 2.2 above**), therefore mutatis mutandis the same novelty objections arise as for claim 1.

4 Novelty - Dependent Claims

4.1 Dependent **claims 2, 9, 10-12, 14, 17-19, and 21** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (Article 33(2) PCT), and therefore the

FITBIT 1002
Fitbit v. Immersion

criteria of Article 33(1) PCT are not fulfilled.

4.2 Document **D1** discloses **all features of Dependent claims 2, 8, 10-12, 14, 17-19, and 21** as follows:
- claim 2: see D1 column 2, lines 3-5 and column 3, lines 30-32 or column 4, lines 13-23; *it is implicit that a haptic signal corresponding to the respective type of tactile feedback is sent to the vibration actuators disclosed in D1*
- claims 8, 10-12, and 19: see D1 column 4, lines 7-23 with Fig. 4; *D1 discloses that the user may switch by means of a particular gesture from a "default mode" to a "drag & drop mode" ("active mode" in the parlance of the application) in which the user can move a selected graphical icon; it is implicit that said icon is not movable in the "default mode" ("passive mode" in the parlance of the application), otherwise D1 would not disclose an explicit mode switch gesture*
- claim 14, 17, 18, and 21: see column 1, line 45 - column 2, line 5 with Fig. 1

5 Inventive Step - Dependent Claims

5.1 Dependent **claims 3-7, 9, 13, and 20** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Article 33(3) PCT), and therefore the criteria of Article 33(1) PCT are not fulfilled.

5.2 Closest prior art D1 discloses the haptically enhanced interaction with graphical icons displayed on the touch screen of a mobile phone. A particular embodiment in D1 refers to a drag & drop interaction with a text document icon and the associated tactile feedback indicative of the respective type of interaction between said text document icon and other graphical objects disposed on the displayed desktop (e.g. a folder icon, an application launch icon, or the desktop itself) (see D1 column 4, lines 1-23 with Fig. 4). D1 does not show the supplementary feature of claim 3, namely the interaction with specific graphical icons, so-called "virtual message objects".
However, given the fact that D1 generally refers to the interaction with graphical icons presented on the display of a mobile phone and in particular to the interaction with text documents stored in said mobile phone, it appears a mere design measure to apply the known teaching of D1 to specific graphical objects, namely "virtual message objects". Consequently, the additional subject-matter of claim 3 is not considered to

contribute to an inventive step vis-à-vis D1.

5.3 Furthermore, following the above-given reasoning (see paragraph 5.2) and considering that the additional subject-matter of dependent claims 4-6 appears to be directed to minor implementation details regarding the type of virtual message object or its visual representation in the graphical user interface, respectively, none of said claims is regarded to contribute to an inventive step over D1.

5.4 All additional features of claim 7 which depend on the subject-matter of claim 3 are disclosed in closest prior art D1 as providing the same advantages as in the present application (Fig. 4 of D1 shows virtual objects - e.g. a text document icon, a folder icon, an application icon - having a size and a shape). Therefore, the subject-matter of claim 7 does not involve an inventive activity.

5.5 The additional subject-matter of claim 9 is not disclosed by D1. The distinguishing features bring about the technical effect of improving the assistance of a user in targeting graphical objects displayed in a graphical environment.
In light of D1, the problem to be solved can therefore be considered as how to modify the closest prior art D1 in order to improve the assistance of a user in targeting graphical objects displayed in a graphical environment.
However, all additional features of claim 9 are disclosed in document D2 as providing the same advantages as in the present application (see D2 [0006], [0007], [0057], lines 18-20 and [0058]). Since D2 pertains to the same technical field of handheld devices with touch-based input, it would have been obvious for the skilled person, when given the system of D1, to incorporate this teaching of D2 in the disclosure of D1, thereby arriving at the subject-matter of claim 9, and solving the posed problem.

5.6 In light of closest prior art D1, the additional subject-matter of claims 13 and 20 appears to refer to minor implementation details which are known to the skilled person. Consequently, the subject-matter of claims 13 and 20 does not involve an inventive activity.

Re Item VII.

6 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art

FITBIT 1002
Fitbit v. Immersion

disclosed in the documents D1-D6 is not mentioned in the description, nor are these documents identified therein.

6.1 Independent claims 1, 15, and 16 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

6.2 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

FITBIT 1002
Fitbit v. Immersion

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION CONCERNING TRANSMITTAL OF COPY OF INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (CHAPTER I OF THE PATENT COOPERATION TREATY)

(PCT Rule 44bis.1(c))

To

GARDNER, Steven
Kilpatrick Stockton LLP
1001 West Fourth Street
Winston-Salem, NC 27101
ETATS-UNIS D'AMERIQUE

Date of mailing (day/month/year): 27 January 2011 (27.01.2011)	
Applicant's or agent's file reference: IMM314.PCT	IMPORTANT NOTICE

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2009/050587	14 July 2009 (14.07.2009)	15 July 2008 (15.07.2008)

Applicant: IMMERSION CORPORATION et al

The International Bureau transmits herewith a copy of the international preliminary report on patentability (Chapter I of the Patent Cooperation Treaty).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Nora Lindner
Facsimile No. +41 22 338 82 70	e-mail: pct.pcb@wipo.int

Form PCT/IB/326 (January 2004)

FITBIT 1002
Fitbit v. Immersion



FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference IMM344.PCT	FOR FURTHER ACTION	See item 4 below
International application No. PCT/US2008/050697	International filing date (day/month/year) 14 July 2008 (14.07.2008)	Priority date (day/month/year) 15 July 2008 (15.07.2008)
International Patent Classification (IPC) or national classification and IPC See relevant information in Form PCT/ISA/237		
Applicant IMMERSION CORPORATION		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44bis.1(a).

2. This REPORT consists of a total of 10 sheets, including this cover sheet.

   In the attached sheets any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

- [X] Box No. I — Basis of the report
- [ ] Box No. II — Priority
- [ ] Box No. III — Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- [ ] Box No. IV — Lack of unity of invention
- [X] Box No. V — Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- [ ] Box No. VI — Certain documents cited
- [X] Box No. VII — Certain defects in the international application
- [ ] Box No. VIII — Certain observations on the international application

4. The international Bureau will communicate the report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2) before the expiration of 30 months from the priority date (Rule 44bis.2).

	Date of issuance of this report 16 January 2013 (16.01.2013)
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No. +41 22 338 82 70	Authorized officer Nora Lindner e-mail pt1.pct@wipo.int

Form PCT/IB/373 (January 2004)

FITBIT 1002
Fitbit v. Immersion

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US2008/050587	14.07.2008	15.07.2008

International Patent Classification (IPC) or both national classification and IPC
INV. H04M1/725 G06F3/01 G06F3/048

Applicant
IMMERSION CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Fax +49 89 2399 - 4465	see form PCT/ISA/210	Hölzl, Andreas Telephone No. +49 89 2399 8642

Form PCT/ISA/237 (Cover Sheet) (April 2005)

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No.
PCT/US2009/050587

Box No. I Basis of the opinion

1. With regard to the language, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. ☐ This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to the Authority under Rule 91 (Rule 43bis.1(a))

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing:

      ☐ contained in the international application as filed.

      ☐ filed together with the international application in electronic form.

      ☐ furnished subsequently to this Authority for the purposes of search.

4. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

FITBIT 1002
Fitbit v. Immersion

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

International application No. PCT/US2009/050587

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	3,7,18
	No:	Claims	1,2,4-6,8-16,20
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-20
Industrial applicability (IA)	Yes:	Claims	1-20
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Form PCT/ISA/237 (April 2007)

FITBIT 1002
Fitbit v. Immersion

Re Item V.

1 Prior Art

1.1 Reference is made to the following documents:

D1: IAN OAKLEY, SILE O' MODHRAIN: "Contact IM: Exploring Asynchronous Touch Over Distance" INTERNET ARTICLE, [Online] 16 November 2002 (2002-11-16), XP007910188 Retrieved from the Internet: URL:http://people.os.vt.edu/~wengf06/touch%20review%20organization/Oak002.pdf>

D2: ROVERS A F ET AL: "HIM: A Framework for Haptic Instant Messaging" CHI 2004; [CHI CONFERENCE PROCEEDINGS. HUMAN FACTORS IN COMPUTING SYSTEMS], VIENNA, AUSTRIA, 29 April 2004 (2004-04-29), pages 1313-1316, XP002464573 ISBN: 978-1-58113-702-6

D3: US 2006/061545 A1 (HUGHES STEPHEN [IE] ET AL) 23 March 2006 (2006-03-23)

D4: EP-A-0 899 650 (XEROX CORP [US]) 3 March 1999 (1999-03-03)

D5: WO 2004/075169 A (KONINKL PHILIPS ELECTRONICS NV [NL]; PHILIPS CORP [US]; VAN DE SLUIS B) 2 September 2004 (2004-09-02)

It is noted that document D1 is not provided with a publication date. However, document D2 referencing D1 (see D2, reference 6 at column 8 as well as column 3, lines 1-19 with Fig. 2) discloses that D1 was published at the CSCW Conference in 2002. Furthermore, this publication date is also confirmed by document D3 containing a reference to D1 (see D3 [0010], lines 17-22) and disclosing the publication of D1 at the CSCW Conference, New Orleans, USA, 16-20 Nov. 2002. Consequently, D1 will be considered as prior art available to the public at the priority date of the present application, and hence relevant for the assessment of novelty and inventive step (Article 33(1)-(3) PCT).

2 Clarity

2.1 The application does not meet the requirements of Article 6 PCT, because claims 1, 2, 5, 8, 10, 11, 13, 14, 16, 17, and 20 are not clear as detailed in the following.

2.2 The term "virtual force" is unclear and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of independent **claims 1, 10, and 16 unclear**. However, in light of the description and drawings it appears that the term "virtual force" relates to a simulated force that acts on a virtual message object, such that the virtual message object is moved on the display of the messaging device in accordance with the sensed sensor signal (cf. description at page 3, line 31 - page 4, line 3 with Figs. 6a-7d).
For the analysis of novelty and inventive step, the subject-matter of claims 1, 10, and 16 will be interpreted accordingly.

2.3 Further, **claims 1, 10, and 16** are rendered unclear by the vague expression "a virtual message object within a virtual message environment" (emphasis added) as it is obscure to which technical features it refers. For the assessment of novelty and inventive step, the corresponding subject-matter will be interpreted in light of the description from which it can be understood that a "virtual message environment" relates to the visual representation of a message inbox on the display of a messaging device in which electronic messages are represented as "virtual message objects".

2.4 Likewise, the above-objected term "virtual message object" renders independent **claims 6, 14, and 20** unclear.

2.5 The definition "determining whether to transmit the virtual message object" renders dependent **claims 2, 11, and 17** unclear as the reader is completely left in doubt about the criteria on which this determination is based. Consequently, for the analysis of novelty and inventive step any determination with regard to the transmission of a virtual message object will be considered as falling within the scope of this definition.

2.6 Dependent **claims 5 and 13** are rendered unclear by the vague wording "receiving a recipient signal associated with a recipient of the virtual message object" (emphasis added), which might imply that the recipient transmits said "recipient signal", e.g. in reply to the reception of a virtual message object. However, in light of the description it appears that the above-mentioned expression refers to the selection of the recipient of a virtual message object from e.g. an address list with predetermined recipients (cf. description at page 11, lines 21-33). Accordingly, novelty and inventive step of claims 5 and 13 will be assessed in view of the description

FITBIT 1002
Fitbit v. Immersion

2.7 Further, **claims 5 and 13** are rendered unclear by the obscure definition "displaying a virtual gateway in the virtual message environment" (emphasis added). Commonly, in the field of telecommunications the term gateway refers to a network node interfacing with another network that uses different protocols. However, from the description and drawings it appears that the term "virtual gateway" as used in this application rather relates to a display item displayed in the virtual message environment, wherein said display item may be associated with a recipient of a virtual message object (cf. description at page 11, lines 1-15 and page 12, lines 2-3 with Figs. 5a and 5b). Therefore, the unclear subject-matter of claims 5 and 13 will be interpreted in the light of the description and drawings.

2.8 Independent **claim 20** is rendered unclear by the reference to "the recipient device of claim 19" which is lacking an antecedent in claim 19 and any claim to which claim 19 refers.

2.9 The above-mentioned lack of clarity notwithstanding, and for the sake of efficiency of the procedure, a preliminary opinion regarding novelty and inventive step is given for all claims.

3 Novelty - Independent Claims

3.1 The present application does not meet the requirements of Article 33(1) PCT because the subject-matter of independent **claims 1, 8, 10, 14, 16, and 20** (clarified as mentioned above) is not new within the meaning of Article 33(2) PCT.

3.2 Document D1 discloses the subject-matter of **claim 1** as follows (the references in parentheses applying to this document):

"A method comprising:
receiving a sensor signal from a sensor configured to sense a physical interaction with a messaging device (see column 3, lines 1-4 and lines 21-29 as well as column 4, lines 13-19 with Fig. 1);
determining a virtual force based at least in part on the sensor signal (see column 3, lines 30-34); and
applying the virtual force to a virtual message object within a virtual message

FITBIT 1002
Fitbit v. Immersion

environment (see column 3, lines 21-40 with Fig. 1)."

3.3 **Claims 10 and 16** are of the category "computer program product claim" and "system claim", respectively, and correspond to the method claimed in claim 1, therefore mutatis mutandis the same novelty objections arise as for claim 1.

3.4 Further, document **D1** also discloses the subject-matter of claim 8 as follows (the references in parentheses applying to this document):

"A method comprising:
receiving a signal associated with a virtual message object; and
determining a haptic effect based, at least in part, on a transmission characteristic of the virtual message object (see column 3, lines 38-44 and column 4, lines 2-5 as well as column 4, lines 17-19 with Fig. 1)."

3.5 **Claims 14 and 20** are of the category "computer program product claim" and "system claim", respectively, and correspond to the method claimed in claim 8, therefore mutatis mutandis the same novelty objections arise as for claim 8.

3.6 For the sake of completeness, it is pointed out that the application also lacks novelty with respect to **D2** (see D2 column 3, lines 1-19 with Fig. 2), which discloses the subject-matter of independent **claims 1, 8, 10, 14, 16, and 20**.

4 Novelty - Dependent Claims

4.1 Dependent **claims 2, 4-6, 9, 11-13, 15, 17, and 18** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of novelty (Article 33(2) PCT), and therefore the criteria of Article 33(1) PCT are not fulfilled.

4.2 Document **D1** discloses all features of dependent **claims 2, 4-6, 9, 11-13, 15, 17, and 18** as follows:
- claims 2, 11, and 17: see D1 column 3, lines 36-40 with Fig. 1; *the instant message bell is transmitted as soon as it reaches the net of the Contact IM interface*.
- claims 4, 12, and 18: see D1 column 3, lines 34-44 and column 4, lines 2-5 with Fig.

1

- claims 5, 6, and 13: see D1 column 3, lines 24-27 and lines 36-40 with Fig. 1; *the net of the tennis-court which is associated with the recipient of the instant message corresponds to the term "virtual gateway" as used in the present application*
- claims 9 and 15: see D1 column 3, lines 21-24 and lines 36-45 as well as column 4, lines 17-19

4.3 For the sake of completeness, it is pointed out that the application also lacks novelty with respect to D2 which incorporates all features of D1 by reference (see D2, column 3, lines 1-19), and consequently anticipates in the manner the subject-matter of dependent **claims 2, 4-6, 9, 11-13, 15, 17, and 18.**

5 Inventive Step - Dependent Claims

5.1 Dependent **claims 3, 7, and 19** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Article 33(3) PCT), and therefore the criteria of Article 33(1) PCT are not fulfilled.

5.2 Closest prior art D1 discloses to base the determination whether to transmit a virtual message object (instant message represented by a tennis ball) on a virtual force that throws said virtual message object through a gateway (net of the tennis-court representing the recipient of the message object) (cf. D1 column 3, lines 21-45 with Fig. 1). D1 does not disclose the supplementary feature contained in dependent claim 3, namely to base this determination in addition on a status of the recipient. However, the skilled person and even the layman knows that the successful transmission of data between two computer based systems depends on a status, e.g. the availability status, of the recipient. Consequently, dependent claim 3 is not inventive over D1.

5.3 All supplementary features of **claims 7 and 19** are disclosed in each of D3-D5 as providing the same advantages as in the present application (see passages cited in the search report). Therefore, the distinguishing features of claims 7 and 19 do not contribute to an inventive step vis-à-vis any of the combinations of **D1+D3, or D1+D4, or D1+D5.**

FITBIT 1002
Fitbit v. Immersion

Re Item VII.

6 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1-D5 is not mentioned in the description, nor are these documents identified therein.

6.1 Independent claims 1, 8, 10, 14, 16, and 20 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

6.2 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Renee Prevette
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt	
EFS ID:	14513225
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	19-DEC-2012
Filing Date:	14-JUL-2009
Time Stamp:	14:17:47
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	791
Deposit Account	201430
Authorized User	KILPATRICK TOWNSEND & STOCKTON, LLP

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

FITBIT 1002
Fitbit v. Immersion

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	IDSLetter.pdf	204756	no	5
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	PTOSB08.pdf	73037	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	IMM341PCTSearchReportandWrittenOpinion1.pdf	520648	no	9
Warnings:					
Information:					
4	Non Patent Literature	IMM341PCTPreliminaryReportonPatentability1.pdf	425874	no	8
Warnings:					
Information:					
5	Non Patent Literature	IMM351PCTPreliminaryReportonPatentability1.pdf	805709	no	15
Warnings:					
Information:					
6	Non Patent Literature	IMM312PCTPreliminaryReportonPatentability1.pdf	481069	no	11
Warnings:					
Information:					
7	Non Patent Literature	IMM313PCTPreliminaryReportonPatentability1.pdf	599336	no	13
Warnings:					
Information:					
8	Non Patent Literature	IMM314PCTPreliminaryReportonPatentability1.pdf	497649	no	12
Warnings:					
Information:					

FITBIT 1002
Fitbit v. Immersion

9	Fee Worksheet (SB06)	fee-info.pdf	30365 18aeeabea94097c3815392dedcc8e783c073d706	no	2

Warnings:	
Information:	
Total Files Size (in bytes):	3638438

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	)	
	)	Conf. No.: 6699
Serial No. 12/502,702	)	
	)	Art Unit: 2688
Filed: July 14, 2009	)	
	)	Examiner: Wong, Kin C.
For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES	)	
Attorney Ref: IMM351 (51851-378586)	)	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

c. ☒ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

FITBIT 1002
Fitbit v. Immersion

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☒ No statement: therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

FITBIT 1002
Fitbit v. Immersion

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☒ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 20-1430.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 20-1430 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 12/4/2012

By: _____
Michael T. Mortock (Reg. No. 62,245)

Attachment(s):

- ☒ PTO/SB/08
- ☒ Documents
- ☒ Fee
- ☐ Other

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	David Brinbaum
Application No.	:	12/502,702
For	:	**SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**
Filed	:	July 14, 2009
Examiner	:	Kin C. Wong
Art Unit	:	2627
Confirmation No.	:	6699

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION

Sir:

The following Amendment and Remarks are submitted in response to the Office Action mailed November 13, 2012.

Listing of the Claims begins on page 2 of this paper.

Remarks begin on page 8 of this paper.

FITBIT 1002
Fitbit v. Immersion

LISTING OF THE CLAIMS

1. (Previously Presented) A method comprising:

receiving at least one sensor signal from at least one sensor of a mobile device, the at least one sensor signal associated with a movement of the mobile device;

determining a message to be displayed in a user interface based at least in part on the at least one sensor signal;

determining a haptic effect based in part on the first sensor signal; and

causing the message to be displayed and the haptic effect to be output.

2. (Original) The method of claim 1, wherein the at least one sensor comprises one or more of: an accelerometer, a gyroscope, a touch-sensitive input device, a camera, or a GPS sensor.

3. (Original) The method of claim 1, wherein the at least one sensor comprises a plurality of sensors.

4. (Original) The method of claim 3, wherein a first sensor of the plurality of sensors comprises an accelerometer and a second sensor of the plurality of sensors comprises a touch-screen.

5. (Original) The method of claim 1, wherein the message comprises predefined characteristics.

FITBIT 1002
Fitbit v. Immersion

6. (Original) The method of claim 5, wherein the predefined characteristics comprise: a shape and a haptic effect.

7. (Original) The method of claim 1, wherein:

the movement of the mobile device comprises a movement approximating the shape of a heart; and

the message is in the form of a heart.

8. (Original) The method of claim 1, wherein:

the movement of the mobile device comprises a movement approximating a hammering motion; and

the message is in the form of a nail.

9. (Original) The method of claim 1, further comprising detecting a user interaction associated with the message.

10. (Original) The method of claim 9, wherein the interaction comprises an input on a touch-sensitive input device of the mobile device.

11. (Original) The method of claim 9, wherein the interaction comprises tilting the mobile device.

12. (Original) The method of claim 9, wherein the interaction comprises an input detected by a microphone of the mobile device.

FITBIT 1002
Fitbit v. Immersion

13. (Original) The method of claim 12, wherein the interaction comprises blowing on the microphone.

14. (Original) The method of claim 9, further comprising transmitting a signal associated with the message to a recipient.

15. (Previously Presented) A method comprising:

receiving a first sensor signal from a first sensor, the first sensor signal associated with a movement of a first mobile device;

receiving a second sensor signal from a touch-sensitive interface of the first mobile device, the second sensor signal associated with a user interaction;

determining a change in a display of the first mobile device based at least in part on the second sensor signal;

transmitting a first data signal to a second mobile device, the first data signal comprising data associated with the user interaction and the movement of the first mobile device; and

determining a haptic effect based at least in part on the first data signal and outputting the haptic effect.

16. (Original) The method of claim 15, wherein the touch-sensitive interface comprises a touch-screen display.

FITBIT 1002
Fitbit v. Immersion

17. (Original) The method of claim 15, wherein the determining a change in the display of the first mobile device and the transmitting a data signal to a second mobile device occur substantially simultaneously.

18. (Original) The method of claim 15, wherein the change in the display of the first mobile device comprises displaying a trail substantially following the location of a point of contact between the user and the device.

19. (Original) The method of claim 15, wherein the movement of the first mobile device comprises a movement substantially approximating a pouring gesture.

20. (Original) The method of claim 19, wherein the change in the display comprises displaying a champagne bottle.

21. (Original) The method of claim 15, further comprising:

receiving a second data signal from the second mobile device;

determining a second change in the display of the first mobile device based at least in part on the second data signal.

22. (Original) The method of claim 21, wherein the second data signal comprises data corresponding to a display of the second mobile device.

FITBIT 1002
Fitbit v. Immersion

23. (Original) The method of claim 21, wherein the change in the display of the first mobile device comprises outputting an image substantially the same as the display of the second mobile device.

24. (Original) The method of claim 21, further comprising:

determining a haptic effect based at least in part on the second data signal; and

transmitting a haptic signal associated with the haptic effect to an actuator configured to output the haptic effect.

25. (Original) The method of claim 24, wherein the haptic effect comprises a haptic effect approximating a champagne cork popping.

26. (Original) The method of claim 24, wherein the haptic effect comprises a haptic effect approximating a collision between a user of the first mobile device and a user of the second mobile device.

27. (Previously Presented) A system comprising:

a processor configured to:

receive a first sensor signal from a first sensor, the first sensor configured to detect a movement of a first mobile device;

receive a second sensor signal from a second sensor, the second sensor configured to detect an interaction with the first mobile device;

receive a first data signal from a network interface, the network interface configured to receive signals transmitted by a second mobile device;

FITBIT 1002
Fitbit v. Immersion

determine a change in a display signal based at least in part on the first data signal and the second sensor signal;

determine a haptic effect based at least in part on the first data signal; and

outputting the haptic effect.

28. (Original) The system of claim 27, wherein the first sensor and the second sensor are each configured to detect one or more of: contact, pressure, acceleration, inclination, inertia, or location.

29. (Original) The system of claim 27, wherein the second sensor comprises a touch-screen.

30. (Original) The system of claim 27, wherein the mobile device further comprises a speaker configured to generate a sound effect coordinated with the haptic effect.

31. (Original) The system of claim 27, wherein the processor is further configured to transmit a second data signal to the network interface, and the network interface is further configured to transmit the second data signal to the second mobile device.

FITBIT 1002
Fitbit v. Immersion

REMARKS

I. General

This paper is filed in response to the Final Office Action mailed on November 13, 2012. The Office Action rejects all pending claims, specifically the Office Action provisionally rejects claims 1-31 for non-statutory obviousness type double patenting. Further, the Office Action rejects claims 1-31 as allegedly anticipated under 35 USC 102(b) by U.S. 6,573,883 to Bartlett ("Bartlett"). The Office Action further rejects claims 10, 16, and 29 as allegedly obvious under 35 USC 103 in view of Bartlett and U.S. 8,306,576 to Cho ("Cho").

In light of the remarks herein, Applicants respectfully request reconsideration and allowance of all pending claims.

II. Non-Statutory Double Patenting Rejections – Claims 1-31

The Office Action provisionally rejects claims 1-4 and 11 over Application Nos. 12/502,755 and 12/502,647. The Office Action further indicates that these are "provisional obviousness-type double patenting rejections because the conflicting claims have not in fact been patented." Office Action, p. 3 (emphasis in original).

Applicants traverse the provisional obviousness type double patenting rejections as improper for not making clear: "(A) *The differences between the inventions defined by the conflicting claims* - a claim in the patent compared to a claim in the application; and (B) *The reasons why a person of ordinary skill in the art would conclude that the invention defined in the claim at issue* . . . would have been an obvious variation of the invention defined in a claim in the patent." MPEP 804 (emphasis added).

Thus, Applicants respectfully request withdrawal of the provisional double patenting rejections. Applicants respectfully request that any further double patenting rejection, provisional or otherwise, comply with the requirements of MPEP 804, discussed above.

FITBIT 1002
Fitbit v. Immersion

Furthermore, without conceding the accuracy of the rejection, Applicants will consider filing a Terminal Disclaimer once claims 1-31 are otherwise in condition for allowance.

III. 35 USC 102 – Claims 1-31

The Office Action rejects claims 1-31 as allegedly anticipated under 35 USC 102 by Bartlett. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." MPEP § 2131, quoting *Verdegaal Bros. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987). Applicants respectfully assert that the Office Action has failed to establish that Bartlett discloses each and every limitation of claims 1-31.

Applicants note that, as previously argued, Bartlett does not disclose or suggest a processor configured to "determine a haptic effect based at least in part on the first data signal and outputting the haptic effect." In the response to Arguments section, the Office Action states that "regarding to Bartlett: applicant asserted that Bartlett fails to disclose the touch sensing; and thus, further asserted that Bartlett fails to have the haptic effect. Applicant is directed to figure 5 of Bartlett and the associated descriptions for details." Office Action, p. 6.

Applicants respectfully note that Bartlett figure 5 does not disclose "determine a haptic effect based at least in part on the first data signal and outputting the haptic effect." Rather, Figure 5 discloses receiving gesture and position commands from a user. *e.g.* Bartlett Col. 6:19-26. This may disclose taking in data from a user based on the user's movements or movements of the mobile device. But this does not disclose or suggest determining a haptic effect, and then outputting that haptic effect to the user.

Furthermore, Applicants respectfully note that in the rejection of this limitation, the Office Action cites Bartlett col. 6:27-36. Applicants respectfully note that this passage of Bartlett discloses:

> The display device 700 is used to observe images that are stored in a database. Scrolling position commands are used to scroll from image to image displayed on a display screen 710 until an image of interest is found. A gesture command then activates the displayed image for more detailed viewing. Additional gesture commands serve to "zoom" in to observe the selected image in greater detail or to zoom out to observe a

FITBIT 1002
Fitbit v. Immersion

> greater portion of the image or the entire image. Position commands, again, serve to scroll the image across the display screen 710.
>
> Bartlett col. 6:27-36

Applicants respectfully note that this does not disclose or suggest a haptic effect. Rather, it discloses a visual effect (e.g. images) and scrolling to view this visual effect.

Furthermore, Applicants respectfully note with regard to "outputting the haptic effect" the Office Action merely states "(as illustrated in figures 5 and 6 of Bartlett and see associated descriptions for details)." Office Action, p. 5. Applicants respectfully note that neither Figures 5 nor 6 disclose outputting a haptic effect. Rather, these Figures are related to detecting gestural commands (e.g. the user moving the device), but in no way relate to outputting a haptic effect.

Finally, Applicants respectfully note that the rejection of claims 1-26 is improper. With regard to these claims, the Office Action states only that "[r]egarding claims 1-16: method claims (1-26) are considered met when the apparatus of Bartlett is been implemented." Office Action, p. 5. Applicants respectfully note that this is an improper omnibus rejection under MPEP § 707.07(d). Applicants respectfully request that any future rejection be fully and clearly stated in order to give Applicants the opportunity to fully respond to the rejection.

Accordingly, Applicants respectfully request withdrawal of the 35 USC 102 rejection of claim 27. Applicants further request withdrawal of the 35 USC 102 rejections of claims 28-31, which depend from and further limit claim 27, and are thus allowable for at least the same reasons as claim 27.

Applicants respectfully request withdrawal of the 35 USC 102 rejection of claim 1, which Applicants have amended to recite a similar limitation to that recited by claim 27. Accordingly, Applicants respectfully assert claim 1 is allowable for at least the same reasons as claim 27. Applicants further request withdrawal of the 35 USC 102 rejections of claims 2-14, which depend from and further limit claim 1, and are thus allowable for at least the same reasons as claim 1.

Applicants respectfully request withdrawal of the 35 USC 102 rejection of claim 15, which Applicants have amended to recite a similar limitation to that recited by claim 27. Accordingly, Applicants respectfully assert claim 15 is allowable for at least the

FITBIT 1002
Fitbit v. Immersion

same reasons as claim 27. Applicants further request withdrawal of the 35 USC 102 rejections of claims 16-26, which depend from and further limit claim 15, and are thus allowable for at least the same reasons as claim 15.

IV. 35 USC 103 – Claims 10, 16, and 29

The Office Action rejects claims 10, 16, and 29 as allegedly obvious in view of Bartlett and Cho. Claims 10, 16, and 29 each depend from and further limit one of claims 1, 15, and 27. As discussed above, Bartlett does not disclose each and every limitation of claims 1, 15, and 27. Applicants respectfully assert that the Office Action has not established *prima facie* obviousness with regard to claims 1, 15, and 27, and therefore request withdrawal of the rejection of claims 10, 16, and 29.

CONCLUSION

Applicants respectfully assert that in view of the amendments and remarks above, all pending claims are allowable and Applicants respectfully request the allowance of all claims.

Should the Examiner have any comments, questions, or suggestions of a nature necessary to expedite the prosecution of the application, or to place the case in condition for allowance, the Examiner is courteously requested to telephone the undersigned at the number listed below.

Respectfully submitted,

Date: 11/8/2013

Michael Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
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(336) 734-2756 (fax)

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	14639598
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Laura Smith
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	08-JAN-2013
Filing Date:	14-JUL-2009
Time Stamp:	11:28:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	Transmittal378586.pdf	47596	no	2
Warnings:					
Information:					

FITBIT 1002
Fitbit v. Immersion

2		Response378586.pdf	431379 8ba107cc116165d04eac54ca361760d1140d2460d	yes	11

Multipart Description/PDF files in .zip description		
Document Description	**Start**	**End**
Amendment After Final	1	1
Claims	2	7
Applicant Arguments/Remarks Made in an Amendment	8	11

Warnings:	
Information:	
Total Files Size (in bytes):	478975

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	)	
	)	Conf No.: 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2688
Serial No. 12/502,702	)	
	)	Examiner: **Wong, Kin C.**
Filed: July 14, 2009	)	
	)	

For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Transmittal; and
2. Amendment and Response to Final Office Action.

Shown below are the fees for the presentation of the amended claims:

	Claims Remaining	Highest # Previously Paid For	Extra	Rate	Fee
TOTAL	31	31	0	$ 62	$ 0
Ind. Cls.	3	3	0	$250	$ 0
Multiple Dependent Claim Added..... NO					
				TOTAL	$ 0

US2008 4150509 1

FITBIT 1002
Fitbit v. Immersion

The Commissioner is hereby authorized to charge any additional fees required by this action, or credit any overpayment, to Deposit Account Number 20-1430.

Respectfully submitted,

Date: 1/9/2013

Michael T. Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing
I hereby certify that this correspondence is being electronically filed with the United States Patent Office via EFS-Web on January 9, 2013.

Laura J. Smith

PTO/SB/06 (07-06)
Approved for use through 7/31/2007. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number	Filing Date	
12/502,702	07/14/2009	☒ To be Mailed

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)	SMALL ENTITY ☐		OR	OTHER THAN SMALL ENTITY	
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)		RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	x $ =		OR	x $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	x $ =			x $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							
* If the difference in column 1 is less than zero, enter "0" in column 2			TOTAL			TOTAL	

APPLICATION AS AMENDED – PART II

	(Column 1)		(Column 2)	(Column 3)	SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
AMENDMENT	01/08/2013	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 31	Minus	** 31	= 0	x $ =		OR	x $42=	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	x $ =		OR	x $250=	0
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADDL FEE		OR	TOTAL ADDL FEE	0

	(Column 1)		(Column 2)	(Column 3)					
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)		RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x $ =		OR	x $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x $ =		OR	x $ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADDL FEE		OR	TOTAL ADDL FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner
/NICHELE PETERSON/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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www.uspto.gov

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
12/502,702	07/14/2009	David Birnbaum	IMM351 (51851/P7836US0)	6619

3430 1590 01/15/2013

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER
WONG, KIN C

ART UNIT	PAPER NUMBER
2628	

MAIL DATE	DELIVERY MODE
01/15/2013	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Advisory Action Before the Filing of an Appeal Brief	**Application No.** 12/502,702	**Applicant(s)** BIRNBAUM ET AL.
	Examiner K. Wong	**Art Unit** 2688

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 08 January 2013 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

NO NOTICE OF APPEAL FILED

1. ☒ The reply was filed after a final rejection. No Notice of Appeal has been filed. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114 if this is a utility or plant application. Note that RCEs are not permitted in design applications. The reply must be filed within one of the following time periods:
   a) ☐ The period for reply expires _____ months from the mailing date of the final rejection.
   b) ☒ The period for reply expires on: (1) the mailing date of this Advisory Action; or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.
   c) ☐ A prior Advisory Action was mailed more than 3 months after the mailing date of the final rejection in response to a first after-final reply filed within 2 months of the mailing date of the final rejection. The current period for reply expires months from the mailing date of *the prior Advisory Action* or SIX MONTHS from the mailing date of the final rejection, whichever is earlier.
   Examiner Note: If box 1 is checked, check either box (a), (b) or (c). ONLY CHECK BOX (b) WHEN THIS ADVISORY ACTION IS THE FIRST RESPONSE TO APPLICANT'S FIRST AFTER-FINAL REPLY WHICH WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. ONLY CHECK BOX (c) IN THE LIMITED SITUATION SET FORTH UNDER BOX (c). See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) or (c) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☐ The proposed amendments filed after a final rejection, but prior to the date of filing a brief, will not be entered because
   a) ☐ They raise new issues that would require further consideration and/or search (see NOTE below);
   b) ☐ They raise the issue of new matter (see NOTE below);
   c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or
   d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.
   NOTE: _____. (See 37 CFR 1.116 and 41.33(a)).
4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).
5. ☐ Applicant's reply has overcome the following rejection(s): _____.
6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).
7. ☒ For purposes of appeal, the proposed amendment(s): (a) ☐ will not be entered, or (b) ☒ will be entered, and an explanation of how the new or amended claims would be rejected is provided below or appended.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).
9. ☐ The affidavit or other evidence filed after the date of filing the Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing of good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).
10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☒ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: See Continuation Sheet.
12. ☒ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____
13. ☐ Other: _____.

STATUS OF CLAIMS

14. The status of the claim(s) is (or will be) as follows:
    Claim(s) allowed: .
    Claim(s) objected to: .
    Claim(s) rejected: 1-31.
    Claim(s) withdrawn from consideration: .

/K. Wong/
Primary Examiner
Art Unit: 2688

Continuation of 11. does NOT place the application in condition for allowance because: the reconsiderations of the applicant argue that Barlett's gesture commands of rolling, pitching and shaking (vibrating) are not the haptic or motions have translated into haptic effect in the apparatus of Barlett. Further, applicant argues that the apparatus of Barlett never responsed to the haptic effect that which generated by the user - externally as depicted in figure 5 of Barlett. Hence, the claims are broadly interpreted. Moreover, the applicant further argues or suggests that the haptic effect is mutually between two different apparatus(s) which applicant has not positively recited or have the recitations positively in the claims. However, as hindsight argendo in view of the above reconsiderations, col. 5, line 32 to col. 6, line 17 of Cho et al (8306576) where Cho et al describes the haptic effects between two mutual apparatus(s). Hence, each and every element is addressed in the spirt of the meat and germane of In re Jung, 637 F.3d 1356 (Fed. Cir. 2011).

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete If Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M Birnbaum
Art Unit	2688
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (51851/378586)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number — Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	2005/0179617	08-18-2005	Matsui et al.	
	2.	2006/0279542	12-14-2006	Flack et al.	
	3.	2007/0247442	10-25-2007	Andre et al.	
	4.	2008/0300055	12-04-2008	Lutnick et al.	
	5.	5,666,499	09-09-1997	Baudel et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document — Country Code[3] - number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	6	International Search Report and Written Opinion mailed March 23, 2010 for corresponding International Patent Application PCT/US2010/022928.	
	7.	International Preliminary Report on Patentability mailed August 11, 2011 for corresponding International Patent Application PCT/US2010/022928.	
	8.	International Preliminary Report on Patentability mailed January 27, 2011 for corresponding International Patent Application PCT/US2009/050569.	
	9.	International Preliminary Report on Patentability mailed January 27, 2011 for corresponding International Patent Application PCT/US2009/050569.	
	10.	International Preliminary Report on Patentability mailed January 27, 2011 for corresponding International Patent Application PCT/US2009/050574.	
	11.	International Preliminary Report on Patentability mailed January 27, 2011 for corresponding International Patent Application PCT/US2009/050537.	

Examiner Signature	/K. Wong/	Date Considered	01/13/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.W./

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	David Birnbaum
Application No.	:	12/502,702
For	:	**SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**
Filed	:	July 14, 2009
Examiner	:	Kin C. Wong
Art Unit	:	2627
Confirmation No.	:	6699

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE TO FINAL OFFICE ACTION

Sir:

The following Amendment and Remarks are submitted in response to the Office Action mailed November 13, 2012.

OK TO ENTER: /K.W./
01/13/2013

Listing of the Claims begins on page 2 of this paper.

Remarks begin on page 8 of this paper.

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete If Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2688
Examiner Name	Wong, Kai C.
Attorney Docket Number	IMM351 (51851/378586)

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number: Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	1.	WO 2006/013363 A1	02-09-2006	Voda-Fone Group PLC		

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	2	Chinese Office Action dated November 13, 2012 for corresponding Chinese Patent Application No. 200980127978.1	

Examiner Signature		Date Considered	

FITBIT 1002
Fitbit v. Immersion

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

PCT

(43) International Publication Date
9 February 2006 (09.02.2006)

(10) International Publication Number
WO 2006/013363 A1

(51) International Patent Classification[7]: H04M 1/725, G06F 3/00

(21) International Application Number: PCT/GB2005/003046

(22) International Filing Date: 3 August 2005 (03.08.2005)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0417660.8 5 August 2004 (05.08.2004) GB

(71) Applicant (*for all designated States except US*): VODAFONE GROUP PLC [GB/GB]; Vodafone House, The Connection, Newbury, Berkshire RG14 2FN (GB).

(72) Inventor; and

(75) Inventor/Applicant (*for US only*): GOSSET, Phil [GB/GB]; 8 Barr End, Marshfield, South Gloucester SN14 8PE (GB).

(74) Agent: FOSTER, Mark, Charles; Mathisen, Macara & Co., The Coach House, 6-8 Swakeleys Road, Ickenham, Uxbridge UB10 8BZ (GB).

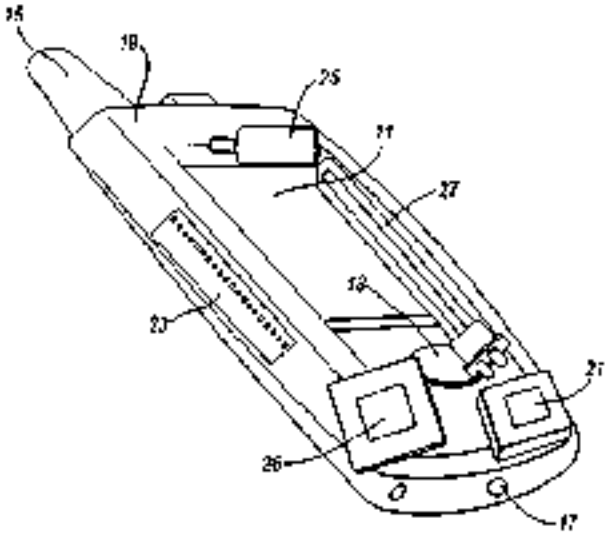
(81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: HAPTIC INPUT AND HAPTIC OUTPUT IN A COMMUNICATIONS NETWORKS



(57) Abstract: A mobile telecommunications network may be provided with mobile terminals including motion sensors (21) and pressure sensors (23). Movement and/or pressure applied to a mobile terminal can be sensed by these sensors (21,23) and converted into an electrical signal. This electrical signal is encoded and transmitted to the network core. The network core generates a message to a recipient mobile terminal having a movement enabler (25) and/or pressure enabler (26). When the message is received by the receiving mobile terminal, the movement and/or pressure enabler generate an approximation of the touch input generated at the sending mobile terminal. The users of mobile terminals are therefore able to communicate with each other by the sense of touch.

WO 2006/013363 A1

FITBIT 1002
Fitbit v. Immersion

HAPTIC INPUT AND HAPTIC OUTPUT IN A COMMUNICATION NETWORK

Background to the Invention

The present invention relates to a mobile telecommunications network, to terminals for use with a mobile telecommunications network and to a method of operating a mobile telecommunications network, and in particular to an arrangement in which communications can be enhanced by using the sense of touch.

Brief description of the prior art

In addition to voice calls between mobile terminals registered with a mobile telecommunications network, it is possible to send alphanumeric data in the form of an SMS or text message. Recent developments allow the transmission of multimedia messages (MMS) such as drawings, photographs, music and video clips.

GB-A-2308523 and US-A-2002/180698 disclose mobile terminals that have a touch-sensitive screen that allows alphanumeric data to be captured by moving a finger or stylus across the screen.

Brief Summary of the invention

The present invention seeks to provide an additional type of communication using a mobile telecommunications network.

According to a first aspect of the present invention, there is provided a mobile telecommunications network including a plurality of terminals registered with

FITBIT 1002
Fitbit v. Immersion

the network, wherein a first of said terminals includes means for sensing the variation of a touch input with respect to time and/or the intensity of the touch input and generating a signal representative thereof, and including means for generating a message representative of said signal; and means for transmitting the message to a second of said terminals for generating an output in response to the message that is indicative of the touch input.

The touch input may also be referred to as a haptic input.

The intensity of motion or pressure may be sensed.

The message may be generated by the first terminal, the mobile telecommunications network or a separate entity.

The output may be a simulation or approximation of the input - it may stimulate the touch (haptic) sense of the user of the second terminal to convey the touch (haptic) input by the user of the first terminal, allowing the users to communicate by the sense of touch (haptics).

Alternatively, the output may be indicative of the touch input but may stimulate a different sense of the user of the second terminal - such as sight or hearing. This arrangement may be used when the second terminal is not capable of generating a touch output.

Particular touch inputs generate particular outputs (whether stimulating touch, sight or hearing). Particular inputs may be mapped to particular outputs. For example, shaking the first terminal may generate a particular audible message at the second terminal. This mapping may be pre-set and/or may be set by the users of the terminals or by a third party.

FITBIT 1002
Fitbit v. Immersion

According to a second aspect of the present invention, there is provided a mobile telecommunications network, including means for receiving a message from a first terminal for delivery to a second terminal and for converting the message between a first type to a second type, wherein at least the first type of message includes data enabling the reproduction of an output by a terminal which output is detectable by the sense of touch and varies with respect to time and/or varies in intensity in dependence upon the content of the message.

The data in the first type of message enabling the reproduction of an output by a terminal may data input from a terminal (which will subsequently be reproduced in some form) or data for generating an output from a terminal.

According to a third aspect of the present invention, there is provided a terminal for use with a mobile telecommunications network, the terminal including means for sensing a variation of a touch input with respect to time and/or the intensity of the touch input and generating a signal representative thereof, a representation of which is for inclusion in a message for transmission to another terminal for generating an output in response to the message that is indicative of the touch input.

According to a fourth aspect of the present invention, there is provided a terminal for use with a mobile telecommunications network, the terminal including means for receiving a message representative of an input signal generated by another terminal, means for generating an output detectable by the sense of touch and which varies with respect to time and/or in intensity in dependence upon the content of the message.

According to a fifth aspect of the present invention, there is provided a method of operating a mobile telecommunications network having a plurality of terminals, the method including generating at a first of said terminals a signal

FITBIT 1002
Fitbit v. Immersion

representative of how a touch input varies with respect to time and/or intensity of the touch input, generating a message representative of the signal, transmitting the message to a second of said terminals, and generating an output at the said second terminal in response to the message that is indicative of the touch input.

According to a sixth aspect of the present invention, there is provided a mobile telecommunication network including means for generating a message containing information for use by the user of a terminal, means for transmitting the message to said mobile terminal, and means for conveying the information to the user of said mobile terminal by stimulating the user's sense of touch.

Humans have five senses: sight, hearing, touch, smell and taste.

Known mobile terminals can detect visual and audible stimuli, convert these into a message and transmit this to another terminal via a mobile telecommunications network. For example, a user of a first mobile terminal may record a video clip (comprising sound and moving pictures) of themselves and transmit this as a message to a second mobile terminal, where it is reproduced, stimulating the sight and hearing sense of the recipient. The present invention provides an enhancement to communications by allowing a touch input to be sensed by a mobile terminal and/or a touch output to be reproduced on a mobile terminal.

In the specification the term "touch" means anything that is detectable by the human sense of touch, and includes such stimuli as heating and vibration.

Some mobile terminals have the facility to vibrate in order to alert the user of an incoming call or message. However, the vibration is simply triggered by a mobile terminal on receipt of an incoming call or message. The vibration does

FITBIT 1002
Fitbit v. Immersion

not convey the content of the message. The signal that generates the vibration is not generated in dependence upon the content of a message received from another terminal.

Conventional mobile telephones are capable of receiving a touch input in the sense that they have buttons and other controls which are depressed. However, the nature or intensity of the touch input is not recorded and conveyed as part of a message. The depression of the key may result in data being recorded in a message (for example a letter in an SMS message), but the nature or intensity of the touching of the key (or how it varies with time) is not recorded or conveyed.

According to one aspect of the present invention the variation of a touch input with respect to time is sensed. The intensity of the touch input may be sensed.

The term mobile telecommunications "network" used in this specification does not necessarily refer to a single network operated by a particular (legal) entity. The network might comprise a plurality of separately operated networks, or a part of one of such networks.

Brief description of the drawings

For a better understanding of the present invention, an embodiment will now be described by way of example, with reference to the accompanying drawings, in which:-

Figure 1 shows schematically principal elements of a mobile telecommunications network; and

FITBIT 1002
Fitbit v. Immersion

Figure 2 shows schematically additional components provided to a mobile telecommunications terminal in accordance with an embodiment of the invention.

Exemplary embodiment of the invention

As shown in Figure 1, mobile terminals 1,3,5 and 7 are registered with a GSM or UMTS (3G) mobile or cellular telecommunications network 9. The mobile terminals may be hand held mobile telephones, personal digital assistants (PDAs) or laptop computers equipped with a datacard (or, of course, any combination of these). The mobile terminals communicate wirelessly with the mobile telecommunications network 9 via a radio access network comprising base transceiver stations (BTSs) and base station controllers (BSCs). Communications between the mobile terminals and the network 3 are routed from the radio access network via mobile switching centres (MSCs), which may be connected by a fixed (cable) link to the network 9. Of course, in practice, a typical mobile telecommunications network 9 will have many thousands of subscribers, each with one or more terminals.

Each of the mobile terminals 1,3,5,7 is provided with a respective subscriber identity module (SIM). During the manufacturing process of each SIM authentication information is stored thereon under control of the network 9. The network 9 itself stores details of each of the SIMs issued under its control. In operation of the network 9, a mobile terminal is authenticated (for example, when the user activates the terminal in the network with a view to making and receiving calls) by the network sending a challenge to the mobile terminal. The received challenge is passed to the SIM associated with the mobile terminal and the SIM calculates a reply (dependent on predetermined information held on the SIM - typically an authentication algorithm and a unique key Ki) and transmits it back to the network 9. The network receives the reply from the

FITBIT 1002
Fitbit v. Immersion

mobile terminal. Using information pre-stored concerning the content of the relevant SIM and the nature of the challenge sent to the mobile terminal, the network calculates the expected value of the reply from the mobile terminal. If the reply received matches the expected calculated reply, the SIM and the associated mobile terminal are considered to be authenticated.

A mobile terminal in accordance with an embodiment of the invention is shown in Figure 2. In a conventional manner the mobile terminal includes a visual display 11, various buttons and keys 13 and an antenna 15 for communication with the radio access network of the mobile telecommunications network 9. The mobile terminal also includes a microphone 17 for sensing audio input such as speech and a loudspeaker 19 for generating an audio output. The visual display 11 may provide a user interface such as a graphical user interface to facilitate access to functions provided by the mobile terminal and may also display messages received by the mobile terminal - such as alphanumeric text and pictures (moving or still). The mobile terminal also of course includes data processing circuitry (not shown) for allowing the user of the mobile terminal to control the terminal and for allowing wireless communications with the mobile telecommunications network 9. The features of the mobile terminal described thus far are conventional.

According to the embodiment the mobile terminal is provided with a motion sensor 21, such as a micro-accelerometer for detecting movement of the mobile terminal. A pressure sensor 23, such as a piezoelectric strip, is also provided for detecting, for example, squeezing, hitting and/or stroking of the mobile terminal. The sensors 21 and 23 allow the terminal to sense movement and pressure - for example caused by the user of the mobile terminal shaking the terminal or squeezing the terminal. The mobile terminal may be provided with an elastically deformable outer casing and may be configured to allow the outer casing to be resiliently compressed (for example, by squeezing) such that this is

FITBIT 1002
Fitbit v. Immersion

sensed by the pressure sensor 23. The pressure sensor 23 may be insensitive to the position of the location of pressure application on the sensor 23 but sensitive to the intensity of the pressure applied.

Other sensors may also be provided that allow the mobile terminal to sense touch inputs (that is, inputs that would stimulate the human sense of touch). For example, the mobile terminal may also be provided with a temperature sensor.

The sensors 21 and 23 generate electrical signals in response to a touch input. These are detected by processing circuitry of the mobile terminal and may be stored or converted into a format suitable for transmission in the message to the mobile telecommunications network 9 and oowardly to another mobile terminal. The generation and transmission of such messages will be discussed further below.

In addition to providing sensors for receiving and recording a touch input, the mobile terminal also includes devices for generating a touch output (that is, devices that provide a stimulus to the human sense of touch). Motion output is created using a movement enabler 25 such as an electromagnetic device. Heat is generated using a heating element 27. Additionally, a pressure generation mechanism 26 may be provided for flexing (expanding/contracting) the resiliently deformable case of the mobile terminal. These output types all stimulate the human sense of touch.

If the user of mobile terminal 1 wishes to communicate with the user of mobile terminal 3 using the mobile telecommunications network 9, data relating to the communication is routed wirelessly between mobile terminal 1 and the local BTS 29. From there the communication data is transmitted to the BSC 31 and to MSC 33 via a fixed or cable link. The mobile telecommunications network

FITBIT 1002
Fitbit v. Immersion

core 35 then routes the communication to an appropriate MSC 37 with which the mobile terminal 3 is registered. The communication data is transmitted from MSC 37 to the appropriate BSC 39, and from there to BTS 41. The communication data is transmitted from the BTS 41 wirelessly to the mobile terminal 3.

The communication data may be data representative of the users' voices in a conventional circuit switched voice call. The communication data may also be transmitted during a (packet switched) communication session between the mobile terminal 1 and the mobile terminal 3.

To efficiently facilitate such communication sessions, the third generation partnership project (3GPP) has recently defined a new concept known as IMS (IP-based multimedia subsystem). The aim of IMS is to allow users such as mobile telephone network operators to provide services to their subscribers as efficiently and effectively as possible. For example, the IMS architecture is likely to support the following communication types: voice, video, instant messaging, "presence" (a user's availability for contact), location-based services, email and web. Further communication types are likely to be added in the future. This diverse collection of communication devices requires efficient communication session management due to the number of different applications and services that will be developed to support these communication types. The 3GPP have chosen session initiation protocol (SIP) for managing these sessions.

SIP protocol is a session-based protocol designed to establish IP based communication sessions between two or more points or users. Once the SIP session has been established, communication between these end points or users can be carried out using a variety of different protocols (for example, those

FITBIT 1002
Fitbit v. Immersion

designed for streaming audio and video). These protocols are defined in the SIP session initiation messages.

With IMS, users are no longer restricted to a separate voice call or data session. Sessions can be established between mobile terminals that allow a variety of communication types to be used and media to be exchanged. The sessions are dynamic in nature in that they can be adapted to meet the needs of the end users. For example, two users might start a session with an exchange of instant messages and then decide that they wish to change to a voice call, possibly with video. This is all possible within the IMS framework. If a user wishes to send a file to another user and the users already have a session established between each other (for example, a voice session), the session can be redefined to allow data file exchange to take place. This session redefinition is transparent to the end user.

One application of IMS is push-to-talk over cellular (PoC). PoC allows a communication session to be established between a group of devices such that the user of one of the devices can speak and the users of the or each of the other devices will hear that person speak. During such communication session each device functions like a two-way radio or walkie-talkie in a one-to-one or one-to-many group mode. Full duplex speech communication between the users of the respective devices during the PoC part of the communication is not possible - only one user can speak at a time.

One feature of PoC is that, when the communication is established, there is an "always on" communication in between the terminals. When a user wishes to talk to the or each of the other terminals associated with the communication session, the user issues an appropriate instruction to their device (typically using a soft key - that is, a key whose function is programmable), and the user's speech is captured by their terminal instantly, or within a relatively short mode

FITBIT 1002
Fitbit v. Immersion

of time, is transmitted to the or each of the other terminals and is reproduced on those terminals. There is no requirement for the user inputting the speech data to dial the or each other device, and nor is there any requirement for the users of the devices receiving the speech to take any action to receive the speech data - it is automatically reproduced by the device when it is received (assuming, of course, the device is operating in an appropriate mode for allowing PoC communication).

PoC is described in the document "Push-to-talk over Cellular (PoC) - architecture, draft version 1.0 - 13th February 2004" available from the Open Mobile Alliance Limited (OMA).

In addition to establishing a PoC communication session using IMS, a PoC communication session could be established over existing GSM/GPRS networks by the exchange of data packets but without IMS.

In the embodiment of the present invention, the touch input of mobile terminal 1 is sensed by sensors 21 and/or 23 and a signal representative thereof is generated by the mobile terminal 1. In accordance with a feature of the present embodiment, this touch input is used as a means of communicating with the user of mobile terminal 3. The signal derived from the sensors 21 and/or 23 is encoded and transmitted to the network core 35 via BTS 29, BSC 31 and MSC 33. In the network core 35 a translation server 43 is provided which receives the encoded signal and generates a suitable output message representative of the encoded signal. The output message is transmitted to the mobile terminal 3 via MSC 37, BSC 39 and BTS 41.

The data communicated between the mobile terminal 1 and the mobile terminal 3 may be transmitted by any suitable means. The data may be transmitted in the circuit switched domain, but is preferably transmitted in the packet

FITBIT 1002
Fitbit v. Immersion

switched domain. The data may be transmitted as GPRS data, as an SMS message or an MMS message. The data may also be transmitted during a IMS communication session (controlled by SIP) between the mobile terminals 1 and 3 (and possibly other mobile terminals). The data may be transmitted as part of a PoC communication session, so that when the message is received by the mobile terminal 3 an appropriate output is generated (preferably immediately) without requiring any action of the user of the mobile terminal 3. In this regard, although PoC relates to push-to-"talk", in fact any type of data can be communicated during such a session.

In a first example, it will be assumed that both mobile terminal 1 and mobile terminal 3 include the features of the mobile terminal shown in Figure 2. In mobile terminal 1 the touch input signals generated as a result of pressure, movement or heating of the mobile terminal 1 have the electrical signals generated thereby recorded and stored by their mobile terminal 1. The electrical signals vary with the intensity of the pressure, movement or heating. How the signals received from the sensors vary with respect to time is recorded. For example, the variation in pressure applied to pressure sensor 23 may be recorded for a predetermined period of, for example, one, two, or five seconds (or of any other duration). Simultaneously, or during a different time period, the signals generated by the movement sensor 21 may be recorded and stored. The data processor of the mobile terminal 1 then encodes the signals in a suitable format such that their data content can be extracted by a receiving device. Typically, the data will be encoded as binary data. Suitable methods for encoding such data will be known to those skilled in the art and will not be described further here.

A communication session (for example, a IMS, SIP controlled, communication session) between mobile terminal 1 and mobile terminal 3 is then initiated in a known manner if not already established. The encoded data is transmitted to

FITBIT 1002
Fitbit v. Immersion

the network core 35, where it is passed to translation server 43. In this example the translation server 43 need not take any action because the mobile terminals 1 and 3 are the same type of mobile terminal. The translation server 43 then issues a message comprising the encoded data to the mobile terminal 3. On receipt of the message the mobile terminal 3 decodes the message and applies appropriate electrical signals to movement enabler 25, pressure generation mechanism 26 and any other touch output devices provided. The touch output or outputs generated by the mobile terminal 3 will, if the user is in contact with mobile terminal 3, stimulate the touch sense of the user. The touch output is an approximation of the touch input to mobile terminal 1. For example, the squeezing of mobile terminal 1 will temporarily change the shape of its casing. The touch output of the mobile terminal 3 will cause a corresponding temporary change in the shape of the terminal 3. The users of mobile terminals 1 and 3 can therefore communicate with each other using the sense of touch.

If the user of mobile terminal 3 does not have a mobile terminal of the type illustrated in Figure 2, or at least has a mobile terminal of a different type to the mobile terminal 1, the translation server 43 is operative to process the encoded data received from the mobile terminal 1 to convert it into a suitable message for reproduction by the mobile terminal 3. For example, the user of mobile terminal 3 may not have a movement enabler 25. In such an instance, the translation server may generate the message such that the output produced by the mobile terminal 3 is an audible and/or visible output. That is, data encoded from the motion sensor 21 and/or pressure sensor 23 is detected by the translation server 43 and is converted into an encoded signal for generating a different type of output from the sensed input.

For example, the encoded signals representing the touch input sensed by the motion sensor 21 and the pressure sensor 23 may be analysed by the translation server 43, where it is determined that these signals are indicative of the user of

FITBIT 1002
Fitbit v. Immersion

mobile terminal 1 stroking the mobile terminal. The translation server 43 then accesses a look-up table to determine to which type of output this type of input should be mapped. In this example, it is indicated that the output should be mapped to a simulated voice output generating an "oooh" sound. Similarly, if the translation server determines that the signals input to the movement sensor 21 and pressure sensor 23 are indicative of the mobile terminal 1 being squeezed by the user, the look-up table may indicate that the appropriate output is an audio voice simulation output generating the sound "aaah". Further, if it is determined from the sensors 21,23 that the mobile terminal has been shaken, the look-up table may indicate that the appropriate output is the signal to cause the display 11 of the mobile terminal 3 to have a red colour. Furthermore, if the signals derived from the sensor 21,23 indicate that the mobile terminal has been dropped, the appropriate output message may be a signal to cause the display to flash between red and blue colours.

It should of course be understood that these are merely examples of the translation of types of input to types of output. The output may stimulate more than one sense - for example, the output may produce both an audible and a visual stimulus to the user of mobile terminal 3, or a visual output and a touch output.

The mapping of the inputs of mobile terminal 1 to the appropriate output of mobile terminal 3 may be predetermined or preset by the mobile terminal 1, the mobile terminal 3 or the network 9. The mapping may depend upon the functionality of the mobile terminal 1 and/or the mobile terminal 3 - for example, whether the terminal has the facility to detect and/or reproduce movement. The type of message that needs to be generated by the translation server 43 to cause the receiving mobile terminal 3 to produce the desired output type may depend upon the particular type of mobile terminal 3, and this

FITBIT 1002
Fitbit v. Immersion

information may be obtained from the look-up table. If the mobile terminal 3 has a standard operating system, this may not be necessary.

As indicated above, the mapping of particular input stimuli to output stimuli may be predetermined or pre-set. The user of mobile terminal and/or the user of mobile terminal 3 may be able to select which input stimuli are mapped to which output stimuli, for example by appropriate data communication with the translation server 43. For example, the users of mobile terminals 1 and 3 may agree a particular form of communication between themselves. For example, the users may agree that the sensed squeezing of the mobile terminal 1 by pressure sensor 23 will cause heat generation by heating element 27 in mobile terminal 3. This allows the user of mobile terminals 1 and 3 to communicate in a manner that will not disturb others around them and which is only understandable to the users. Even if the heat output at the mobile terminal 3 was detected by the person other than the authorised user of mobile terminal 3, that person would not know what the generation of heat signified. If desired, this allows communications between the users of the mobile terminals 1 and 3 that have an element of secrecy.

The table below shows the entries of the look-up table stored in the translation server 43 in relation to the mobile terminal 1, indicating the appropriate output to receiving mobile terminals A,B,C and D, depending upon the input from mobile terminal 1.

	Mobile terminal 1			
Input	**Output of Mobile terminal A**	**Output of Mobile terminal B**	**Output of Mobile terminal C**	**Output of Mobile terminal D**
Vertical stroke	Simulation of vertical stroke	Audio: "oooh"	Vibration	MMS image:
Squeeze	Simulation of Squeeze	Audio: "aaah".	Heat generation	MMS image:
Shake	Simulation of	Display	Audio: "John	MMS image:

FITBIT 1002
Fitbit v. Immersion

	Shake	colour to red	is fine"	
Drop	Simulation of Drop	Display flashes red/blue	Audio: "John is cross"	MMS image:

The mapping of particular input stimuli to output stimuli between any pair of mobile terminals may be set by the users of those terminals, or may be preset in dependence upon the input and output facilities of those terminals.

The mapping may also be set or altered by a third party - i.e. not the mobile terminals or the network. For example, mapping data may be obtained from a website and passed to the translation server 43. Such a website may, by way of illustration, be for users interested in massage. Details of the type of mobile terminals 1 and 3 may be provided to the website. The website may then provide for downloading suitable mapping coding that allows the user of mobile terminal 1 to cause the mobile terminal 3 to produce a touch output for performing a particular type of massage. The user of the mobile terminal 1 may do this by providing as an input a particular touch input, alphanumeric character or sound. The website may download a menu for providing a user interface for the user of mobile terminal 1 that provides a convenient mechanism for the desired touch output for mobile terminal 3 to be selected.

As an alternative, or in addition to, the translation server 43 being provided by the network core 35, the mobile terminal 1 may be provided with a data processing function that generates an appropriately formatted message that produces the desired output stimuli on the mobile terminal 3 when transmitted to that mobile terminal 3 without modification. Alternatively, the receiving mobile terminal 3 may receive encoded signals from the sensors 21 and/or 23 of the sending mobile terminal and may include a data processing function for converting those received data to an appropriate message to generate the desired output stimuli on the mobile terminal 3. These data processing functions may require a considerable amount of processing power, and at

FITBIT 1002
Fitbit v. Immersion

present it is preferred that these are performed by the network core 35, rather than the mobile terminals 1 and 3.

It should be understood that an output corresponding to the input stimuli of the mobile terminal 1 may be transmitted (possibly simultaneously) to a plurality of receiving terminals. The output stimuli generated by each of the receiving terminals may be different, in dependence upon the data in the relevant part of the look-up table accessed by the translation server 43 in respect of the receiving terminal and/or upon the output facilities of the receiving mobile terminal.

The touch output generated by the receiving mobile terminal may be in addition to conventional forms of visual and/audio output. During a single communication session (such as an IMS SIP controlled communication session), voice data, other audio data, picture data and touch data may be transmitted, providing an enriched communications experience between the users of mobile terminals 1 and 3.

FITBIT 1002
Fitbit v. Immersion

CLAIMS

1. A mobile telecommunications network (9) including a plurality of terminals (1,3) registered with the network (9), wherein a first of said terminals (1) includes means (21,23) for sensing the variation of a touch input with respect to time and/or the intensity of the touch input and generating a signal representative thereof; and including means for generating a message representative of said signal; and means for transmitting the message to a second of said terminals (3) for generating an output in response to the message that is indicative of the touch input.

2. The network of claim 1, wherein the message is generated by a data processor of the first terminal (1).

3. The network of claim 1, wherein the message is generated by a data processor of an entity separate from the first terminal (1).

4. The network of claim 1, wherein the message is generated by a data processor associated with the mobile telecommunications network (9).

5. The network of claim 1, wherein the output is generated by a data processor of the second terminal (3).

FITBIT 1002
Fitbit v. Immersion

6. The network of any one of claims 1 to 5, wherein the output is a simulation or approximation of the touch input.

7. The network of any one of claims 1 to 5, wherein the output is indicative of the touch input but is an audible and/or visible output.

8. The network of any one of claims 1 to 7, including means (43) for mapping selected inputs to generate selected outputs to provide a predetermined relationship therebetween.

9. The network of claim 8, wherein said mapping is determined by the first terminal (1).

10. The network of claim 8, wherein said mapping is determined by the second terminal (3).

11. The network of claim 8, wherein said mapping is determined by the mobile telecommunications network (9).

12. The network of claim 8, wherein said mapping is determined by a third party entity, separate from said terminals and the mobile telecommunications network (9).

FITBIT 1002
Fitbit v. Immersion

13. The network of any one of claims 1 to 12, wherein the sensing means includes a motion sensor (21).

14. The network of claim 13, wherein the motion sensor (21) includes a micro-accelerometer.

15. The network of any one of claims 1 to 14, wherein the sensing means includes a pressure sensor (23).

16. The network of claim 15, wherein the pressure sensor (23) includes a piezoelectric device.

17. The network of any one of claims 1 to 16, wherein the network (9) comprises a GSM mobile telecommunications network.

18. The network of any one of claims 1 to 16, wherein the network (9) comprises a UMTS (3G) mobile telecommunications network.

19. The network of any one of claims 1 to 18, wherein the network comprises a GPRS mobile telecommunications network.

20. The network of any one of claims 1 to 19, wherein the message is transmitted in a push-to-talk over cellular (PoC) communication session.

FITBIT 1002
Fitbit v. Immersion

21. The network of any one of claims 1 to 20, wherein the message is transmitted in a session initiation protocol (SIP) session.

22. The network of any one of claims 1 to 19, wherein the message is an SMS message.

23. The network of any one of claims 1 to 19, wherein the message is an MMS message.

24. A mobile telecommunications network (9), including means for receiving a message from a first terminal (1) for delivery to a second terminal (3) and for converting the message between a first type to a second type, wherein at least the first type of message includes data enabling the reproduction of an output by a terminal which output is detectable by the sense of touch and varies with respect to time and/or varies in intensity in dependence upon the content of the message.

25. The network of claim 24 wherein the second type of message includes data enabling the production of an output by a terminal detectable by the sense of touch.

FITBIT 1002
Fitbit v. Immersion

26. The network of claim 24, wherein the second type of message includes data enabling the production of an audible output.

27. The network of claim 24, wherein the second type of message includes data enabling the production of a visible output by a terminal.

28. A terminal (1,3) for use with a mobile telecommunications network (9), the terminal (1,3) including means (21,23) for sensing a variation of a touch input with respect to time and/or the intensity of the touch input and generating a signal representative thereof, a representation of which is for inclusion in a message for transmission to another terminal for generating an output in response to the message that is indicative of the touch input.

29. A terminal (1,3) for use with a mobile telecommunications network (9), the terminal (1,3) including means for receiving a message representative of an input signal generated by another terminal, means (25,26,27) for generating an output detectable by the sense of touch and which varies with respect to time and/or in intensity in dependence upon the content of the message.

30. A method of operating a mobile telecommunications network (9) having a plurality of terminals (1,3), the method including generating at a first of said terminals (1) a signal representative of how a touch input varies with respect to time and/or the intensity of the touch input, generating a message

FITBIT 1002
Fitbit v. Immersion

representative of the signal, transmitting the message to a second of said terminals (3), and generating an output at the said second terminal (3) in response to the message that is indicative of the touch input.

31. The method of claim 30, including generating the message at the first terminal (1).

32. The method of claim 30, including generating the message using a data processor associated with the mobile telecommunications network (9).

33. The method of claim 30, 31 or 32, wherein the output is a simulation or approximation of the touch input.

34. The method of claim 30, 31,32 or 33, wherein the output is indicative of the touch input but is an audible and/or visible output.

35. The method of any one of claims 30 to 34, including receiving said signal representative of how a touch input varies with respect to time or the intensity of the touch input, generating said message such that said output is produced for stimulating a selected human sense.

36. The method of any one of claims 30 to 35, including transmitting the message in a push-to-talk over cellular (PoC) communication session.

FITBIT 1002
Fitbit v. Immersion

37. The method of any one of claims 30 to 35, including transmitting the message in a session initiation protocol (SIP) communication session.

38. The method of any one of claims 30 to 35, including transmitting the message as an SMS message.

39. The method of any one of claims 30 to 35, including transmitting the message as an MMS message.

40. The method of any one of claims 30 to 39, wherein the mobile telecommunications network comprises a GSM, GPRS or UMTS (3G) mobile telecommunications network.

41. A mobile telecommunication network (9) including means for generating a message containing information for use by the user of a terminal, means for transmitting the message to said mobile terminal, and means for conveying the information to the user of said mobile terminal by stimulating the user's sense of touch.

FITBIT 1002
Fitbit v. Immersion

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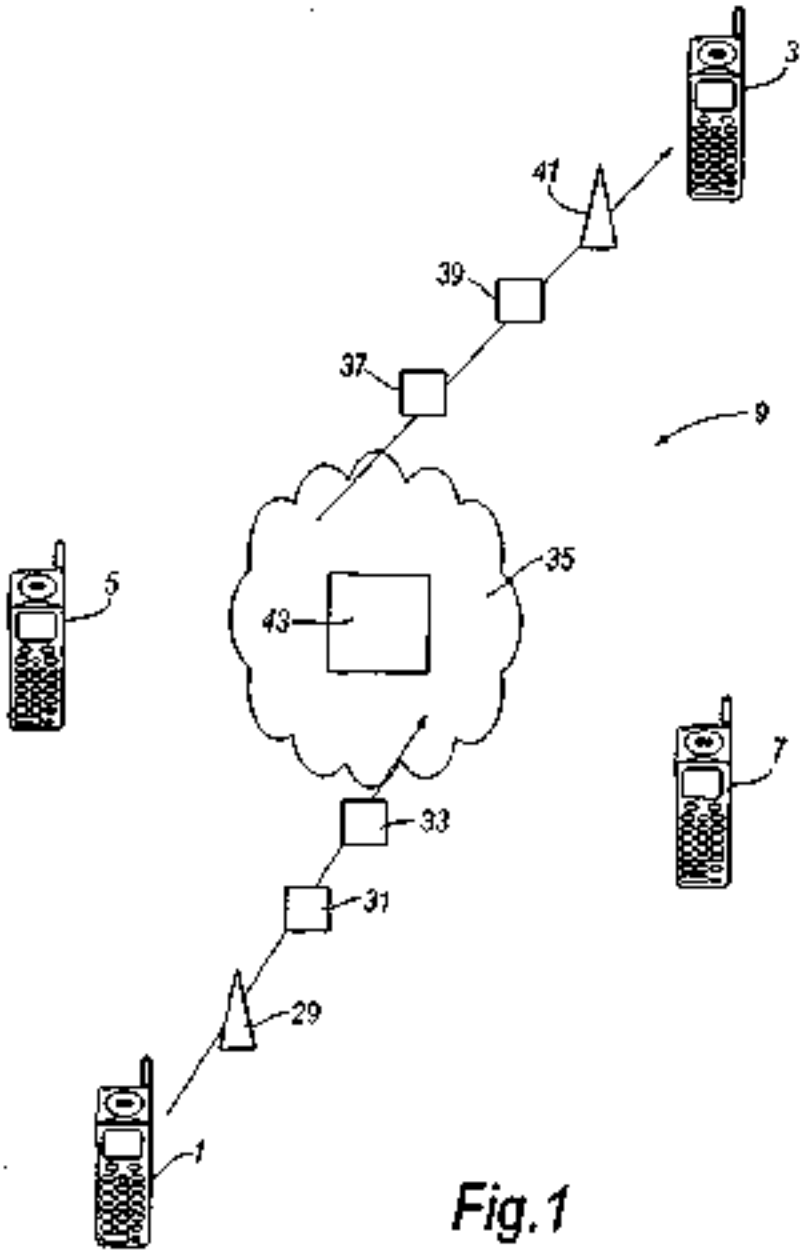


Fig.1

FITBIT 1002
Fitbit v. Immersion

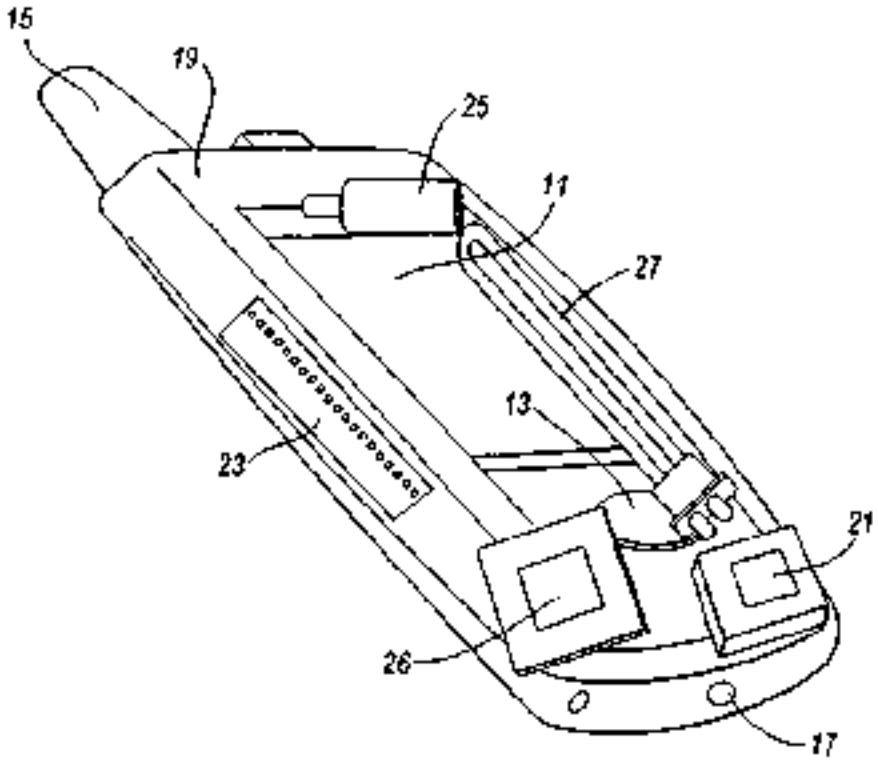


Fig.2

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB2005/003046

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04M1/725 G06F3/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04M G06F A61H A63H G09G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2004/125120 A1 (WEINER MICHAEL) 1 July 2004 (2004-07-01) the whole document	1-41
X	US 2003/069470 A1 (LEE CHING-CHUAN) 10 April 2003 (2003-04-10) abstract paragraph '0001! paragraph '0007! - paragraph '0008! paragraph '0015! - paragraph '0024!	1-41

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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
3 November 2005	11/11/2005

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Kim-Nayser, M

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FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB2005/003046

C(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 1 376 316 A (BRITISH TELECOMMUNICATIONS PUBLIC LIMITED COMPANY) 2 January 2004 (2004-01-02) paragraph '0001! paragraph '0005! - paragraph '0006! paragraph '0015! paragraph '0018! paragraph '0023! paragraph '0029! paragraph '0033!	1-41
X	DE 37 05 262 A1 (DIKEOULIAS,VASSILIOS,DIPL.-ING; DIKEOULIAS, VASSILIOS, DIPL.-ING., 66]) 1 September 1988 (1988-09-01) abstract column 2, line 20 - column 4, line 11 .	1-41
X	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 04, 30 April 1999 (1999-04-30) & JP 11 015600 A (MATSUSHITA ELECTRIC IND CO LTD), 22 January 1999 (1999-01-22) abstract	1-41
X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 05, 14 September 2000 (2000-09-14) & JP 2000 049956 A (SHARP CORP), 18 February 2000 (2000-02-18) abstract	1-41
X	DE 100 22 336 A1 (RALL, JUERGEN) 29 November 2001 (2001-11-29) the whole document	1-41
X	WO 98/14860 A (SENSE TECHNOLOGY B.V. I.O; KARMAN, CHRISTINE; DE ROOI, MARK) 9 April 1998 (1998-04-09) page 1, line 1 - page 5, line 13 page 5, line 26 - line 29 page 6, line 1 - line 10	1-41

Form PCT/ISA/210 (continuation of second sheet) (January 2004)

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int... Application No
PCT/GB2005/003046

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 2004125120	A1	01-07-2004	NONE	
US 2003069470	A1	10-04-2003	NONE	
EP 1376316	A	02-01-2004	AU 2003279960 A1	19-01-2004
			CA 2498273 A1	08-01-2004
			WO 2004003717 A1	08-01-2004
DE 3705262	A1	01-09-1988	AT 113516 T	15-11-1994
			WO 8806077 A2	25-08-1988
			EP 0347415 A1	27-12-1989
JP 11015600	A	22-01-1999	NONE	
JP 2000049956	A	18-02-2000	NONE	
DE 10022336	A1	29-11-2001	NONE	
WO 9814860	A	09-04-1998	AU 4402897 A	24-04-1998
			NL 1004195 C1	07-04-1998

Form PCT/ISA/210 (patent family annex) (January 2004)

FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Renee Prevette
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	14755927
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	22-JAN-2013
Filing Date:	14-JUL-2009
Time Stamp:	14:14:03
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	819
Deposit Account	201430
Authorized User	KILPATRICK TOWNSEND & STOCKTON, LLP

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

FITBIT 1002
Fitbit v. Immersion

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	IDSLetter.pdf	208433	no	5
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	PTOSB08.pdf	59156	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	WO2005013363A1.pdf	1132583	no	30
Warnings:					
Information:					
4	Non Patent Literature	IMM312CNOfficeAction11-13-2012.pdf	577985	no	9
Warnings:					
Information:					
5	Fee Worksheet (SB06)	fee-info.pdf	30366	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	2008523		

FITBIT 1002
Fitbit v. Immersion

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	Conf. No.: 6699
Serial No. 12/502,702	Art Unit: 2688
Filed: July 14, 2009	Examiner: Wong, Kin C.
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	
Attorney Ref. IMM351 (51851-378586)	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☒ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

Chinese Office Action dated November 13, 2012 for corresponding Chinese Patent Application No. 200980127978.1.

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

FITBIT 1002
Fitbit v. Immersion

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below. or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☒ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

FITBIT 1002
Fitbit v. Immersion

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☒ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 20-1430.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 20-1430 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted.

Date: 1/18/2013

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):

- ☒ PTO/SB/08
- ☒ Documents
- ☒ Fee
- ☐ Other

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Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet | 1 | of | 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2668
Examiner Name	Wong, Kim C
Attorney Docket Number	IMM351 (51851/378586)

U.S. PATENT DOCUMENTS

Examiner Initial *	Cite No.[1]	Document Number Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	1.	Chinese Office Action dated November 28, 2012 for corresponding Chinese Patent Application No. 200980127938.7.	

Examiner Signature		Date Considered	

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	14874606
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	05-FEB-2013
Filing Date:	14-JUL-2009
Time Stamp:	10:09:26
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	IDSLetter.pdf	206955	no	5

Warnings:	
Information:	

FITBIT 1002
Fitbit v. Immersion

2	Information Disclosure Statement (IDS) Form (SB08)	PTOSB08.pdf	57479 5066589587794c17ce78dc1bb1528f5eb377b1bc	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	IMM314CNOA11-29-2012.pdf	6812233 fc57964fb07939116ec691bd60412af598e6ee2be	no	7
Warnings:					
Information:					
		Total Files Size (in bytes):	7076667		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	)	
	)	Conf. No.: 6699
Serial No. 12/502,702	)	
	)	Art Unit: 2688
Filed: July 14, 2009	)	
	)	Examiner: Wong, Kin C.
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	)	
Attorney Ref. IMM351 (51851-378586)	)	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☐ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☒ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

Chinese Office Action dated November 29, 2012 for corresponding Chinese Patent Application No. 200980127938.7.

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. | | within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

FITBIT 1002
Fitbit v. Immersion

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☐ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☒ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☒ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

FITBIT 1002
Fitbit v. Immersion

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☐ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☒ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 20-1430.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 20-1430 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date. 2/5/2013

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):
- ☒ PTO/SB/08
- ☒ Documents
- ☐ Fee
- ☐ Other

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
12/502,702	07/14/2009	David Birnbaum	IMM351 (51851/P7836US0)	6619

3430 1590 02/08/2013

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
WONG, KIN C	

ART UNIT	PAPER NUMBER
2628	

MAIL DATE	DELIVERY MODE
02/08/2013	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Applicant-Initiated Interview Summary	Application No.	Applicant(s)	
	12/502,702	BIRNBAUM ET AL	
	Examiner	Art Unit	
	K. Wong	2688	

All participants (applicant, applicant's representative, PTO personnel):

(1) *K. Wong*. (3)_____.

(2) *Mr. M. Morlock* (4)_____

Date of Interview: *06 February 2013*

Type ☒ Telephonic ☐ Video Conference
☐ Personal [copy given to: ☐ applicant ☐ applicant's representative]

Exhibit shown or demonstration conducted: ☐ Yes ☐ No.
If Yes, brief description. _____.

Issues Discussed ☐101 ☐112 ☒102 ☒103 ☐Others
(For each of the checked boxes above, please describe below the issue and detailed description of the discussion)

Claim(s) discussed: *claim 1 and general for other claims*.

Identification of prior art discussed: *Bartlett (6573883)*.

Substance of Interview
(For each issue discussed, provide a detailed description and indicate if agreement was reached. Some topics may include: identification or clarification of a reference or a portion thereof, claim interpretation, proposed amendments, arguments of any applied references etc...)

Applicant's representative argued the Advisory action suggesting a new ground of rejection. Applicant is suggested to file an Appeal, or Pre-appeal.

Applicant recordation instructions: The formal written reply to the last Office action must include the substance of the interview. (See MPEP section 713.04). If a reply to the last Office action has already been filed, applicant is given a non-extendable period of the longer of one month or thirty days from this interview date, or the mailing date of this interview summary form, whichever is later, to file a statement of the substance of the interview.

Examiner recordation instructions: Examiners must summarize the substance of any interview of record. A complete and proper recordation of the substance of an interview should include the items listed in MPEP 713.04 for complete and proper recordation including the identification of the general thrust of each argument or issue discussed, a general indication of any other pertinent matters discussed regarding patentability and the general results or outcome of the interview, to include an indication as to whether or not agreement was reached on the issues raised.

☐ Attachment

/K. Wong/ Primary Examiner Art Unit 2688	

FITBIT 1002
Fitbit v. Immersion

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record
A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews
Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.
All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:
- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:
1) A brief description of the nature of any exhibit shown or any demonstration conducted,
2) an identification of the claims discussed,
3) an identification of the specific prior art discussed,
4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
5) a brief identification of the general thrust of the principal arguments presented to the examiner,
   (The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
6) a general indication of any other pertinent matters discussed, and
7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	David Birnbaum
Application No.	:	12/502,702
For	:	**SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**
Filed	:	July 14, 2009
Examiner	:	Kin C. Wong
Art Unit	:	2627
Confirmation No.	:	6699

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRE-APPEAL BRIEF

Sir:

Appellant requests a review of this application prior to submission of an Appeal Brief.

Remarks begin on page 2 of this paper.

FITBIT 1002
Fitbit v. Immersion

REMARKS

The Final Office Action mailed on November 13, 2012 ("Office Action") rejects claims 1-31 for non-statutory obviousness type double patenting. Further, the Office Action rejects claims 1-31 as allegedly anticipated under 35 U.S.C. § 102(b) by U.S. 6,573,883 to Bartlett ("Bartlett"). The Office Action further rejects claims 10, 16, and 29 as allegedly obvious under 35 U.S.C. § 103 in view of Bartlett and U.S. 8,306,576 to Cho ("Cho").

Appellant respectfully asserts that the rejection of claims 1-31 under 35 U.S.C. § 102(b) in view of Bartlett is improper.[1] "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." MPEP § 2131, quoting *Verdegaal Bros. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987). The Office Action fails to establish that Bartlett discloses each and every limitation of claims 1-31. Specifically, the Office Action fails to establish that Bartlett discloses determining a haptic effect based at least in part on the first data signal and outputting the haptic effect. And in the Advisory Action mailed January 15, 2013 ("Advisory Action"), the Examiner apparently acknowledges this deficiency.

In the Advisory Action the Examiner appears to recognize that the rejection is improper, as the Examiner states "as hindsight argendo [sic] in view of the above reconsiderations, col. 5, line 32 to col. 6, line 17 of Cho et al (8306576) where Cho et al describes the haptic effects between two mutual apparatus(s)." Appellant respectfully notes that, regardless of whether this is correct, the Office Action does not reject claims 1-31 over the combination of Cho and Bartlett. Rather, the Office Action rejects claims 1-31 under 35 U.S.C. § 102(b) in view of Bartlett alone. Bartlett does not disclose or suggest a processor configured to "determine a haptic effect based at least in part on the first data signal and outputting the haptic effect."

Appellant has twice presented this argument. In the response to Arguments section, the Office Action states that "regarding to [sic] Bartlett: applicant asserted that Bartlett fails to disclose the touch sensing; and thus, further asserted that Bartlett fails to have the haptic effect. Applicant is directed to figure 5 of Bartlett and the associated descriptions for details." Office Action, p. 6.

[1] Appellant further traverses the rejection of claims 1-31 for non-statutory obviousness type double patenting and the rejection of claims 10, 16, and 29 as allegedly obvious under 35 U.S.C. § 103 in view of Bartlett and Cho. But due to space constraints, addresses only the 35 U.S.C. § 102 rejection here.

FITBIT 1002
Fitbit v. Immersion

Appellant respectfully notes that Bartlett figure 5 does not disclose "determine a haptic effect based at least in part on the first data signal and outputting the haptic effect." Rather, Figure 5 discloses receiving gesture and position commands from a user. *e.g.* Bartlett Col. 6:19-26. This may disclose receiving data from a user based on the user's movements or movements of the mobile device. But this does not disclose or suggest determining a haptic effect, and then *outputting* that haptic effect *to the user*.

Furthermore, Appellant respectfully notes that in the rejection of this limitation, the Office Action cites Bartlett col. 6:27-36. Appellant respectfully notes that this passage of Bartlett discloses:

> The display device 700 is used to observe images that are stored in a database. Scrolling position commands are used to scroll from image to image displayed on a display screen 710 until an image of interest is found. A gesture command then activates the displayed image for more detailed viewing. Additional gesture commands serve to "zoom" in to observe the selected image in greater detail or to zoom out to observe a greater portion of the image or the entire image. Position commands, again, serve to scroll the image across the display screen 710.
>
> Bartlett col. 6:27-36

Appellant respectfully notes that this does not disclose or suggest a haptic effect. Rather, it discloses a visual effect (e.g. images) and scrolling to view this visual effect.

Furthermore, Appellant respectfully notes with regard to "outputting the haptic effect" the Office Action merely states "(as illustrated in figures 5 and 6 of Bartlett and see associated descriptions for details)." Office Action, p. 5. Appellant respectfully notes that neither Figures 5 nor 6 disclose outputting a haptic effect. Rather, these Figures relate to detecting gestural commands (e.g. the user moving the device), but in no way relate to outputting a haptic effect.

Further, in the Advisory Action the Examiner states "applicant argue [sic] that Barlett's [sic] gesture commands of rolling, pitching and shaking (vibrating) are not the haptic [sic] or motions have translated into haptic effect in the apparatus of Barlett [sic]." This is incorrect. Appellant argues that Bartlett does not disclose outputting a haptic effect, for example, Bartlett does not describe *any* vibration based effect. Rather, Bartlett discloses controlling a device with gestures.

Accordingly, Appellant respectfully requests reversal of the 35 U.S.C. § 102 rejection of claim 1. Appellant further requests reversal of the 35 U.S.C. § 102 rejections of claims 2-14,

FITBIT 1002
Fitbit v. Immersion

which depend from and further limit claim 1, and are thus allowable for at least the same reasons as claim 1.

Appellant respectfully requests reversal of the 35 U.S.C. § 102 rejection of claim 15. Appellant further requests reversal of the 35 U.S.C. § 102 rejections of claims 16-26, which depend from and further limit claim 1, and are thus allowable for at least the same reasons as claim 15.

Appellant respectfully requests reversal of the 35 U.S.C. § 102 rejection of claim 27. Appellant further requests reversal of the 35 U.S.C. § 102 rejections of claims 28-31, which depend from and further limit claim 27, and are thus allowable for at least the same reasons as claim 27.

Respectfully submitted,

Date: 2/13/2013 / Michael T. Morlock /

Michael Morlock
Reg. No. 62,245

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1001 West Fourth Street
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FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Notice of appeal	1401	1	630	630
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
			Total in USD ($)	**630**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	14954049
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock
Filer Authorized By:	
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	13-FEB-2013
Filing Date:	14-JUL-2009
Time Stamp:	18:07:37
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$630
RAM confirmation Number	8007
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

EXHIBIT 1002
Fitbit v. Immersion

1	Notice of Appeal Filed	Noticel.PDF	216390 b3ca4d27fbf4b798e7c7a9a422a6abbb69814694	no	2
Warnings:					
Information:					
2	Pre-Brief Conference request	IMM351.pdf	94342 66540ff42108f56125e0bf45f9a58633ea306de7	no	4
Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	30228 d45f150a4a4be8428425ed6f4ad5db56ba2d3747	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	340960		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

PTO/SB/31 (09-12)
Approved for use through 09/01/2013. OMB 0651-0031
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

NOTICE OF APPEAL FROM THE EXAMINER TO THE PATENT TRIAL AND APPEAL BOARD

Docket Number (Optional)
IMM351(51651/378586)

I hereby certify that this correspondence is being facsimile transmitted to the USPTO or EFS-Web transmitted to the USPTO, or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)]

on _____

Signature _____

Typed or printed name _____

In re Application of
David M. Birnbaum

Application Number	Filed
12/502,702	July 14, 2009

For Systems And Methods For Transmitting Haptic Messages

Art Unit	Examiner
2688	Kin C. Wong

Applicant hereby appeals to the Patent Trial and Appeal Board from the last decision of the examiner.

The fee for this Notice of Appeal is (37 CFR 41.20(b)(1)) $ 630.00

☐ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by half, and the resulting fee is: $ _____

☐ A check in the amount of the fee is enclosed.

☑ Payment by credit card. Form PTO-2038 is attached

☐ The Director has already been authorized to charge fees in this application to a Deposit Account.

☑ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 20-1430 .

☐ A petition for an extension of time under 37 CFR 1.136(a) (PTO/SB/22) is enclosed

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

☐ applicant/inventor.

☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96)

☑ attorney or agent of record. Registration number 62,245

☐ attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____

/ Michael T. Morlock /
Signature

Michael Morlock
Typed or printed name

336/607-7300
Telephone number

2/13/2013
Date

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.

This collection of information is required by 37 CFR 41.31. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11, 1.14 and 41.6. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FITBIT 1002
Fitbit v. Immersion

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2688
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (5155/378586)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.*	Document Number: Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[7]
	1	Chinese Office Action dated November 29, 2012 for corresponding Chinese Patent Application No. 200980127804.7.	

Examiner Signature		Date Considered	

FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Renee Prevette
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	15036767
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	25-FEB-2013
Filing Date:	14-JUL-2009
Time Stamp:	12:20:29
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	12547
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

EXHIBIT 1002
Fitbit v. Immersion

1	Transmittal Letter	IDSLetter.pdf	208594 a100b548b0e553e23be93f7ad5e120ca61aba445	no	5
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	PTOSB08.pdf	58203 9bcbf8c6e53074c788d52dad527d4a0d27dc6f6f	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	CNOAdated11-29-2012WithEnglishTranslation.pdf	1235175 76876743f461d671d17ca60c8d210cfbd35faffb	no	20
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30364 ed99038c9fca0641740cf2e4811d4965daac3936	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1532336		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	)	
	)	Conf. No.: 6699
Serial No. 12/502,702	)	
	)	Art Unit: 2688
Filed: July 14, 2009	)	
	)	Examiner: Wong, Kin C.
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	)	
Attorney Ref. IMM351 (51851-378586)	)	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☐ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☒ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

Chinese Office Action dated November 29, 2012 for corresponding Chinese Patent Application No. 200980127938.7.

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

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Fitbit v. Immersion

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☐ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☒ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

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Fitbit v. Immersion

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☒ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 20-1430.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 20-1430 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date. 2/24/2013

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):
- [x] PTO/SB/08
- [x] Documents
- [x] Fee
- [ ] Other

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
12/502,702	07/14/2009	David Birnbaum	IMM351 (51851/P7836US0)	6619

3430 1590 03/04/2013

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
WONG, KIN C	

ART UNIT	PAPER NUMBER
2628	

MAIL DATE	DELIVERY MODE
03/04/2013	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of Panel Decision from Pre-Appeal Brief Review	Application No. 12/502,702	Applicant(s) BIRNBAUM ET AL.
	Examiner K. Wong	Art Unit 2688

This is in response to the Pre-Appeal Brief Request for Review filed 13 February, 2013.

1. ☐ **Improper Request** – The Request is improper and a conference will not be held for the following reason(s):

☐ The Notice of Appeal has not been filed concurrent with the Pre-Appeal Brief Request.
☐ The request does not include reasons why a review is appropriate.
☐ A proposed amendment is included with the Pre-Appeal Brief request.
☐ Other: .

The time period for filing a response continues to run from the receipt date of the Notice of Appeal or from the mail date of the last Office communication, if no Notice of Appeal has been received.

2. ☐ **Proceed to Board of Patent Appeals and Interferences** – A Pre-Appeal Brief conference has been held. The application remains under appeal because there is at least one actual issue for appeal. Applicant is required to submit an appeal brief in accordance with 37 CFR 41.37. The time period for filing an appeal brief will be reset to be one month from mailing this decision, or the balance of the two-month time period running from the receipt of the notice of appeal, whichever is greater. Further, the time period for filing of the appeal brief is extendible under 37 CFR 1.136 based upon the mail date of this decision or the receipt date of the notice of appeal, as applicable.

☐ The panel has determined the status of the claim(s) is as follows:
Claim(s) allowed: _____.
Claim(s) objected to: _____.
Claim(s) rejected: _____.
Claim(s) withdrawn from consideration: _____.

3. ☐ **Allowable application** – A conference has been held. The rejection is withdrawn and a Notice of Allowance will be mailed. Prosecution on the merits remains closed. No further action is required by applicant at this time.

4. ☒ **Reopen Prosecution** – A conference has been held. The rejection is withdrawn and a new Office action will be mailed. No further action is required by applicant at this time.

All participants:

(1) *K. Wong*.	(3) *H. Nguyen, SPE*.
(2) *W. Young, SPE*.	(4)_____.

/K. Wong/ Primary Examiner Art Unit: 2688	/Wayne Young/ Supervisory Patent Examiner, Art Unit 2688	/HOA T NGUYEN/ Supervisory Patent Examiner, Art Unit 2686

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2688
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (51851/378586)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	4,873,623	10-10-1989	Lane et al.	
	2	6,909,723	06-07-2005	Forest	
	3.	7,061,882	07-25-2006	Sowden et al.	
	4.	7,460,110	11-11-2008	Shahoian et al.	
	5	7,548,232	06-16-2009	Shahoian et al.	
	6	2006/0028453	02-09-2006	Kawabe	
	7	2007/0040810	02-22-2007	Dowe et al.	
	8	2008/0165163	07-10-2008	Westerman et al.	
	9	2009/0073118	03-19-2009	Yamaji et al.	
	10.	2009/0295743	12-03-2009	Nakajima	
	11.	2010/0013777	01-21-2010	Baudisch et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	12	Chinese Office Action dated December 6, 2012 for corresponding Chinese Patent Application No. 200980127935.1	
	13.	Chinese Office Action dated January 31, 2013 for corresponding Chinese Patent Application No. 200980128008.3.	
	14.	Office Action dated February 28, 2013 for corresponding United States Patent Application No. 12/502,795	

Examiner Signature		Date Considered	

FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Renee Prevette
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	15198963
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	13-MAR-2013
Filing Date:	14-JUL-2009
Time Stamp:	08:25:09
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	11621
Deposit Account	201430
Authorized User	KILPATRICK TOWNSEND & STOCKTON, LLP

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

FITBIT 1002
Fitbit v. Immersion

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	IDSLetter.pdf	212940	no	5
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	PTOSB08.pdf	69704	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	IMM310CNOA12-06-12.pdf	9836792	no	10
Warnings:					
Information:					
4	Non Patent Literature	IMM351CNOA01-31-13.pdf	15649718	no	13
Warnings:					
Information:					
5	Non Patent Literature	IMM314USOA02-28-13.pdf	17001792	no	20
Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	30364	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	42851376		

FITBIT 1002
Fitbit v. Immersion

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	Conf. No.: 6699
Serial No. 12/502,702	Art Unit: 2688
Filed: July 14, 2009	Examiner: Wong, Kin C.
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	
Attorney Ref. IMM351 (51851-378586)	

INFORMATION DISCLOSURE STATEMENT

Commissionet for Patents
P.O. Box 1450
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II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☒ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

Chinese Office Action dated December 6, 2012 for corresponding Chinese Patent Application No. 200980127939.1, English translation provided.

Chinese Office Action dated January 31, 2013 for corresponding Chinese Patent Application No. 200980128008.3, English translation provided.

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

FITBIT 1002
Fitbit v. Immersion

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

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V. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☒ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

FITBIT 1002
Fitbit v. Immersion

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☒ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

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FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 20-1430 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 3/12/2013

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):

- ☒ PTO/SB/08
- ☒ Documents
- ☒ Fee
- ☐ Other

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2688
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (51851/378586)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number - Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	7,176,886	02-13-2007	Marvit et al	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document - Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	2	Office Action dated February 27, 2013 for corresponding United States Patent Application No. 12/697,030.	

Examiner Signature		Date Considered	

FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Renee Prevette
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	15443705
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	05-APR-2013
Filing Date:	14-JUL-2009
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RAM confirmation Number	9790
Deposit Account	201430
Authorized User	KILPATRICK TOWNSEND & STOCKTON, LLP

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.16 (National application filing, search, and examination fees)

FITBIT 1002
Fitbit v. Immersion

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	IDSLetter.pdf	207051 fd8da2b7313f34af69d04b3c0f54563e74f7ee0e	no	5
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	PTOSB08.pdf	60574 15c5f71137f719106a3c4d32d4059551bba55de1	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Non Patent Literature	IMM341OA2-27-13.pdf	20898350 3bf7bf8e084b7e3b0c6ebde8d5a96522e88cdeaa	no	24
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	30368 20811e5abef3977343d6c81bde2fd69cbdba6e86	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	21196343		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	Conf. No.: 6699
Serial No. 12/502,702	Art Unit: 2688
Filed: July 14, 2009	Examiner: Wong, Kin C.
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	
Attorney Ref. IMM351 (51851-378586)	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

FITBIT 1002
Fitbit v. Immersion

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☒ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated

FITBIT 1002
Fitbit v. Immersion

in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☒ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 20-1430.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 20-1430 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 4/5/2013

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):

- [x] PTO/SB/08
- [x] Documents
- [x] Fee
- [ ] Other

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
12/502,702	07/14/2009	David Birnbaum	IMM351 (51851/P7836US0)	6619

3430 1590 05/06/2013

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
WONG, KIN C	

ART UNIT	PAPER NUMBER
2628	

MAIL DATE	DELIVERY MODE
05/06/2013	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 12/502,702	Applicant(s) BIRNBAUM ET AL.	
	Examiner K. Wong	Art Unit 2688	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *4 March 2013*.

☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____. the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1-31* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1-31* is/are rejected.

8)☐ Claim(s) _____ is/are objected to

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a)☐ All b)☐ Some * c)☐ None of the:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Interim copies:

a)☐ All b)☐ Some c)☐ None of the: Interim copies of the priority documents have been received.

Attachment(s)

1) ☐ Notice of **References Cited** (PTO-892)

2) ☒ **Information Disclosure Statement(s)** (PTO/SB/08) Paper No(s)/Mail Date _____

3) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____

4) ☐ Other: _____.

This is a response to communication of 3/4/13.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

FITBIT 1002
Fitbit v. Immersion

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims (1-31) are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims (1-29) of copending Application No. 12/502755 (submitted by applicant in IDS {8/10/12}). Although the conflicting claims are not identical, they are not patentably distinct from each other because of variation of wordings (i.e., claims (1, 2 and 10) of 12/502702 vs. claims (1, 4 and 7) of co-pending 12/502755).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims (1-31) are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims (1-23) of copending Application No. 12/502647 (submitted by applicant in IDS). Although the conflicting claims are not identical, they are not patentably distinct from each other because of variation of wordings (i.e., claims (1,2, 5 and 10) vs. claims (1-4) of copending 12/502647).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

FITBIT 1002
Fitbit v. Immersion

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims (1-9, 11-15 and 17-31) are rejected under 35 U.S.C. 102(b) as being anticipated by Bartlett (6573883).

Regarding claim 27: Bartlett discloses a system (as depicted in figure 5 of Bartlett and see associated descriptions for details) including:

a processor (col. 4, lines 46-63 of Bartlett) configured to:

receive a first sensor signal from a first sensor, the first sensor configured to detect a movement of a first mobile device (col. 6, lines 19-26 of Bartlett);

receive a second sensor signal from a second sensor, the second sensor configured to detect an interaction with the first mobile device (col. 6, lines 19-26 of Bartlett);

receive a first data signal from a network interface, the network interface configured to receive signals transmitted by a second mobile device (col. 6, lines 37-46 of Bartlett);

determine a change in a display signal based at least in part on the first data signal and the second sensor signal (col. 6, lines 19-36 of Bartlett);

determine a haptic (sensing user touch or physical contact interface) effect based at least in part on the first data signal (col. 6, lines 27-36 of Bartlett); and

outputting the haptic effect (as illustrated in figures 5 and 6 of Bartlett and see associated descriptions for details).

FITBIT 1002
Fitbit v. Immersion

Regarding claim 28: Bartlett teaches that wherein the first sensor and the second sensor are each configured to detect one or more of: contact, pressure, acceleration, inclination, inertia, or location (col. 6, lines 19-26 of Bartlett).

Regarding claim 29: the limitations of wherein the second sensor comprises a touch-screen are considered inherent because in col. 1, lines 30-62 and col. 5, lines 5-21 of Bartlett where Bartlett describes the function of a touch display unit.

Regarding claim 30: the limitations of wherein the mobile device further comprises a speaker configured to generate a sound effect coordinated with the haptic effect are considered inherent because in col. 5, lines 5-21 of Bartlett where Bartlett describes the highlighting of the haptic effect that which includes audio (sound) and visual.

Regarding claim 31: Bartlett teaches that wherein the processor is further configured to transmit a second data signal to the network interface, and the network interface is further configured to transmit the second data signal (dialing and/or texting) to the second mobile device (col. 6, lines 37-46 of Bartlett).

Regarding claims 1-9, 11-15 and 17-26: method claims (1-9, 11-15 and 17-26) are considered met when the apparatus of Bartlett is been implemented.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

FITBIT 1002
Fitbit v. Immersion

Claims (10, 16 and 29) are rejected under 35 U.S.C. 103(a) as being unpatentable over Bartlett (6573883) in view of Cho et al (8306576).

The reason for Bartlett is stated in above. If Bartlett does not have the touch screen, then, Cho et al is considered for teaching the touch screen (col. 5, lines 32-36 of Cho et al).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the touch screen into Bartlett and as taught by Cho et al. The rationale is as follow: one of ordinary skill in the art would have been motivated to provide a user of easy or recognition of variations of display images and sense of touch as suggested in col. 1, lines 48-52 of Cho et al.

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims (1-31) are rejected under 35 U.S.C. 102(e) as being anticipated by Cho et al (8306576).

Regarding claim 27: Cho et al discloses a system (as depicted in figure 1 of Cho et al) comprising:

a processor (element 180 in figure 1 and see associated descriptions for details) configured to:

receive a first sensor signal from a first sensor, the first sensor configured to detect a movement of a first mobile device (col. 5, lines 12-20 of Cho et al);

FITBIT 1002
Fitbit v. Immersion

receive a second sensor signal from a second sensor, the second sensor configured to detect an interaction with the first mobile device (col. 5, lines 12-20 of Cho et al);

receive a first data signal from a network interface, the network interface configured to receive signals transmitted by a second mobile device (depicted in figure 10 and col. 13, lines 39-65 of Cho et al);

determine a change in a display signal based at least in part on the data signal and the second sensor signal (col. 13, lines 41-57 of Cho et al); and

determine a haptic effect based at least in part on the first data signal (col. 13, line 58 to col. 14, line 6 of Cho et al).

Regarding claim 28: Cho et al teaches that wherein the first sensor and the second sensor are each configured to detect one or more of: contact, pressure, acceleration, inclination, inertia, or location (col. 5, lines 1-20 of Cho et al).

Regarding claim 29: Cho et al teaches that wherein the second sensor comprises a touch-screen (col. 4, line 64 to col. 5, line 20 and col. 8, lines 60-67 of Cho et al).

Regarding claim 30: Cho et al teaches that wherein the mobile device further comprises a speaker configured to generate a sound effect coordinated with the haptic effect (col. 5, line 43 to col. 6, line 17 of Cho et al).

Regarding claim 31: Cho et al teaches that wherein the processor is further configured to transmit a second data signal to the network interface, and the network interface is further configured to transmit the second data signal to the second mobile device (col. 13, lines 58-65 of Cho et al).

FITBIT 1002
Fitbit v. Immersion

Regarding claims 1-26: method claims (1-26) have the same structure as apparatus claims 26-31. Thus, the method claims (1-26) are considered met when the apparatus of Cho et al is been implemented.

Response to Arguments

Applicant's arguments filed 9/17/12 have been fully considered but they are not fully persuasive because the arguments are directed to the new amended claims.

Regarding to Bartlett: applicant asserted that Bartlett fails to disclose the touch sensing; and thus, further asserted that Bartlett fails to have the haptic effect. Applicant is directed to figure 5 of Bartlett and the associated descriptions for details.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to K. Wong whose telephone number is (571) 272-7566.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, W. Young can be reached on (571) 272-7582. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

FITBIT 1002
Fitbit v. Immersion

USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. Wong/
Primary Examiner
Art Unit 2688

kw
28 Apr 13

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2688
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (5155/378586)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.*	Document Number: Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear

FOREIGN PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[7]
	1	Chinese Office Action dated November 29, 2012 for corresponding Chinese Patent Application No. 200980127804.7.	

Examiner Signature	/K. Wong/	Date Considered	04/21/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.W./

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2688
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (51851/378586)

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	4 873 623	10-10-1989	Lane et al.	
	2	6 909 723	06-07-2005	Forest	
	3.	7,061,882	07-25-2006	Sowden et al.	
	4.	7,460,110	11-11-2008	Shahoian et al.	
	5	7,548,232	06-16-2009	Shahoian et al.	
	6	2006/0028453	02-09-2006	Kawabe	
	7	2007/0040810	02-22-2007	Dowe et al.	
	8	2008/0165088	07-10-2008	Westerman et al.	
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Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	12	Chinese Office Action dated December 6, 2012 for corresponding Chinese Patent Application No. 200980127935.1	
	13.	Chinese Office Action dated January 31, 2013 for corresponding Chinese Patent Application No. 200980128008.3.	
	14.	Office Action dated February 28, 2013 for corresponding United States Patent Application No. 12/502,795	

Examiner Signature	/K. Wong/	Date Considered	04/25/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.W./

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2688
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (51851/378586)

U.S. PATENT DOCUMENTS

Examiner Initials *	Cite No.[1]	Document Number - Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	7,476,886	02-13-2007	Marui et al	

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Examiner Initials*	Cite No.[1]	Foreign Patent Document - Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

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	2	Office Action dated February 27, 2013 for corresponding United States Patent Application No. 12/697,030.	

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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.W./

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

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U.S. PATENT DOCUMENTS

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Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	1.	WO 2006/013363 A1	02-09-2006	Vodafone Group PLC		

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Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[6]
	2	Chinese Office Action dated November 13, 2012 for corresponding Chinese Patent Application No. 200980127978.1	

Examiner Signature	/K. Wong/	Date Considered	02/26/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.W./

FITBIT 1002
Fitbit v. Immersion

Index of Claims	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12502702	BIRNBAUM ET AL.
	Examiner	Art Unit
	K WONG	2627

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	+	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

CLAIM		DATE								
Final	Original	06/03/2012	11/10/2012	04/26/2013						
	1	✓	✓	✓						
	2	✓	✓	✓						
	3	✓	✓	✓						
	4	✓	✓	✓						
	5	✓	✓	✓						
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	7	✓	✓	✓						
	8	✓	✓	✓						
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	31	✓	✓	✓						

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet | 1 | of | 1

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Application Number	12/502,702
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First Named Inventor	David M. Birnbaum
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Examiner Name	Wong, Kin C
Attorney Docket Number	IMM351 (51851/378586)

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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]

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	1.	Chinese Office Action dated November 28, 2012 for corresponding Chinese Patent Application No. 200980127938.7.	

Examiner Signature	/K. Wong/	Date Considered	02/22/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.W./

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

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Sheet 1 of 1

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Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (51851/378586)

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Examiner Initials*	Cite No.*	Document Number: Number - Kind Code[1] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
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	2	US-2005/0062480 A1	03-10-2005	Shahoian et al.	

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Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[2] - Number[3] - Kind Code[4] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[5]
	3	JP 2007-531158	11-01-2007	Unknown		X
	4	JP 2007-531163	11-01-2007	Unknown		X
	5	JP 2007-535273	11-29-2007	Unknown		X

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	6.	United States Patent and Trademark Office, Office Action, Application No. 12/697,030, mailed June 3, 2013	
	7.	Notice of Reasons for Rejection, Japanese Application No. 2011-518849, dated May 28, 2013	

Examiner Signature		Date Considered	

FITBIT 1002
Fitbit v. Immersion

No documents available for the priority number.

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DISTINGUISHING TILT AND TRANSLATION MOTION COMPONENTS IN HANDHELD DEVICES

Inventor(s):

Applicant(s):

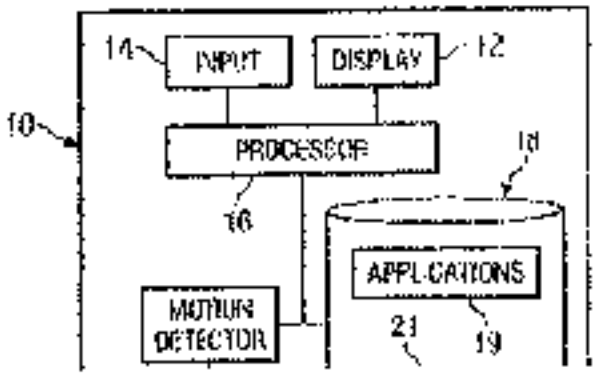
Classification: - international: *G06F1/16; G06F3/00; G06F3/01; G06F3/033; G06F3/048*
- cooperative: G06F1/1613; G06F1/1686; G06F1/1694; G06F3/017; G06F3/0346; G06F2200/1637

Application number: JP20070504983 20050307

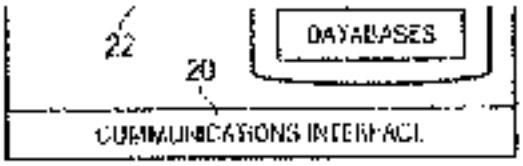
Priority number(s): US20040807560 20040323 ; US20040807571 20040323 ; US20040807589 20040323 ; US20040807567 20040323 ; US20040807572 20040323 ; US20040807565 20040323 ; US20040807569 20040323 ; US20040807561 20040323 ; US20040807559 20040323 ; US20040807564 20040323 ; US20040807570 20040323 ; US20040807558 20040323 ; US20040807563 20040323 ; US20040807566 20040323 ; WO2005US07409 20050307 ; US20040807562 20040323 ; US20040807557 20040323 ; US20040807588 20040323 ; US20040807568 20040323

Also published as: WO2005103863 (A2) WO2005103863 (A3) KR20060134119 (A) KR100853605 (B1) JP2008299866 (A) more

Abstract not available for JP2007531113 (A)
Abstract of corresponding document: WO2005103863 (A2)



FITBIT 1002
Fitbit v. Immersion



A motion controlled handheld device includes a first accelerometer operable to detect acceleration along a first axis and a second accelerometer operable to detect acceleration along a second axis. The second axis is perpendicular to the first axis. The device includes a tilt detection component operable to detect rotation having a component around at least one of the first axis and the second axis and a display operable to present a current image. The device includes a motion tracking module operable to track motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component. The device also includes a controller operable to generate the current image and to modify the current image in response to the motion of the device.

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1109
FITBIT 1002
Fitbit v. Immersion

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審査請求 有　予備審査請求 未請求　（全 49 頁）

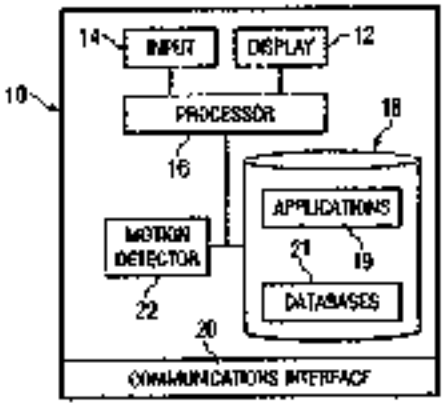
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(33)優先権主張国　米国 (US)
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最終頁に続く

(54)【発明の名称】携帯装置の傾斜及び並進運動成分の測定

(57)【要約】
モーションコントロール携帯装置は、第１の軸に沿う加速度を検出する第１の加速度計と、第２の軸に沿う加速度を検出する第２の加速度計とを有する。第２の軸は第１の軸に垂直である。当該装置は、前記第１の軸及び前記第２の軸の少なくとも一方の回りの傾斜成分を検出するチルト検出素子と、現在の画像を表示するディスプレイとを有する。当該装置は、前記第１の加速度計、前記第２の加速度計及び前記チルト検出素子を用いて３次元での当該装置の運動を追跡するモーション追跡モジュールをさらに有する。当該装置は前記現在の画像を生成し、当該装置の運動に応じて前記現在の画像を変更するコントローラとを有する。



FITBIT 1002
Fitbit v. Immersion

【特許請求の範囲】
【請求項1】
モーションコントロール携帯装置であって、
第1の軸に沿う加速度を検出する第1の加速度計と、
前記第1の軸に垂直な第2の軸に沿う加速度を検出する第2の加速度計と、
前記第1の軸及び前記第2の軸の少なくとも一方の回りの回転成分を検出するチルト検出素子と、
現在の画像を表示するディスプレイと、
前記第1の加速度計、前記第2の加速度計及び前記チルト検出素子を用いて3次元での当該装置の運動を追跡するモーション追跡モジュールと、
前記現在の画像を生成し、当該装置の運動に応じて前記現在の画像を変更するコントローラと、
を有することを特徴とするモーションコントロール携帯装置。
【請求項2】
前記ディスプレイが表示面を有し、
前記第1及び前記第2の軸が前記表示面に実質的に平行である
ことを特徴とする請求項1記載のモーションコントロール携帯装置。
【請求項3】
前記チルト検出素子が、前記第1の軸と垂直であって前記第2の軸とも垂直な第3の軸に沿う加速度を検出する第3の加速度計を有し、
前記モーション追跡モジュールが、前記第3の加速度計で測定された加速度に基づいて、前記第1の軸及び第2の軸のなす面内の並進と、前記第1の軸及び前記第2の軸の少なくとも一方の回りの成分を有する回転とを区別する
ことを特徴とする請求項1記載のモーションコントロール携帯装置。
【請求項4】
前記チルト検出素子が、
前記第1の軸と垂直であって前記第2の軸とも垂直な第3の軸に沿う加速度を検出する第3の加速度計と、
ビデオストリームを生成するカメラと、
前記ビデオストリームに基づいて運動方向を検出するビデオ分析モジュールと、
を有することを特徴とする請求項1記載のモーションコントロール携帯装置。
【請求項5】
前記チルト検出素子が、前記ビデオストリーム中の対象物と当該装置間の距離を含む距離情報を決定する距離測定計を有し、
前記ビデオ分析モジュールが、前記距離を用いて前記距離に関する並進運動の大きさを判定する
ことを特徴とする請求項4記載のモーションコントロール携帯装置。
【請求項6】
前記チルト検出素子が、
第1のビデオストリームを生成し、前記第1の軸と垂直であって前記第2の軸とも垂直な第3の軸に沿う第1方向の成分に合わせられた第1のカメラと、
第2のビデオストリームを生成し、前記第3の軸に沿う第1方向と反対の第2方向の成分に合わせられた第2のカメラと、
前記第1のビデオストリーム及び前記第2のビデオストリームに基づいて、当該装置の運動方向を検出するビデオ分析モジュールと、
を有することを特徴とする請求項1記載のモーションコントロール携帯装置。
【請求項7】
前記チルト検出素子が、前記第3の軸に沿う加速度を検出する第3の加速度計を更に有する

FITBIT 1002
Fitbit v. Immersion

ことを特徴とする請求項5記載のモーションコントロール携帯装置。
【請求項8】
前記ビデオ分析モジュールが、
前記第1のビデオストリーム中の対象物の第1エッジを検出し、
前記第2のビデオストリーム中の対象物の第2のエッジを検出し、
前記第1エッジ及び前記第2エッジの動きを確認し、
前記第1エッジの動き及び前記第2エッジの動きの間の相違を判定し、
該相違に基づいて横移成分及び並進成分を判定する
ことを特徴とする請求項5記載のモーションコントロール携帯装置。
【請求項9】
当該装置の第1の位置に関する当該装置の動きにより規定されるジェスチャーを複数含むジェスチャーデータベースと、
ジェスチャー各々と対応するコマンドとを対応付けるジェスチャーマッピングデータベースと、
を更に有し、前記コントローラが、追跡した当該装置の動きとジェスチャーを比較して受信したジェスチャーを確認し、受信したジェスチャーに対応付けられる関連するコマンドを確認し、確認されたコマンドを実行して前記現在の画像を修正する
ことを特徴とする請求項1記載のモーションコントロール携帯装置。
【請求項10】
前記モーション追跡モジュールが、当該装置の動きに基づいて、前記第1の軸及び前記第2の軸のなす面内での当該装置の並進運動を確認するよう更に動作し、
前記現在の画像はより大きな画像の小区分であり、
前記コントローラは、並進運動に起因する当該装置の位置に基づいて、より大きな画像中の別の小区分を表示するように現在の画像を連続的に修正する
ことを特徴とする請求項1記載のモーションコントロール携帯装置。
【請求項11】
前記モーション追跡モジュールは、前記第1の加速度計により検出された加速度及び前記第2の加速度計により検出された加速度のうち所定ノイズ閾値より小さく現れるものを無視するよう動作する
ことを特徴とする請求項1記載のモーションコントロール携帯装置。
【請求項12】
携帯装置を制御する方法であって、
第1の軸に沿う加速度を第1の加速度を用いて検出するステップと、
前記第1の軸に垂直な第2の軸に沿う加速度を第2の加速度を用いて検出するステップと、
前記第1の軸及び前記第2の軸の少なくとも一方の回りの回転成分をチルト検出素子を用いて検出するステップと、
前記第1の加速度計、前記第2の加速度計及び前記チルト検出素子を用いて3次元での当該装置の運動を追跡するステップと、
前記装置のディスプレイを用いて前記現在の画像を生成し、当該装置の追跡した運動に応じて前記現在の画像を変更するステップと、
を有することを特徴とする方法。
【請求項13】
前記ディスプレイが表示面を有し、
前記第1及び前記第2の軸が前記表示面に実質的に平行である
ことを特徴とする請求項12記載の方法。
【請求項14】
前記第1の軸と垂直であって前記第2の軸とも垂直な第3の軸に沿う加速度を、前記チルト検出素子の第3の加速度計を用いて検出するステップと、
前記第3の加速度計で測定された加速度に基づいて、前記第1の軸及び第2の軸のなす

FITBIT 1002
Fitbit v. Immersion

面内の並進と、前記第１の軸及び前記第２の軸の少なくとも一方の回りの成分を有する回転とを区別するステップと、

を有することを特徴とする請求項１２記載の方法。

【請求項15】

前記第１の軸と垂直であって前記第２の軸とも垂直な第３の軸に沿う加速度を、前記チルト検出素子の第３の加速度計を用いて検出するステップと、

当該装置のカメラで生成したビデオストリームを監視するステップと、

前記ビデオストリームに基づいて運動方向を検出するステップと、

を有することを特徴とする請求項１２記載の方法。

【請求項16】

前記ビデオストリーム中の対象物と当該装置間の軌跡を含む評価情報を決定するステップと、

前記距離を用いて当該装置の並進運動の大きさを判定するステップと、

ことを特徴とする請求項１５記載の方法。

【請求項17】

当該装置の第１のカメラにより生成された第１のビデオストリームを監視し、前記第１のカメラは前記第１の軸と垂直であって前記第２の軸とも垂直な第３の軸に沿う第１方向の焦点に合わせられており、

当該装置の第２のカメラにより生成された第２のビデオストリームを監視し、前記第２のカメラは前記第３の軸に沿う第１方向とは逆の第２方向の焦点に合わせられており、

前記第１のビデオストリーム及び前記第２のビデオストリームに基づいて、当該装置の運動方向を検出する、

ことを特徴とする請求項１２記載の方法。

【請求項18】

前記第１のビデオストリーム中の対象物の第１エッジを検出し、

前記第２のビデオストリーム中の対象物の第２のエッジを検出し、

前記第１エッジ及び前記第２エッジの動きを確認し、

前記第１エッジの動き及び前記第２エッジの動きの間の相関を判定し、

該相関に基づいて回転成分及び並進成分を判定する

ことを特徴とする請求項１７記載の方法。

【請求項19】

当該装置の第１の位置に関する当該装置の動きにより規定されるジェスチャーを複数含むジェスチャーデータベースと追跡した当該装置の動きとを比較し、

受信したジェスチャーに対応付けられるコマンドを確認し、

確認されたコマンドを実行して前記現在の画像を修正する

ことを特徴とする請求項１２記載の方法。

【請求項20】

コンピュータ読み取り可能な媒体に組み込まれる、携帯装置を制御するための論理装置であって、

第１の軸に沿う加速度を第１の加速度計を用いて検出するステップと、

前記第１の軸に垂直な第２の軸に沿う加速度を第２の加速度計を用いて検出するステップと、

前記第１の軸及び前記第２の軸の少なくとも一方の回りの回転成分をチルト検出素子を用いて検出するステップと、

前記第１の加速度計、前記第２の加速度計及び前記チルト検出素子を用いて３次元での当該装置の運動を追跡するステップと、

前記装置のディスプレイを用いて前記現在の画像を生成し、当該装置の追跡した運動に応じて前記現在の画像を変更するステップと、

をコンピュータに実行させることを特徴とする論理装置。

【請求項21】

FITBIT 1002
Fitbit v. Immersion

前記第１の軸と垂直であって前記第２の軸とも垂直な第３の軸に沿う加速度を、前記チルト検出素子の第３の加速度計を用いて検出するステップと、

前記第３の加速度計で測定された加速度に基づいて、前記第１の軸及び第２の軸のなす面内の並進と、前記第１の軸及び前記第２の軸の少なくとも一方の周りの成分を有する回転とを区別するステップと、

をコンピュータに実行させることを特徴とする請求項２０記載の論理装置。

【請求項22】

前記第１の軸と垂直であって前記第２の軸とも垂直な第３の軸に沿う加速度を、前記チルト検出素子の第３の加速度計を用いて検出するステップと、

当該装置のカメラで生成したビデオストリームを監視するステップと、

前記ビデオストリームに基づいて運動方向を検出するステップと

をコンピュータに実行させることを特徴とする請求項２０記載の論理装置。

【請求項23】

前記ビデオストリーム中の対象物と当該装置間の距離を含む距離情報を決定するステップと、

前記距離を用いて当該装置の並進運動の大きさを判定するステップと、

をコンピュータに実行させることを特徴とする請求項２０記載の論理装置。

【請求項24】

当該装置の第１のカメラにより生成された第１のビデオストリームを監視し、前記第１のカメラは前記第１の軸と垂直であって前記第２の軸とも垂直な第３の軸に沿う第１方向の焦点に合わせられており、

当該装置の第２のカメラにより生成された第２のビデオストリームを監視し、前記第２のカメラは前記第３の軸に沿う第１方向とは逆の第２方向の焦点に合わせられており、

前記第１のビデオストリーム及び前記第２のビデオストリームに基づいて、当該装置の運動方向を検出する、

ことをコンピュータに実行させる特徴とする請求項２０記載の論理装置。

【請求項25】

前記第１のビデオストリーム中の対象物の第１エッジを検出し、

前記第２のビデオストリーム中の対象物の第２のエッジを検出し、

前記第１エッジ及び前記第２エッジの動きを追跡し、

前記第１エッジの動き及び前記第２エッジの動きの間の相違を判定し、

該相違に基づいて傾斜成分及び並進成分を判定する

ことをコンピュータに実行させることを特徴とする請求項２４記載の論理装置。

【請求項26】

当該装置の第１の位置に関する当該装置の動きにより規定されるジェスチャーを複数含むジェスチャーデータベースと連携した当該装置の動きとを比較し、

受けたジェスチャーに対応付けられるコマンドを確認し、

確認されたコマンドを実行して前記現在の画像を修正する

ことをコンピュータに実行させることをと特徴とする請求項２０記載の論理装置。

【請求項27】

モーションコントロール携帯装置であって、

第１の軸に沿う加速度を第１の加速度を用いて検出する手段と

前記第１の軸に垂直な第２の軸に沿う加速度を検出する手段と、

前記第１の軸及び前記第２の軸の少なくとも一方の周りの回転成分を検出する手段と

前記第１の軸に沿う加速度、前記第２の軸に沿う加速度及び前記回転成分に基づいて３次元での当該装置の運動を追跡する手段と、

前記装置のディスプレイを用いて前記現在の画像を生成し、当該装置の追跡した運動に応じて前記現在の画像を変更する手段と、

を有することを特徴とするモーションコントロール携帯装置。

【発明の詳細な説明】

【技術分野】

FITBIT 1002
Fitbit v. Immersion

【0001】
本発明は一般に携帯装置に関連し、特にモーションインターフェース(motion interface)を備えた携帯装置に関連する。
【背景技術】
【0002】
セルラ電話及びパーソナルディジタルアシスタント(PDA)のようなコンピュータ装置の利用性は急速に成長しつつある。そのような装置は、キーパッド及びディスプレイのような様々なタイプのインターフェースを介してますます多くの機能をユーザに提供する。あるコンピュータ装置は、ユーザによる装置の傾き(tilt)を検出することで、動き(motion)をインターフェースとして利用する。あるモーションインターフェースの欠点は、紐付きでコンピュータ装置を拘束すること(tethering)又は大量の電力を要する大型の磁性追跡装置を持ち運ぶことを含む。
【発明の開示】
【発明が解決しようとする課題】
【0003】
本発明の課題は、モーションインターフェースを有する携帯装置を提供することである。
【課題を解決するための手段】
【0004】
本発明では、モーションインターフェースを備えた携帯装置が使用される。
【0005】
特定の携帯では、モーションコントロール携帯装置は、第1の軸に沿う加速度を検出する第1の加速度計と、第2の軸に沿う加速度を検出する第2の加速度計とを有する。第2の軸は第1の軸に垂直である。当該装置は、前記第1の軸及び前記第2の軸の少なくとも一方の回りの回転成分を検出するチルト検出素子と、現在の画像を表示するディスプレイとを有する。当該装置は、前記第1の加速度計、前記第2の加速度計及び前記チルト検出素子を用いて3次元での当該装置の運動を追跡するモーション追跡モジュールを含む。当該装置は前記現在の画像を生成し、当該装置の運動に応じて前記現在の画像を変更するコントローラとを有する。
【0006】
前記ディスプレイは表示面を有し、前記第1及び前記第2の軸は有記表示面に実質的に平行である。前記チルト検出素子は、前記第1の軸と垂直であって前記第2の軸とも垂直な第3の軸に沿う加速度を検出する第3の加速度計を有する。前記モーション追跡モジュールは、前記第3の加速度計で測定された加速度に基づいて、前記第1の軸及び第2の軸のなす面内の並進と、前記第1の軸及び前記第2の軸の少なくとも一方の回りの成分を有する回転とを区別する。前記チルト検出素子は、前記第1の軸と垂直であって前記第2の軸とも垂直な第3の軸に沿う加速度を検出する第3の加速度計を有する。チルト検出素子は、ビデオストリームを生成するカメラと、前記ビデオストリームに基づいて運動方向を検出するビデオ分析モジュールとを有する。
【0007】
別の形態によれば、携帯装置を制御する方法は、第1の軸に沿う加速度を第1の加速度を用いて検出するステップと、第2の軸に沿う加速度を第2の加速度を用いて検出するステップとを有する。第2の軸は第1の軸に垂直である。当該方法は、前記第1の軸及び前記第2の軸の少なくとも一方の回りの回転成分をチルト検出素子を用いて検出するステップと、前記第1の加速度計、前記第2の加速度計及び前記チルト検出素子を用いて3次元での当該装置の運動を追跡するステップとを含む。当該方法は、前記装置のディスプレイを用いて前記現在の画像を生成し、当該装置の追跡した運動に応じて前記現在の画像を変更するステップを有する。
【発明を実施するための最良の形態】
【0008】

FITBIT 1002
Fitbit v. Immersion

本発明の特定の携帯による技術的利点は、装置の傾斜及び振動並びに加速度を検知可能なモーション検出素子を携帯装置が備えることを含む。従ってその装置は、入力として機能する多数の運動を認識することができ、装置の機能性を増やす。ある態様では、多数の様々なタイプのモーション検出素子が組み合わせられ、装置に望まれる機能に依存する最も適切な素子を用いて装置を製造者が設計することを可能にする。

【0009】

他の技術的利点は以下の図面、詳細な説明及び特許請求の範囲から当業者には更に明確になるであろう。なお、特定の利点が列挙されたが、様々な実施例は列挙された利点の全部又は一部を含んでもよいし、全く含まなくてもよい。

【0010】

本発明の特定の実施例及びその特点のより完全な理解を期するため、添付図面に関連して以下の説明がなされる。

【実施例】

【0011】

図１は特定の実施例によるモーションインターフェース機能を備えた携帯装置１０を示す。携帯装置１０は、携帯装置の動き（モーション）を認識することができ、そのようなモーションに対応する様々な機能を実行することができる。そして装置のモーションは装置の入力をなすように機能する。そのようなモーション入力は、装置のディスプレイに表示されるものを直接的に変えてもよいし、或いは他の機能を実行してもよい。携帯装置１０は、移動電話、パーソナルディジタルアシスタント（ＰＤＡ）、スチールカメラ、ビデオカメラ、携帯用計算機、携帯用のラジオその他の音楽又は映像プレーヤ、ディジタル温度計、ゲーム装置、携帯用電子装置、腕時計等から構成されてもよいし、或いはユーザが携帯する又は身に付けることの可能な他の適切なる装置から構成されてもよい。上記に列挙されているように、携帯装置１０は腕時計のような身に付けることが可能な携帯装置をも含んでよい、腕時計はユーザの手首の周りに備えた如何なるコンピュータ装置をも含んでよい。

【0012】

携帯装置１０はディスプレイ１２、入力１４、プロセッサ１６、メモリ１８、コンピュータインターフェース２０及びモーション検出器２２を含む。ディスプレイ１２は、装置の視覚的な出力を与え、液晶ディスプレイ（ＬＣＤ）、発光ダイオードＦ（ＬＥＤ）又はユーザに出力を通知する他の如何なるタイプの装置から構成されてもよい。入力１４は装置への入力を通知するためのユーザ用インターフェースを提供する。入力１４は、キーボード、キーパッド、トラックボール、ノブ、タッチパッド、ステンシルから構成されてもよいし、或いはユーザが装置１０に入力を通知する他の如何なる素子から構成されてもよい。特定の実施例ではディスプレイ１２及び入力１４はタッチ画面のように同一素子に組み合わせられてもよい。

【0013】

プロセッサ１６はマイクロプロセッサ、コントローラ又は適切なる他の如何なるコンピュータ装置若しくはリソースでもよい。プロセッサ１６は、携帯装置１０のシステム内で利用可能な機能を実行するため様々なコンピュータ言語で様々なタイプのコンピュータ命令を実行するように構成される。プロセッサ１６は携帯装置１０の管理及び動作を制御する適切な如何なるコントローラを含んでもよい。

【0014】

メモリ１８は、限定ではないが、磁気媒体、光媒体、ランダムアクセスメモリ（ＲＡＭ）、リードオンリメモリ（ＲＯＭ）、取り外し可能な媒体その他の適切な如何なるローカル又はリモートのメモリ素子を含む適切な如何なる形式の揮発性又は不揮発性のメモリでもよい。メモリ１８はプロセッサ１６により実行可能なソフトウエア、論理モジュール又は素子を含む。メモリ１８は、以下で更に説明されるようなマッピング、カレンダ及びファイル管理アプリケーションのような、モーション入力を用いるユーザインターフェースを備えた様々なアプリケーション１９を含んでよい。また、両図されるように、メ

FITBIT 1002
Fitbit v. Immersion

モリ１８は、ジェスチャーデータベース及び機能又はジェスチャーマッピングデータベースのような様々なデータベースを含む。メモリ１８の構成要素は本発明の範囲内で特定の必要性及び要請に応じて処理を行うように結合されてもよいし及び／又は分割されてもよい。通信インターフェース２０は、他の携帯装置や端子のような他の装置との間でのデータ及び情報の無線又は有線の通信をサポートする。

【００１５】

モーション検出器２２は、或る機能を実行するための或る形式の入力として使用される携帯装置１０の動きを追跡する。そのような入力モーションは、以下で更に説明されるように所望のタスクを実行するために、ユーザが所望の形式で装置を動かすことで生じる。

【００１６】

特定の実施例による携帯装置１０は、ここで説明されるような機能を実行する適切な如何なる処理モジュール及び／又はメモリモジュール（例えば、制御モジュール、モーション追跡モジュール、映像分析モジュール、モーション応答モジュール、表示制御モジュール及び署名検出モジュール等）を含んでもよいことが理解されるべきである。

【００１７】

特定の実施例では、入力の動きは、並進(translation)及び／又はジェスチャの形式である。並進ベースの入力は、動きの始点及び終点並びにそのような始点及び終点間の差分に着目する。ジェスチャーベースの入力は、装置の通った実際の経路に着目し、区切った点群の全体像である。一例として、並進ベースの入力を用いてマップをナビゲーションする場合、"Ｏ"の形の動きは動く途中で表示を変えるが、描く前に表示されていた情報と動いた後に表示された情報との間では最終的に何の変化もない（なぜなら、装置は動きが終了した時にスタート地点と同じ地点にいると思われるからである。）。しかしながら、ジェスチャー入力モードの場合、（例えば、たとえ始点及び終点が同じになったとしても）装置は"Ｏ"の形に通ったことを認識するであろう、なぜなら、ジェスチャーベースの入力の場合、装置はその動き又は移動の間にジェスチャーの始点及び終点の間で通った経路に着目するからである。このジェスチャー"Ｏ"の動きは、"Ｏ"のジェスチャーを構成する経路に沿って移動したことを装置が認識した場合に、以下に詳細に説明されるような或る機能を実行するように、特定の機能に対応付けられてもよい。特定の実施例では、或る意思表示（ジェスチャー）として意図される装置の動きは、ジェスチャーデータベース中のジェスチャーを規定するものと、一連の、連続的な又はパターン的な加速運動とを照合することで、ジェスチャーと同様に装置によって認識されてもよい。

【００１８】

他の実施例による携帯装置は図１に示される装置の或る要素を含まなくてもよい。例えば或る実施例では、モーション検出器と別個の入力１４のない携帯装置１０を用意し、装置の動きがその装置に関する単独の又は主要な入力を与えるようにする。他の実施例による携帯装置は、装置１０に関して具体的には図示されていない付加的な素子を含んでよいことが理解されるべきである。

【００１９】

図２は本発明の特定の実施例による図１のモーション検出器２２を示す。この例では、モーション検出器２２は加速度計24a, 24b, 24cと、カメラ26a, 26b, 26cと、ジャイロ28a, 28b, 28cと、レンジファインダ30a, 30b, 30cと、プロセッサ３２とを含む。

【００２０】

加速度計24a, 24b, 24cは各自の検出軸に沿う加速度を検出することで装置の運動を検出する。装置の特定の動きは、加速度計により検出される一連の、連続的な又はパターン的な加速度を含んでよい。携帯装置が特定の加速度系の検出軸に沿って傾けられると、その検出軸に沿う重力加速度が変化する。重力加速度のこの変化は、加速度計により検出され、装置の傾きに反映する。同様に、回転も静止も止まない携帯装置の直線又は曲線の運動も、加速度計で検出される検出軸に沿う加速度の変化を生み出す。

【００２１】

図示の例では、加速度計24aはＸ軸に沿う装置の運動を検出するＸ軸加速度計を構成し

FITBIT 1002
Fitbit v. Immersion

．加速度計2bはＹ軸に沿う装置の運動を検出するＹ軸加速度計を構成し，加速度計2cはＺ軸に沿う装置の運動を検出するＺ軸加速度計を構成する．これらを組み合わせると，加速度計2a，2b，2cは装置１０の回転及び並進を検出できる．上述のように装置１０の回転及び／又は並進は，装置を操作するユーザからの入力として機能してよい．

【0022】

モーション検出に３つの加速度計を利用すると或る利点がもたらされる．例えば，２つの加速度計しか使用されなかったならば，そのモーション検出器は，並進面での傾斜により，携帯装置の明確な（曖昧さのない）並進を検出できない．しかしながら，第３のＺ軸加速度計（他の２つの加速度計の検出軸に少なくとも近似的に垂直な検出軸を有する加速度計）を利用すると，ほとんどの並進から，ほとんどの傾斜を明確化できるようにする．

【0023】

加速度計24a，24b，24cによって互いに識別できない或る固有の動きが存立するかもしれないことが理解されるべきである．例えば，或る回転及び或る並進を伴う運動は，加速度計24a，24b，24cにとって，別の特定の回転及び別の特定の並進を伴う別の運動と同じであるように見えるかもしれない．モーション検出器２２が動きを検出するように（より高い精度を保証する付加的な何らかの様子を設けずに）単に３つの加速度計を含んでいたならば，或る特定の識別できない運動が同一機能に対応付けられるかもしれない，又は混乱を避けるために機能に対応付けられないかもしれない．

【0024】

上述したように，モーション検出器２２はカメラ26a，26b，26cを含み，カメラは電荷結合素子（CCD）カメラその他の光センサで構成されてもよい．カメラ26a，26b，26cは（傾斜及び並進ともに）携帯装置の動きを検出する別の手法を提供する．モーション検出にただ１つのカメラが装置に設けられていたならば，（加速度計のような他の動き検出素子を使用しなかったならば）装置の傾斜は並進と区別できないかもしれない．しかしながら少なくとも２つのカメラを利用することで，傾斜及び並進は互いに識別可能になる．例えば，２つのカメラが携帯装置１０に（１つは装置の上面に，及び１つは装置の底面に）設けられていた場合，装置が左に並進すると，各カメラは右に動く世界を見るであろう．装置が水平に横たわっていた場合に，左端を持ち上げつつ右端を下げることによって装置が回されると，底面のカメラは右に動く世界を感知し，上面のカメラは左に動く世界を感知する．かくて装置が並進する場合には対向面のカメラは同じ方向に動く世界（この例では左に動く世界）を見るであろう．装置が回されると，対向面のカメラは反対向きに動く世界を見るであろう．この演繹的なプロセスは途でも成り立つ．双方のカメラが同じ方向に動く世界を見るならば，モーション検出器はその装置が並進運動させられていることを知る．双方のカメラが逆向きに動く世界を見るならば，モーション検出器は装置が回されていることを知る．

【0025】

装置が回された場合，そのカメラに対する世界の動きの大きさは，装置の回転の大きさに直接的に関連する．かくてカメラに対する世界の動きに基づいて回転量が正確に判定可能である．しかしながら装置が並進させられていた場合，その並進の大きさは，カメラに対する世界の動きの大きさと，カメラの視野中の対象物までの距離との双方に関連する．従って，カメラだけを用いて並進量を正確に判定するには，カメラの視野中の対象物までの距離に関する或る形式の情報が取得されなければならない．しかしながら或る実施例では距離測定機能を備えたカメラが使用される．

【0026】

距離情報のない場合でさえ，光学的な情報は，加速度計又は他のセンサからの情報と関連付けられる場合に重要な鍵になり得ることが理解されるべきである．例えば，光学的なカメラの入力は，大きな動きが一切生じていないことを装置に通知するのに使用されてよい．これはドリフトに戻る問題の解決手段をもたらし，その問題は或る装置機能にとっての絶対的な位置情報を決定するために加速度データを利用する場合に固有の問題である．

FITBIT 1002
Fitbit v. Immersion

【0027】
上述したように，動きを検出するのにカメラが使用される場合に，距離情報は並進量を決定するのに有用である。図7の例では，そのような距離情報が距離測定器30a,30b,30cにより用意される。距離測定器30a,30b,30cは，超音波距離測定器，レーザ距離測定器その他の適切な如何なる距離測定素子で構成されてもよい。距離情報を決定するために他の素子が使用されてもよい，例えば距離測定機能を備えたカメラが使用されてもよいし，双眼立体視像(stereopsis)を用いて距離測定部として機能するように装置の同じ側に複数のカメラが使用されてもよい，決定された距離情報は，並進に起因する何らかの明示的な並進成分及び回転に起因する成分の正確且つ明示的な計算を可能にする。
【0028】
上述したように，モーション検出器２２は付加的にジャイロ29a,29b,29cを含む，ジャイロ28a,28b,28cはモーション検出器２２の他の素子と組み合わせて使用され，装置の動きを検出する精度を高める。
【0029】
プロセッサ３２は加速度計２４，カメラ２６，ジャイロ２８及び距離測定器３０至のデータを処理し，装置１０の動きを示す出力を生成する，プロセッサ３２はマイクロプロセッサ，コントローラその他の適切な如何なるコンピュータ装置又はリソース（例えば，カメラからビデオストリームを受信する較像分析モジュール等）から構成されてもよい，或る実施例では，モーション検出器２２のプロセッサ３２に関連してここで説明される処理は，携帯装置１０のプロセッサ１６により又は適切な他の如何なるプロセッサ（その装置から遠隔して位置するプロセッサを含む）により実行されてもよい。
【0030】
上述したように，モーション検出器２２は３つの加速度計，３つのカメラ，３つのジャイロ及び３つの距離測定器を含む。他の実施例によるモーション検出器は，このモーション検出器２２のものより少数の又はそれとは別の素子を含んでもよい，例えば或る実施例は，３つの加速度計を備えるがカメラ，ジャイロ又は距離測定器を一切備えないモーション検出器；２つ又は３つの加速度計及び１つ又はそれより多いジャイロを備えたモーション検出器；２つ又は３つの加速度計及び１つ又はそれより多いカメラを備えたモーション検出器；又は２つ又は３つの加速度計及び１つ又はそれより多い距離測定器を備えたモーション検出器を含んでもよい，更に，モーション検出素子の装置での配置は様々な実施例で異なってよい，例えば，ある実施例は装置とは別の面にカメラを含むかもしれないが，別の実施例は（例えば，距離測定機能を付加するために）同一面に２つのカメラを含むかもしれない。
【0031】
モーション検出器２２の要素のタイプ，数及び位置を変えることは，様々なタイプの動きを検出する或いは正確に測定するモーション検出器の能力に影響を及ぼすかもしれない，上述したように，モーション検出器の要素のタイプ及び数は，特定の要請を満たすように様々な実施例で異なってよい，モーション検出機能を備えた携帯装置の製造コストを減らすために精度を犠牲にすることが望まれる特定の実施例では，より少数の又はより低い精度の素子が使用されるかもしれない，例えば，ある携帯装置は，その装置の所望の機能を実行するには，装置が並進させられていることの検出だけを必要とし，そのような並進の正確な量を検出する必要はないかもしれない，そのような携帯装置は，距離情報をもたらす何らかの種類の距離測定器や他の素子を備えないがカメラを備えるモーション検出器を含んでよい，特定の実施例では，カメラ及び距離測定器のような上述の素子は，動き検出機能に関連する上述のもの以外の他の目的のためにその装置で使用されてもよい。
【0032】
図8は図1の携帯装置１０のモーション検出素子の利用例を示す図である。モーション検出素子からの未処理データはプロセッサ３２で処理される，そのような未処理データは，加速度計24a,24b,24cそれぞれからのX軸加速度計の未処理データ23a，Y軸加速度計の未処理データ23b及びZ軸加速度計の未処理データ23c；カメラ26a,26b,26c各々からのカメラ

FITBIT 1002
Fitbit v. Immersion

未処理データ25a、カメラ未処理データ25b及びカメラ未処理データ25c；ジャイロ25b，25b，25c各々からのジャイロ未処理データ27a，ジャイロ未処理データ27b及びジャイロ未処理データ27c；及び距離測定器30a，30b，30c各々からの距離測定器の未処理データ29a，距離測定器の未処理データ29b及び距離測定器の未処理データ29cを含む．何らかの実施例における場合のように、携帯装置がより多数の、より少数の又は別のモーション検出要素を含む場合には，未処理データは包含される要素に対応してよい．

【0033】

未処理データはプロセッサ16で処理され、装置10の動きを識別するモーション検出器出力34を生成する．図示の例では、モーション検出器出力34はx，y，z軸に沿う並進と、x，y，z軸に関する回転とを含む．モーション検出器出力は携帯装置のプロセッサ16に通知され，プロセッサは，装置の動きに基づいてその装置が実行すべき動作、機能又はタスク（即ち，装置の挙動36）を判定する．特定の動きに基づく或る動作，機能又はタスクの実行は後に更に説明される．

【0034】

図4は特定の実施例によるモーション検出機能を備えた携帯装置31の等価線図を示す図である．携帯装置31はX軸加速度計33、Y軸加速度計35及びZ軸にあるカメラ37を含む．X軸33、Y軸39及びZ軸41（もリファレンスとして装置31に関して図示されている．携帯装置31は、加速度計33，35及びカメラ37を用いて様々な方向の傾斜及び並進を含む動きを検出する．携帯装置31は，ディスプレイ12，入力14、プロセッサ16，メモリ18及び通信インターフェース20のような，携帯装置10に関して図示及び説明された素子のような他の素子を含んでもよい．上述したように，特定の実施例は（加速度計、ジャイロ，カメラ，距離測定器又は適切な他の素子を含む）様々なタイプのモーション検出素子を有する携帯装置を，その装置に関して適切な如何なる手法で如何なる組み合わせ及び位置又は向きに含んでもよい．

【0035】

特定の実施例では，ユーザインターフェース機能は，ある時点の或る動きの軸に沿う入力運動を利用してもよい．例えば、装置のアプリケーションは、特定の軸に沿って（例えば、1つの方向に又は双方向に）装置を動かすことで，携帯装置に表示されたリストをユーザがスクロールすることを可能にしてもよい．装置の動きを望まれる特定の軸に制限することが，ユーザにとって困難かもしれない．言い換えれば，ユーザの生み出す別の軸に関する何らかの回転又は運動が困難かもしれない．この問題に対処するため，本装置は好ましい動きを選択する機能（支配的な動きの選択及び増幅，並びに他の方向又は軸に関する動きの縮小化を含む機能）を含んでもよい．

【0036】

図5は，上述したような支配的な運動の選択及び増幅並びに他の方向に関する動きの最小化を行う様子を示す．図示の例では，「実際の運動41」が携帯装置の動きを表現する．実際の運動41は，或る軸44に沿う運動成分42と軸44に垂直な別の軸46に沿う運動成分46とを有する．運動42の量は運動46の量より大きいので、携帯装置は支配的な動きとして運動42を選択する．そして携帯装置はこの支配的な動きを増幅し，運動46（他の運動成分）を最小化し，実際の運動41が，運動50のように描かれたように装置で処理されるようにする．支配的な動きの増幅の度合い又はサイズは，その時点で装置で動作している特定のアプリケーションのような特定の要因に応じて様々な実施例で異なってよい．更に支配的な動きの増幅は，加速度の大きさ，動きの速度，或る方向（例えば，動き46）に対する別の方向の動き（例えば，動き42）の比率，ナビゲートされる基礎となるデスクトップのサイズ，又はユーザの好み等に基づいてもよい．或る実施例では，携帯装置は，或る運動属性が生じた場合にのみ好ましいモーション選択を実行する．例えば場合によっては，携帯装置は，或る軸の動きが何らかの他の動きよりも閾値以上大きかった場合に支配的な動きを選択及び増幅してもよい．その他の，より小さな動きは縮小化されてもよい．

【0037】

FITBIT 1002
Fitbit v. Immersion

支配的な動きの選択及び増幅並びに他の動きの最小化は、モーションユーザインターフェースを利用するようにユーザの経験を更に拡張し、携帯装置又は装置で走っているアプリケーションが、望まれないノイズであってユーザが特殊したところのノイズをフィルタリングすることを可能にする。この機能により、ユーザは例えば装置を左に動かして調べるリストを取り出し、上下に動かすことでそのリストをスクロールすることができるかもしれない。下辺りな軸に沿う動きは無視される或いはその装置によりかなり抑えられてよい。

【0038】

特定の実施例では、支配的な動きの選択及び増幅並びに他の動きの最小化は、装置の回転運動にも適用されてよい。並進運動に関して上述したように或る軸に沿う動きの場合と同様な手法で、或る軸の回りの支配的な運動が選択され及び増幅されてよい。更に、（支配的な回転でない）別の軸の回りの回転が最小化されてもよい。

【0039】

図６は本発明の特定の実施例による好ましいモーション選択用のフローチャートを示す。フローチャートでは、携帯装置の動きに対応する未処理データが受信される。図示の例では、モーション未処理データは、ｘ－加速データ62a、ｙ－加速データ62b、ｚ－加速データ62cを含み、ステップ６４で処理され、装置の動きを示す出力を生成する。他の実施例は、光学的又はカメラデータ、ジャイロデータ及び／又は絶対測定データのような他のタイプのモーション未処理データを含む。未処理加速データ６２の処理の後に、ステップ６６で運動の支配的な軸が選択される。運動に関して選択された支配的な軸がｘ軸であったならば、ステップ６８ａでｘ軸に沿う運動が増やされる。運動に関して選択された支配的な軸がｙ軸であったならば、ステップ６８ｂでｙ軸に沿う運動が増やされる。運動に関して選択された支配的な軸がｚ軸であったならば、ステップ６８ｃでｚ軸に沿う運動が増やされる。運動に関して支配的な軸における運動の増量は、使用されるアプリケーションに又は他の特性に従って様々な実施例で異なってよい。或る実施例では、ユーザの好み６９が運動の増量又はタイプを決定するのに使用されてよい。運動の支配的な軸以外の軸に沿う運動は上述したように最小化され、そのような運動は特定のアプリケーションでは使用に際して無視される。ステップ７０では増やされた運動が処理され、装置の挙動７２をもたらす。この処理ステップは、使用されるアプリケーションにアクセスし、増やされた動きに基づいて実行する特定の装置の挙動を決定することをさんでもよい。増幅された運動は、使用するアプリケーション、特定のユーザ又はその他に応う多数のタイプの装置動作のどれをもたらしてもよい。

【0040】

モーション入力を用いる特定のユーザインターフェースに関し、装置の位置に関連する、携帯装置１０のディスプレイ１２に表示された情報、又は仮想ディスプレイの位置を有する価値があるかもしれない。例えば、装置に表示された地図上を走行するような並進入力を用いる特定の実施例では、携帯装置の位置はディスプレイ１２に表示されるマップの部分を直接的に決定するかもしれない。しかしながら、装置の位置情報が絶対的に維持されるならば（例えば、グローバルポジショニングサテライト（ＧＰＳ）ベースのシステム）、マップ又はメニューナビゲーションのような多くのタスクの利用性は減退するかもしれない。かくて、ローカルな状況で「ゼロ点」（基準点）又は原点を決めることが状況によっては便利であり、そのゼロ点等は装置の挙動を決定するのに使用されてよい。例えば、装置が地点Ａにある場合にゼロ点が決定されるならば、地点Ａ及び地点Ｂ間の運動が入力として使用されるが、時に、ゼロ点を設定する有用なアプリケーションは、仮想ディスプレイを動かすこと、或いはユーザの体の何らかの範囲にアプリケーションを装置することのような外部挙動を含む。ゼロ点を設定することは、現在の向きにおける重力加速度を無視するように装置に命令するような内部挙動に取り組み、追加的に及びおそらくはユーザがもたらした加速度に関してのみ装置を動作可能にする。

【0041】

特定の実施例による携帯装置は、或る回数でのみモーション入力を利用するアプリケー

FITBIT 1002
Fitbit v. Immersion

ションユーザインターフェースを含んでもよい。他の回数では、例えば、装置の運動は入力として使用されず、これは装置のモーション検出機能又はモーション検知機能を「ターンオフ」にする或いは外すのに有用かもしれない。モーション感度機能を外すことは、例えば、装置１０又は他の素子（例えば、装置のモーション応答モジュール等）のモーション検出器などの非活性化を含んでもよい。特定の実施例は装置のモーション検知機能の関与及び不関与の選択を可能にする。

【００４２】

一例として、モーション検出器２２で検出された動きに基づいてディスプレイ１２を修正するモーション応答モジュールは或る動作モードを有し、その動作モードは、モーション検知がイネーブルにされる別の動作モードにスイッチングするトリガを待機する動作モードである。モーション検知がイネーブルにされない時点には、装置の如何なる動きも無視される。そのトリガはその装置に対するゼロ点を設定してもよい。ゼロ点が設定されると、モーション応答モジュールは、モーション検出器からの測定値に基づいて装置のベースラインの向きを測定してよい。ベースラインの向き（基準方向）は、トリガが受信された時の装置の位置を含んでもよい（モーション検出素子からの情報により決定される。）。装置の更なる動きは、基準方向と比較され、実行する機能又は修正（表示に関するユーザの動きに基づいてディスプレイ１２になされるべき修正）を決定する。

【００４３】

特定の実施例は、装置のモーション検知の選択的な関与　不関与及びゼロ点選択に関する単独のトリガとして動作するユーザの起こす動作をいくつでも用意してよい。そのような動作に例えば入力１４におけるキー押下、特定方向での装置１０の運動（例えば、特定のジェスチャーに対応する動き）及びディスプレイ１２のタッピング（ディスプレイをたたくこと）を含んでもよい。ユーザの起こしたアクションは、ゼロ点を設定し、同時に装置のモーション検知機能を使用するようにしてよいことが理解されるべきである。

【００４４】

或る実施例では、インアクティブな期間又はアクティビティが殆どの期間（即ち、比較的静止状態の期間）にゼロ点及びモーション検知機能の関与又は不関与を設定してもよい。図７に携帯装置のゼロ点を受動的に設定するためのフローチャート８０を示す。ステップ８２ａでｘ軸に関する加速度変化が検出され、ステップ８２ｂでｙ軸に関する加速度変化が検出され、ステップ８２ｃでｚ軸に関する加速度変化が検出される。ステップ８４ａ，８４ｂでは、検出された何らかの加速度変化が或る特定の各自の閾値より大きいか否かが決定される。３つの軸各々に関して検出された加速度変化が、設定された閾値より大きくなかったならば、その装置は静止状態であると考えられてよく、ステップ８６でゼロ点が設定される。静止位置は、例えばセンサ検出器２２の要素の連続成分又は未処理データの安定化により決定されてよい。しかしながら３つの何れかの軸に沿って検出された加速度変化が、設定された閾値より大きかったならば、本プロセスはステップ８２の加速度変化検出に戻る。かくてゼロ点を受動的に設定する本方法は、携帯装置が静止状態にある時にゼロ点が設定されることを保証する。更に、装置が一定の運動をしているが或る特定の時間にユーザによって動かされていなかった場合（例えば、一定の速度で運動している列車内で静止しているような場合）には、加速度は何ら検出されないので、ゼロ点が設定されてもよい。ゼロ点を設定するトリガを与えるほど充分に加速度変化が大きいか否かを判定するための閾値を利用することは、装置を静止状態に保持するユーザが、ゼロ点を受動的に設定することを可能にする。そうでなければこれは（受動的なゼロ点設定は）困難になる。なぜなら、非常に高感度の加速度計を備えた装置は、ユーザの起こした背景に些細な動きの結果生じる加速度変化を検出するかもしれないからである。加速度計以外の素子を備えるモーション検出器に関しても同様な方法が使用されてよいことが理解されるべきである。小さな意図されない動きに対処するためにそのような同様な方法で閾値が使用されてよい（そうでなければ、その例ではゼロ点の設定を妨げる恐れがある。）。

【００４５】

本発明の特定の実施例は、携帯装置のモーション検出機能を双方向に選択的に使用可能

FITBIT 1002
Fitbit v. Immersion

に及び／使用にする機能を含み、限られた物理的空間の中でのモーション入力を利用する仮想的デスクトップ（又は情報空間）での大きな動きを可能にする。このプロセスは、カーソルを制御するマウスと共に「行き来し(scrubbing)」、言い換えるとマウスを持ち上げてその表面の別の場所にマウスを置き直し、そのカーソルのより大きな動きを可能にすることに類似している。マウスを持ち上げることは、マウスの動きとカーソルの動きとの間の繋がり（コネクション）を切断する。同様に、装置１０のような携帯装置の動きと、操作、機能又は動作との間のコネクションを、装置の動きに基づいて使用可能にする及び不使用にすることができる。

【0046】

図８は携帯装置のディスプレイより大きな仮想的なデスクトップ又は情報空間でナビゲーションを行うためのスクラッピング(scrubbing)機能を利用する例を示す。図示の例では、携帯装置は仮想デスクトップ９０を介してナビゲートするように使用される。仮想デスクトップ９０は方眼地図（グリッドマップ）として示され、ユーザがナビゲートを希望する適切な如何なる情報を表現してもよい。携帯装置に表示される仮想デスクトップの情報はボックス９２で表現される。この例では携帯装置の並進運動は仮想デスクトップ９０を介してナビゲートするのに使用される。例えば、仮想デスクトップ９０の情報を通じて右から左にナビゲートするために、ユーザは携帯装置を右から左に動かす。図示の例はスクラッピングプロセスを行うように装置を右に動かすことを示しているが、特定の実施例の携帯装置はスクラッピングプロセスを行うのに適切な如何なる手法で動かされてよいことが理解されるべきである。

【0047】

上述したように、ボックス９２は装置に現在表示されている仮想デスクトップ９０の情報を示す。ユーザがボックス９４で表現される情報を見ることを望むならば、そのユーザは携帯装置を左から右に動かせばよい。本実施例に関し、ユーザが装置を右に動かしたことすると、ボックス９４に含まれている仮想デスクトップ９０の情報が装置に表示される。また、ユーザの腕がユーザの右側に伸びきった状態になると、仮想デスクトップ９０の装置情報のディスプレイにボックス９４の右側にあるものを見るために、ユーザは歩き出さなければならない或いは更に右に動かさなければならない。そのような場合に、装置が更に右に動かされるように、更なる右への歩行や移動をユーザが実行できなかった場合或いは望まなかった場合、ユーザは、携帯装置のモーション検知機能を選択的に不使用にし、装置を左に動かし、装置のモーション検知機能を選択的に再び使用可能にし、そして装置を右に動かし、ボックス９４の右側の情報を表示する。この手法では、ユーザはボックス９６に含まれている仮想デスクトップ９０の情報を表示することができ、ボックス９６の更に右側のボックス９８に含まれている情報を表示するのにそのプロセスが反復される。

【0048】

限られた物理的な空間の中で仮想デスクトップ内で更に大きな動きを可能にするために、装置のモーション検知機能を不使用にして再び使用可能に遷移することは、（装置の入力に関するキーによること、特定のジェスチャーや動き（例えば、ある円弧状の動き）に従って装置を動かすことによること又は装置画面を軽くたたく（タッピングする）ことのような）様々な如何なる方法でも実行可能にされてよい。ユーザの行う他の如何なる動作（アクション）でも、この目的のためにモーション検知機能を不使用に及び使用可能にするのに使用されてよい。特定の実施例は、装置のモーション検知機能を不使用に及び使用可能にするのに種類のアクションを許容する。更に、装置のモーション検知機能を不使用にするユーザのアクションは、モーション検知機能を使用可能にするユーザのアクションと異なっていてもよい。このスクラッピングプロセスは、マップナビゲーション、メニューナビゲーション及びリスト内のスクロールのような適切な如何なるアプリケーションで実行されてもよい。

【0049】

図９は特定の実施例による上述の処理に関連するスクラッピングプロセスのステップを

FITBIT 1002
Fitbit v. Immersion

ズフローチャートである。フローチャートはステップ１００から始まり、仮想ディスプレイ９０のボックス９２で表示する情報からボックス９４の情報へ進むために、携帯装置が右に動かされる。上述したように、ユーザは更にボックス９４の右側の情報を表示することを望むかもしれないが、装置を更に右に動かすための物理的空間は使い果たされているかもしれない。かくてユーザはステップ１０２で装置のモーション検知機能を不使用にする。そのような不使用を実行するために、装置に付いているボタンを押すこと或いは特定のジェスチャーに従って装置を動かすことのような適切な如何なるユーザアクションがなされてもよい。ステップ１０４では、ユーザは装置を左に動かし、そのユーザがより多くの物理的空間を用意できるようにし、モーション検知機能が再び使用可能になった場合にその物理的空間を通じてユーザは装置を右に動かす。

【００５０】

ステップ１０６ではユーザは装置のモーション検知機能を使用可能にする。再び、そのように使用可能にすることは適切な如何なるユーザアクションにより実行されてよく、そのようなユーザアクションは、ステップ１０２でモーション検知機能を不使用にしたときに実行されたユーザアクションと異なってもよい。モーション検知機能が使用可能にされたので、ステップ１０８でユーザは装置を右に動かし、装置に表示される情報を、ボックス９４の情報からボックス９６の情報に変える。ステップ１１０では装置を右側へ更に動かすことの要否が確認される。（例えば、仮想ディスプレイ９０のボックス９８における情報を表示するために上更なる移動が必要ならば、本プロセスはステップ１０２に戻り、装置のモーション検知機能が再び不使用にされる。更なる動きが一切不要ならば、本プロセスは終了する。上述したようにスクラッピングプロセスは、モーション入力をサポートする装置の適切な如何なるアプリケーションで使用されてよく、装置はその機能を使用するために適切な如何なる方法で動かされてもよい。

【００５１】

上述したように、装置の特定の運動（例えば、特定のジェスチャー）が、そのような動きの間にディスプレイに示される情報を変えないことを装置に通知するために、スクラッピングプロセスで使用されてもよい。このことはユーザが装置を或る位置に戻すことを可能にする（ディスプレイに示される情報を更に変更するためにユーザはその位置から装置を動かす。）。例えば、装置が或る基準参照（ベースリファレンス）位置にあり、その位置からの装置の動きが表示情報を変える、或る特定の所定の運動（例えば、円弧状の動き）が使用され、その動きが完了するまで動きに応じて表示情報を変えないように装置に通知してよい。所定の運動が完了すると、基準参照位置がリセットされ、基準参照位置からの装置の更なる動きが表示情報を変えるようにしてもよい。基準参照位置は、装置のモーション検出素子により受信されたモーションデータのベースライン成分で表現される装置のベースライン方向を識別する。特定の実施例では、基準参照位置からの動きにより決定されるようなジェスチャーが受け取られ、装置に表示される情報を変える特定のコマンドを実行する。

【００５２】

上述した様々な実施例に関して説明されたように、特定の実施例による携帯装置は複数のタイプの又はモードの入力を使用して装置を操作してもよい。そのような入力モードは、非運入力モード及びジェスチャー入力モードのようなモーション入力モードを含む。複数の入力モードはしばしば互いに組み合わせて使用されてもよく、場合によっては携帯装置は一度に或る１つのモードタイプを認識するように設定されてもよい。或る状況では、携帯装置は或る特定の時点で複数のタイプの入力（non-motion input）及び種々のタイプのモーション入力（例えば、非運及びジェスチャー）に基づく機能に設定されてもよい。

【００５３】

複数の入力モードを認識する携帯装置いこの装置性を促進するために、特定の実施例では、入力モードを切り替えるために或るトリガが使用される。例えばユーザは入力モードを切り替えるために特定のキーを押す或いは装置を振る方法で（例えば、特定のジェスチ

FITBIT 1002
Fitbit v. Immersion

ーで動かず、装置のアプリケーションが複数のタイプのモーション入力に基づいて認識及び機能する例では、連続モーション入力モード及びジェスチャー入力モードを切り替えるために、特定のキーが押される或いは特定のジェスチャーがその装置を利用して形成される。また、トリガは、或るアプリケーションから別のものへの単なる切り替わりや、或る表示画像から別のものへの切り替わりを含んでもよい。場合によっては、あるトリガで手動入力モード及びモーション入力モードを切り替えてもよい。異なるモーション入力モード間のような異なる入力モード間で切替を行うために、特定の如何なるユーザアクションでもトリガとして使用されてよい。或る実施例では、音声コマンドや装置に関する物理的なアクション（例えば、装置やスクリーンを軽くたたくこと）が入力モードを切り替えるのに使用されてもよい。

【0054】

特定の実施例では、装置のモーション検知機能を使用可能にするユーザアクションは、装置の振る舞いに別様に影響するかもしれない他の情報を含んでもよい。例えば、並進運動検出を使用可能にする或る動きをユーザが行った場合に、それは、モーション検知機能を使用可能にするのにユーザが別のモーションを行う場合よりも、その装置を動きに対して高感度にしてよい。使用可能にする動きは、ユーザの意図やコンテキストを示すジェスチャーを含んでもよく、それによりユーザの好みのような様々な動作設定に従事できる。

【0055】

上述したように、特定の実施例は、携帯装置の様々な機能、タスク及び動作を制御するためのモーション入力を受信する機能を含み、そのプロセスで装置に表示される情報を変えるのに使用されてもよい。場合によっては、そのようなモーション入力は、単なる並進形式の入力とは異なり、ジェスチャー形式のものでもよい。ジェスチャー入力は或るアプリケーションの多次元メニュー又はグリッドを通じてナビゲートするのに使用されてもよい。例えば、マクラッピングプロセスに関して上述されたように、携帯装置のディスプレイは、ディスプレイに表示可能な情報量（例えば、メニューオプション、マップ情報）より少ない（小さい）かもしれない。これは浅く広いメニュー構造を招く。多くの場合に、狭く深いメニュー構造よりも広くて浅いメニュー構造が好ましいかもしれない。なぜなら、

ユーザは機能が位置する場所に関する多くの情報を覚えなくて済むからである。

【0056】

図１０Ａは特定の実施例によるジェスチャー入力を用いるナビゲーションメニュー例を示す。図示の例では、携帯装置は仮想的なデスクトップ１２０を通じてナビゲートするのに使用される。仮想的なデスクトップ１２０は並び順のメニューカテゴリ１２２を有するメニューツリーを含む。各メニューカテゴリ１２２は並び順の各自の副次的なカテゴリ（サブカテゴリ）を含んでよい。或る実施例では、メニューカテゴリ１２２は、機能のカテゴリを含み、メニュー選択各々のサブカテゴリはそのようなカテゴリ各々の下での実際の機能を含む。他の例では、メニューカテゴリは名詞（例えば、「フォルダ」、「ドキュメント（書類）」、「画像」）から成り、サブカテゴリは動詞（例えば、「移動する」、「貼り付ける」、「切り取る」）から成る。携帯装置がセルラ電話を構成するならば、メニューカテゴリ１２２は「呼び出し」、「電話帳」、「メッセージ」、「立案者（プランナー）」、「音」、「設定」その他の項目を含んでもよい。各メニューカテゴリ１２２は、メニューカテゴリ１２２が選択されるとアクセスされるかもしれない機能を含んでもよい。２つのメニューレベルが図１０Ａに示されているが、モーションインターフェースナビゲーションに関する多次元デスクトップ又は情報表示は、レベル数をいくつでも使用しながら、並列的（例えば、メニューをいくつ含んでもよいことが理解されるべきである。

【0057】

図示の例では、メニューカテゴリ１２２ｅが選択され、メニューカテゴリ１２２ｅのサブカテゴリ１２４が選択できるように表示されている。ボックス１２６、１２８は携帯機でユーザに表示される情報を表現する。図示されるように、仮想的なデスクトップ１２０は、一度に装置に表示可能なものよりもより多くの情報又はメニューを含む。ユーザは上記のの

FITBIT 1002
Fitbit v. Immersion

ジェスチャーに従って装置を動かし、仮想デスクトップにわたって又はそれを通じてナビゲートする。ジェスチャーは様々なメニューレベルを通じてナビゲートするために及びメニュー選択を行うために使用されてもよい。一例として、ユーザは、装置１０を時計回りに動かし（１３０）、仮想デスクトップ１２０上で右に所定量だけ進めてもよい（例えば、ボックス１２６の情報からボックス１２８の情報へ動かす。）。特定のメニューカテゴリ１２２は揺れるジェスチャー（１３３）により又は下げるジェスチャーにより選択され（例えば、メニューカテゴリ１２２ｎを選択するため）、詳細用のサブカテゴリ１２４を表示してもよい。同様に仮想デスクトップ１２０から持ち上げるように動かし、ユーザは装置１０を反時計回りに動かしてもよい（１３４）。場合によってはナビゲーションは次の４つのジェスチャーを通じてなされてもよい：前進ジェスチャー、後退ジェスチャー、左ジェスチャー及び右ジェスチャー。或る実施例では、横断方向のモーションベクトルを有するジェスチャーがナビゲーションに使用されてもよい。

【００５８】

特定の実施例では、最も使用されるジェスチャーの機能であるジェスチャーが使用され、他のジェスチャーによってなされるものと逆の機能を実行させてもよい。例えば、ユーザに向かうモーションがズーム（拡大）であり、ユーザから離れる動きである逆のモーションはズームアウト（縮小）でもよい。逆の機能に対応付けられる機能又は逆転のジェスチャーは、学習及び利用しやすい装置用モーションユーザインターフェースを形成する。

【００５９】

場合によっては、ディスプレイ中央でのメニュー項目が選択用に強調されてもよいし、他の場合には特定のジェスチャーは、複数の表示された階層中の、ユーザが選択を希望するメニュー選択肢を示す。ジェスチャーを利用してユーザがナビゲートするメニューその他の情報は、様々な如何なる方法で携帯装置に示されてもよいことが理解されるべきである。或る実施例では、１つのレベル情報のみが（即ち、１つのメニューレベルが）一度に表示され、サブレベル又は高いレベルは、選択によりそれらが利用可能にされるまで表示されない。

【００６０】

図１０Ｂは仮想デスクトップを介してユーザがナビゲートすることを可能にする機能のような様々な機能を実行するのに使用されるジェスチャー例を示す。図示の例のジェスチャーは、デスクトップで上方向に進むための「上昇（アップ）」ジェスチャー１３５、下に進むための「下降（ダウント」ジェスチャー１３５、左に進むための「左（レフト）」ジェスチャー１３６、右に進むための「右（ライト）」ジェスチャー１３７、ユーザに向かう方向に進むための「入（イン！」ジェスチャー１３８及びユーザから離れるように進むための「出（アウト）」ジェスチャー１３９を含む。これらは特定の実施例に関するジェスチャー及びコマンドの具体例に過ぎず、他の実施例は、デスクトップを通じたナビゲーションを行うため又は携帯装置で特定の機能を実行するために、様々なコマンドに対応付けられる同様なジェスチャー又は異なるジェスチャーを含んでよいことが理解されるべきである。

【００６１】

図１１は本発明の特定の実施例によるモーション入力を用いるナビゲーションマップ例を示す。図１１は１６個の部分に分割された情報グリットを表現する仮想デスクトップ１１０を含み、各部分は文字（Ａ、Ｂ、Ｃ、．．．、Ｐ）で参照される。仮想デスクトップの一部は特定の実施例を説明するためだけの参照文字を用いて見分けられ、他の実施例による仮想デスクトップの一部分は参照文字又はそれ以外のもので装置のアプリケーションの中で区別されてもされなくてもよい。仮想デスクトップ１１０は、特定の携帯装置で一度に表示可能な量より多くの情報を含む。仮想デスクトップ１１０は、適切な如何なる情報を表現してもよく、その情報はストリートマップのようにユーザが携帯装置を用いてナビゲーションすることを希望する情報である。ユーザは、携帯装置で情報の様々な部分を表示するために仮想デスクトップ１１０を通じてナビゲートすることを希望し、仮想デスクトップ１１０の情報の或る部分を更に明瞭に見るために仮想デスクトップ１１０の中でズー

FITBIT 1002
Fitbit v. Immersion

ムすること（及びズームアウトすること）－即ち、表示される情報の粒度を変えること－を含むかもしれない。

【0062】

図示の例では、ボックス１４２は携帯装置１０で現在表示されている情報を表す。ボックス１４２は仮想デスクトップ１４０の一部分Ａ，Ｂ，Ｅ，Ｆを含む。特定の実施例では、ユーザが従前に表示されるデスクトップ１４０の情報を例えばボックスＣ，Ｄ，Ｇ，Ｈの情報に変えることを望むならば、そのユーザはモーション入力を利用して装置のディスプレイを表現するボックス１４２を必要な量だけ右へ動かす（図示の例では、右に２つの部分だけ動かす。）。そのようなモーション入力は並進入力（携帯装置１０を右に適用可能な量だけ動かし、表示される情報を変更すること）又はジェスチャー入力（ある機能に対応付けられる特定のジェスチャーに従って携帯装置を動かすことを含む。一例として、或るジェスチャーは１つの部分だけ表示を右に動かすことに対応付けられ、別のジェスチャーは２つの部分だけ表示を右に動かすことに対応付けられてもよい。かくて並進入力又はジェスチャー入力を用いて、ユーザはデスクトップ１４０をナビゲートできる。

【0063】

例えば、並進入力又はジェスチャー入力を通じて、携帯装置１０はユーザが表示される情報に対して（そのような情報をより鮮明に見るために）ズームインすることを可能にする。ジェスチャー入力を用いる例のように、装置に表示される情報が１６個の部分の内４つ（例えば、部分Ａ，Ｄ，Ｅ，Ｆを表示するボックス１４２１を含んでいたならば、ユーザは４つのジェスチャーの１つを用いて、表示される４つの部分の１つにズームインしてもよい（４つのジェスチャーの各々は１つの部分でのズームインに対応付けられる。）。部分Ｂにズームインするよう対応付けられるジェスチャーに従ってユーザが携帯装置を動かしたならば、その装置はボックス１４４（部分B1,B2,B3,B4,B5,B6,B7,B8,B9）により表示される情報を表示するかもしれない（ボックス１４４は仮想デスクトップ１４０の部分Ｂの情報を拡大図で集合的に形成する）。かくて部分Ｂの情報は、より大きく且つより鮮明に表示される。装置でボックス１４４の情報を見る場合に、適切に対応付けられたジェスチャーを用いてユーザは現在表示されている特定の部分を更に拡大又は縮小してもよい。部分Ｂ２を拡大することに対応付けられたジェスチャーに従ってユーザ装置が携帯装置を動かしたならば（そのジェスチャーは、ボックス１４２の情報が表示されたときに部分Ｂを拡大するのに使用されたのと同じジェスチャーでもよい。）、その装置はボックス１４６（部分B2a,B2b,B2c,B2d,B2e,B2f,B2g,B2h,B2i）の情報を表示する。ユーザは特定の部分を拡大した場合に仮想デスクトップを通じてナビゲートしてもよい。例えば、部分Ｂに関してズームインした場合に（ボックス１４４の情報を表示し）、ユーザは並進又はジェスチャー入力を用いて仮想デスクトップを通じて（装置を）動かし、部分Ｂ以外の部分の拡大図を見てもよい。例えば、ボックス１４４の情報を見る場合に、ユーザは、表示されている情報を右に動かすジェスチャーを行い、ディスプレイ全体が仮想デスクトップ１４０の部分Ｃの情報のみを示すようにしてもよい（即ち、部分C1,C2,C3,C4,C5,C6,C7,C8,C9を示す部分Ｃに拡大する。）。モーション入力を用いる適切な如何なる手法ででもユーザは仮想デスクトップ１４０の情報を通じて（並行及び／ズームイン／アウト双方を用いて）ナビゲートしてよいことが理解されるべきである。

【0064】

上述したように、仮想デスクトップを介して（又は携帯のレベルを通じて）ナビゲートすること及び多次元デスクトップの異なるレベル又は状況の間で又はそれを通じてナビゲーションすることの双方に適切な如何なるジェスチャーが使用されてもよい。更に、或る実施例でのジェスチャーのような通常は、多次元デスクトップを通じたナビゲーションに使用されてもよく、不動アクションは状況の間で遷移又はナビゲーションを行うのに使用されてもよい。そのような不動アクションはキー押下による決定入力を含む。かくて移動及び不動アクションの組み合わせが、特定の実施例で多次元仮想デスクトップ又はメニューナビゲーションに使用されてもよい。

【0065】

FITBIT 1002
Fitbit v. Immersion

特定の実施例は、多次元グリッド、メニュー、カレンダその他の階層的アプリケーションのような何らかの適切なアプリケーションを通じてジェスチャー形式のナビゲーションを可能にする。例えば、カレンダーアプリケーションでは、或るジェスチャーが、月のような１つのレベルの中でナビゲートするために使用され、他のジェスチャーが、年、月、日、時間及びイベントの間のようなレベル間をナビゲートするのに使用されてもよい。更に、そのようなジェスチャーナビゲーションを利用する携帯装置で実行される様々なアプリケーションは様々なジェスチャーを利用してもよい。かくて特定のナビゲーションジェスチャーは、使用する特定のアプリケーションに応じて異なってもよい。或る実施例では、ジェスチャーベースの運動を単に利用するのではなく、新規ベースのインターフェースが、仮想デスクトップの多次元情報を介するナビゲーションに使用されてもよい。例えば、ｘ及びｙ軸に沿う運動が或る階層の或るレベル内を進行するのに使用され、ｚ軸に沿う運動が階層レベル間を進行するのに使用されてもよい。

【００６６】

他の例は、施設に関する電話帳、アルファベット文字、名前、連絡先の詳細（例えば、オフィス、セルラ及び家庭の電話番号、電子メール等）及び動作（アクション）を用いて、或る階層の様々なレベル全てに対するコンタクトを開始することを含む。この例では、その使用は情報（名前）及びアクション（動作）を含んでよい。あるものはこの例をｘｙ軸だけに対応付け、例えばｘｙ軸は階層の或るレベル内での選択に使用され、ｚ軸はレベル間を移動するのに使用される、ｚ軸はアクションを確認するのに使用され、アクションの不適切な実行を防ぐことを支援する。

【００６７】

場合によっては、横切るレベル数は、特に装置ベースのナビゲーションでは、動きの大きさに依存してもよい。装置を少しだけ動かすことは、一度に１レベル進行させ、装置を大きく動かすことは一度に複数レベル進行させてもよい。運動の大きさが大きいほど、より多くのレベルを一度に進める。ジェスチャーベースのモーション入力に適用されるように、階層中の異なるレベル数を一度にナビゲートするために、異なるジェスチャーが使用されてもよい。これらのジェスチャーは、同じ動きで異なる大きさでもよいし、完全に異なる動きでもよい。

【００６８】

多次元デスクトップスは情報ディスプレイを介するモーションインターフェースナビゲーションを利用することは、メニューを平坦化することを可能にする。なぜなら、大きさが装置のディスプレイに合わない仮想デスクトップの特定のメニュー又は手法にわたってユーザは容易にナビゲートできるからである。メニューの平坦化の結果、ユーザにはより少ない視覚の記憶しか要求されずに済み、ユーザにとっての装置の機能性及び能力を増進する。

【００６９】

上述したように、特定の実施例では携帯装置は、モーション入力を用いてユーザが仮想デスクトップを介してナビゲートすることを可能にする。場合によっては、ユーザはカーソルを使って携帯装置に表示される情報の上をナビゲートしてもよい。例えば、或る情報が装置に表示され、ユーザはモーション入力を用いて装置のディスプレイ上でカーソルを動かして表示されている特定の項目を選択し、或る機能を実行してもよい。場合によっては、モーション入力がカーソルを動かすのに使用され、（ボタン押下のような）不動アクションが、そのカーソルで現在示されている項目を選択するのに使用されてもよい。ジェスチャー及び非ジェスチャー入力の双方が、カーソルナビゲーションの様々な例で使用されてもよいことが理解されるべきである。

【００７０】

特定の実施例では、表示される情報が装置に関して固定され、カーソルは空間内に固定されたままであり、装置の動きはその情報に対してカーソルをナビゲートするのに使用されてもよい。図１Ｃにより、その形式のモーション入力カーソルナビゲーションを利用する様子を示す。ディスプレイ１４７は携帯装置のディスプレイを示す。このカーソルナビゲ

FITBIT 1002
Fitbit v. Immersion

ーション例を説明するために、ディスプレイは表示される情報をみすようにグリッドに分割される。グリッドは部分Ａ－Ｐをみな。ディスプレイ１４７は部分Ｃ，Ｄ，Ｇ，Ｈの間にカーソル１４３を含む。上述したようにこの例では、表示される情報は、その装置が動かされる場合に、装置に対して固定され、カーソルは空間的に固定されている。しかしながら、表示される情報に対するカーソルの（相対的な）位置はモーション入力に従って変化する。装置が右に並進させられると、右運動１４９に従って、カーソルは装置の並進運動とは逆の運動により進められる。

【００７１】

ディスプレイ１５０は、右運動１４９に従って装置が動かされた後の可能なディスプレイを示し、今カーソル１４３は部分Ａ，Ｂ，Ｅ，Ｆの間にある。この場は並進ベースの入力であるので、装置の運動の大きさ（この例では、右側への運動の大きさ）は、表示される情報に対するカーソルの動きの大きさに直接的に影響することが理解されるべきである。携帯装置が運動１５１に従って動かされた後に、ディスプレイ１５２は別のディスプレイを示し、カーソルは部分Ｉ，Ｊ，Ｍ，Ｎの間にある。明らかに、カーソルは、空間的に固定された間々なので、表示される情報に関して下側に（相対的に）動いている。携帯装置が左運動１５３に従って動かされた後に、ディスプレイ１５４が更に示され、今カーソル１４３はＫ，Ｌ，Ｏ，Ｐの間にある。明らかにカーソルは表示情報に対して右に（相対的に）動いている。かくてこの領域のカーソルナビゲーションでは、装置の運動はその情報でのカーソルの位置を変える。この方式の例では、表示される情報の特定の場所を指し示すように、スタイラスを用いる代わりに、携帯装置が動かされる。

【００７２】

カーソルナビゲーションプロセスのどの時点でも、カーソルで現在示される情報に従ってある機能を選択又は実行するのにユーザは如何なる形式の入力（例えば、ジェスチャー、キー押下等）を利用してもよい。例えば、ディスプレイ１５２に関し、ユーザは特定のジェスチャーを利用して又はボタンを押下して、カーソル１４３で現在示されている部分Ｉ，Ｊ，Ｍ，Ｎ間の情報に基づいて、ズームイン、選択又は他の機能を実行してもよい。

【００７３】

図１２Ａに関して上述したように、特定の実施例は、装置の運動とは逆の運動方向にカーソルを並進させ、表示される情報に対するカーソルの相対的な位置を動かす。一実施例では、装置の入力モーションは３つの軸の各々に沿う運動成分に分解され、それらの内２つは装置のディスプレイに平行である（例えば、ｘ軸及びｙ軸）。ｘ軸及びｙ軸の面内での装置の運動はそのような運動に基づいて装置内で表示されるが、カーソルは、ｘ軸方向及びｙ軸方向の合成運動と逆向きの並進ベクトルに従って動的に動かされ、空間内でのカーソルの位置を実質的に維持する。場合によっては、カーソルがその並進ベクトルに従ってディスプレイの端を過ぎて移動することになる場合は、そのベクトルはディスプレイ内にカーソルを維持するように補正される。そのような補正は、ディスプレイ端から所定の距離の範囲にカーソルを維持するように、並進ベクトルの１以上の成分を減らすことを含む。

【００７４】

表示される情報の部分Ａ－Ｐへの分割は上述の実施例を図示及び説明するためにのみなされ、特定の実施例の携帯装置で表示される情報はそのような分割や他のタイプのリファレンス情報を含まなくてもよいことが理解されるべきである。

【００７５】

図１３Ｂは、特定の実施例による別の形式のモーション入力カーソルナビゲーションを示す。この例では、カーソルはディスプレイに関して固定された場所にとどまり、モーション入力は装置のディスプレイより大きな仮想的なデスクトップ上でナビゲーションを行うために使用される。図１３Ｂは仮想的なデスクトップ１５８を含み、そのデスクトップは、携帯装置でモーション入力を用いてユーザがナビゲーションする情報（例えば、画面地図）を含む。仮想デスクトップ１５８は、特定の携帯装置に一度に表示可能な情報より

FITBIT 1002
Fitbit v. Immersion

も多くを含む。このカーソルナビゲーション例を説明するために、仮想デスクトップ１５８はグリッドに分割され、デスクトップである情報を区別する。グリッドは８つの行（Ａ－Ｈ）及び７つの列（１－７）を含む。グリッドの一部分はここの例では行の文字及び列の番号で特定される（例えば、部分Ｂ７又はＤ２）。行及び列番号により参照される部分に仮想デスクトップ１５８を分割することは、実施例を図示及び説明するためにのみなされ、特定の実施例の仮想的デスクトップはそのような分割や他のタイプのリファレンス情報を含まなくてもよいことが理解されるべきである。

【００７６】

ボックス１６０は携帯装置で現在表示されている仮想デスクトップ１５８の情報を示す。ディスプレイ１６１はボックス１６０を示す携帯装置のディスプレイを示す。また、ディスプレイ１６１は部分B2,B3,C2,C3の交点に位置するカーソル１５９を含む。上述したように、ユーザがモーション入力を用いて仮想デスクトップ機能で動かす場合に（即ち、装置に表示される情報を変えるために動かす場合に）　カーソルはディスプレイに関して固定された位置に残る。しかしながら、携帯装置で表示される仮想的デスクトップの情報に対するカーソルの（相対的な）位置は変化する。例えば、ユーザはモーション入力を用いて、装置で表示されている情報をボックス１６２で表示されるものに変える。装置で表示される情報は（部分B5,B6,C5,C6に）変わり；カーソル１５９は装置のディスプレイ上で（例えば、この例ではディスプレイの中央に）固定されたままであり、ディスプレイ１６３に示されるように仮想デスクトップ１５８の情報に関して、カーソルの相対的位置が変わるようにする。ユーザが、モーション入力を用いて、装置で表示されている情報をボックス１６４で表示されるものに変えることを望むならば、装置で表示される情報は、ディスプレイ１６５に示されるように部分E3,E4,F3,F4に変わる。カーソル１５９はディスプレイ中央に示される部分の間にある、なぜならディスプレイに対するその位置は本実施例では固定されたままだからである。

【００７７】

かくて、図１２Ｂに関して説明されたカーソルナビゲーションの形式によれば、カーソルは装置ディスプレイに対して固定された位置にのこり、仮想デスクトップの情報に対するカーソル位置が変わる。図１２Ａに関して図示及び説明した実施例に関して述べたように、ナビゲーションプロセスのどの時点でも、ユーザは、カーソルで現在示されている情報に従って或る機能を選択する或いは実行するために、如何なる形式の入力（例えば、ジェスチャー、キー押下等）でも使用してよい、例えば、ディスプレイ１６３に関し、カーソル１５９で現在示されている部分B5,B6,C5,C6の情報に基づいてズームイン、選択又は何らかの他の機能を実行するためにユーザは特定のジェスチャーを使用し或いはボタンを押下する。

【００７８】

ジェスチャー又はキー押下のような特定の如何なる入力も、装置でのカーソルナビゲーションモードを切り替えるのに使用されてよいことが理解されるべきである。例えば、図１２Ａの連続制御カーソルモードと図１２Ｂの固定カーソルモードの間でユーザは切替を行ってもよい。

【００７９】

上述したように、特定の実施例は、特定の機能又は動作を実行するために或るジェスチャーに従ってユーザが携帯装置を動かすことを許容する。しかしながら場合によっては、ユーザは、意図される特定のジェスチャーに従って装置を動かしていないかもしれない。その結果装置はその動きを意図されるジェスチャーとして認識できないかもしれない。ユーザによる装置の特定の動き又は特定のジェスチャーとして認識されることを示すため、或る実施例の携帯装置はその動きが実際にジェスチャーとして認識されたことをユーザに通知するフィードバックを用意する。

【００８０】

このフィードバックは、音声、ビープ、トーン又は音楽のような音声フォーマット、装置ディスプレイ上の指標のような視覚的フォーマット、振動型のフォーマット、又は適切

FITBIT 1002
Fitbit v. Immersion

な他の何らかのフィードバックフォーマットを含んでもよい。音声フィードバックはユーザインターフェースのスピーカ又は装置１０のヘッドフォンジャックを通して用意されてもよいし、バイブレーションフィードバックは装置１０のユーザインターフェースバイブレーション生成モジュールを介して用意されてもよい。既述的な、視覚的な及び振動的なフィードバックは複数のフィードバックインジケータに機能を提供するように変形されてよい。一例として、振動フィードバックは、或る持続期間にわたって周波数及び振幅を単独に又は様々な組み合わせで時間と共に変化させてもよい。フィードバックの量並びに複雑さは、音声フィードバックと組み合わせて振動フィードバックを使用するように、様々なタイプの組み合わせで次々とフィードバックを使用することで拡張されてもよい。場合によっては、１以上の認識されたジェスチャーがそれら自身の各自のフィードバックをするように、フィードバックはジェスチャー固有でもよい。例えば、或るジェスチャーが認識された場合、装置は特定のトーンで又は特定の回数だけビープ音を鳴らしてもよく、１以上の他のジェスチャーが認識される場合、ビープ音又はビープ回数は異なってもよい。オーディオフィードバックを用いることは、速やかな視覚的な画面での表明や機能を有しないジェスチャー（例えば、セルラ電話で何らかの電話番号を呼び出すこと等）にとって特に有意義かもしれない。或る実施例では、別のタイプのフィードバックがコンテキスト又はアプリケーション固有でもよい。様々な状況（コンテキスト）は、装置状態（何のアプリケーションが特定され又は使用されているか、バッテリレベル、利用可能なメモリ、（静かな又はサイレントモードのような）ユーザにより規定された状態等）を含んでよい。例えば、携帯装置はジェスチャー入力に応じて振動的なフィードバックを利用してもよいし、オーディオフィードバックでサイレントモードではそれ以外が使用されてもよい。このフィードバックプロセスは、コンピュータ又は他の電子の携帯モーション入力装置により使用されてもよい。

【００８１】

上述のジェスチャー認識に関するフィードバックと同様に、特定の環境下での携帯装置は、装置がジェスチャー入力モードにあった場合において、特定のユーザの動きがジェスチャーとして認識されなかった場合にユーザにフィードバックを与える。例えば、或る動きがジェスチャーであることを意図するように見えるが、装置に既知の特定のジェスチャーに決めることができなかった場合、失敗を示す音を鳴らしてもよい。これは、所望の動作又は機能を実行するために、その装置に意図されるジェスチャーに従って装置を次に動かす必要のあることをユーザに通知する。或る動きが認識されなかったことをユーザに通知するフィードバックは、音声で、視覚に、振動で又は他の適切なフォーマットでなされてもよく、特定の動きが特定のジェスチャーとして装置により認識される場合に通知されるものと異なるフィードバックである。ユーザの意図がジェスチャーを入力することであったか否かを確認するために、携帯装置１０は、動きがジェスチャーであるように意図されることを示す或る動きの特徴を調べてもよい。そのような特徴は、例えば、動きの振幅、閾値を上回る動きの経過時間、加速の回数及び閾値等を含んでもよい。特定のジェスチャーが装置により認識されなかったならば、ジェスチャーによるフィードバックのシステムが、意図されるジェスチャーを決めるのに使用される。例えば、音声フィードバックは携帯装置で決定される見込みを示し、ユーザは意図されるジェスチャーを選択するために音声メニューをナビゲートするようにジェスチャーを利用してもよい。

【００８２】

特定の実施例では、オーディオ又は振動のフィードバックシステムは、視覚的ディスプレイ１２に頼らずに、ユーザが携帯装置１０を動作させることを可能にする。例えば、或る実施例では携帯装置は音声の、視覚的な、又は振動的なフィードバックを、仮想的デスクトップのメニュー、その他の情報をナビゲートするユーザにもたらす。つまり、ユーザのモーション入力で組み合わせられるこの装置のフィードバックは、ユーザと装置との間のある種の「対話（conversation）」として機能する。上述したように、複数のタイプの及び複雑なフィードバックが使用されてもよい。フィードバックプロセスは、装置ディスプレイを眺めることが簡易でなく、安全でなく又は実用的でない環境で（例えば、運転中に

FITBIT 1002
Fitbit v. Immersion

又は明い環境の中で）特に有利である。

【0083】

オーディオの、視覚的な及び振動的なフィードバックのようなフィードバックは並進運動入力に関する実施例で使用されてよいことも理解されるべきである。例えば、並進入力を用いて、ユーザが仮想デスクトップの端に又は制限に達した場合に、フィードバックインジケータが与えられてもよい。

【0084】

図１３はモーション入力に応答するフィードバックを利用するプロセスを示す特定の実施例によるフローチャート１７０である。本プロセスのステップ１７２では、未処理モーションデータが携帯装置１０で受信される。上述したように、未処理データは加速度計、ジャイロ、カメラ、距離測定器その他の適切な如何なる運動検出素子の如何なる組み合わせによって受信されてもよい。ステップ１７４では、未処理モーションデータが処理され、装置の運動を示すモーション検出器出力を生成する。そのような処理は様々なフィルタリング技術や複数の検出素子からのデータの融合を含んでもよい。

【0085】

ステップ１７６では、装置の状態が検査される。なぜなら、或る実施例では、特定の動きに対するフィードバックはその動きが受信された場合の装置の状態に依存するからである。上述したように、装置状態の具体例は、着目する又は使用する特定のアプリケーション、バッテリレベル、利用可能なメモリ及び特定のモード（例えば、サイレントモード）等を含んでよい。ステップ１７８ではモーション検出器出力が装置の状態に関して分析される。ステップ１８０では、モーション検出器出力で示された運動が有意義である或いは特定の装置状態の下で認識可能であるか否かが確認される。例えば、特定のジェスチャーが或るアプリケーション（例えば、カレンダーアプリケーション）では或る機能を実行し、そのジェスチャーは別のアプリケーションでは何らの機能も与えなくてもよい。ジェスチャーが認識可能である又は装置の状態の下で有意義であった場合には、ステップ１８２にてフィードバックが与えられる。上述したように特定の実施例ではフィードバックは音声の、視覚的な又は振動的なフォーマットでもよい。場合によっては、フィードバックは、装置がその装置上方の下でジェスチャーを認識したことの単なる指標でもよい。他の例では、例えば、ユーザが（これ以上の機能を実行するために一連の入力を用意する）装置の特定のアプリケーションを使用していたならば、フィードバックは付加的な入力を求める更なるクエリ（query）でもよい。ステップ１８４では、認識はモーション入力及び装置状態に従って振る舞い、本プロセスはステップ１７２に戻り、更なる未処理データが受信される。

【0086】

ステップ１８０で、モーション検出器出力により示されるモーションが特定の装置状態の下で有意義でも認識可能でもないことが確認されたならば、プロセスはステップ１８６に進む。ステップ１８６では、そのモーションが特定の閾レベルを上回っているか否かが確認される。この確認は例えば特定のモーション入力が或るジェスチャーであることを意図していたか否かを判断することによりなされてもよい。上述したように、この判断の閾値特性は、モーション入力の振幅、モーション入力の経過時間、モーションの加速に関する回数及び周期等を含んでよい。モーション入力が特定の閾値を上回っていなかったことが確認されると、プロセスはステップ１７２に戻り、更なる未処理モーションデータが受信される。しかしながら、或るジェスチャーが意図されていたがその装置状態の下では認識されなかった又は有意義でなかった、という具合にモーション入力が閾値を上回っていたならば、ステップ１８８でフィードバックが与えられる。そのフィードバックは、音声の、視覚的な及び／又は振動的なフィードバックを含んでよく、そのジェスチャーが認識されなかった又は有意義でなかったことを示してよい。特定の実施例では、フィードバックに意図されたジェスチャーに関する問い合わせ（クエリ）を含んでもよいし、或いは意図される可能性のあるいくつものジェスチャーをユーザに提供し、その中からユーザがモーションで意図した特定のジェスチャーを選択してもよい。特定の実施例は上述したステッ

FITBIT 1002
Fitbit v. Immersion

つのいくつかを含まないかもしれないし（例えば、或る実施例はステップ１８６の確認判定を含まないかもしれない。）、他の実施例は追加的なステップを又は同じステップを異なる順序で含むかもしれないことが理解されるべきである。上記により示唆されるように、特定の実施例は多くのアプリケーション及び手法のどれによるモーション入力フィードバック（例えば、フィードバック「対話」を含むヒトを利用してもよく、フィードバックシステムの種類及び複雑さは様々な実施例で大きく異なってよい。

【００８７】

上述したように、特定の実施例による携帯装置は、ジェスチャーモーション入力を受け取り、その装置で動作する如何なる数のアプリケーションの如何なる数の機能でも制御する。ジェスチャーを用いる或るアプリケーションはモバイルコマース（ｍＣｏｍｍｅｒｃｅ）－エムコマース　アプリケーションを含んでもよく、そのアプリケーションでは携帯装置１０のようなモバイル装置は、商用の又は消費者購買のような様々な取引を行うために使用される。多くのエムコマースアプリケーションはある種の認証形式を利用し、個人識別番号（ＰＩＮ）、クレジットカード情報及び／又はモバイル装置の所有権等に関してユーザを認証する。しかしながら多くの形式の認証は「盗聴又はリーク」のおそれがある。それらは故意に又は偶発的に同時使用されるおそれがある。別の形式の認証はユーザの書いた署名であり、署名はそのようなリークの問題による被害を受けにくい。なぜなら偽造をなすことは一般に困難であり且つ発見されやすいからである。特定の実施例は、携帯装置を介するエムコマースの又は他の取引の認証形式としてユーザの署名を受け取るために、モーション入力を利用する。

【００８８】

登記された署名はジェスチャーの２次元記録として処理されてよい。モーション入力機能を備えた携帯装置を用いる場合、ユーザの署名は３次元的でもよく、その場合は「空間的な署名」を構成する。更に、装置で受信される他の形式の入力と組み合わされる場合、ユーザの署名は何次元になってもよい（例えば、４次元、５次元又はそれより多くの次元でさえよい。）。例えば、装置を用いて空間的に「描かれ」且つモーション検出器２２で検出された３次元ジェスチャーは、キー押下その他の入力と組み合わせられ、署名の次元数を増やしてもよい。

【００８９】

これらの空間的な署名は、携帯装置のモーション検出器２２により登録され、記録され且つ分析されることが可能である。これらは、有効な認証形式として機能するセーション検出素子数を変えることで、精度を変えながら登録可能である。ユーザの空間的署名は、ユーザの従来の２次元紙に書かれた署名に基づく３次元的な形式で構成されてもよいし、或いは彼又は彼女の署名としてユーザが携帯装置に記録する適切な他の如何なるジェスチャーで構成されてもよい。

【００９０】

或る実施例では、空間的署名を認識するプロセスはパターン認識及び学習アルゴリズムを含んでもよい。そのプロセスは署名に関連するキーの加速の相対的なタイミングを分析してもよい。これらは、動きの始まり及び終わり、運動の曲がり具合及び他の運動属性に関連する。或る例では、署名評価の或るポイントのデータセットの或るハッシュが記録され、以後の署名は認証用にそのハッシュと比較される。更にこれは、署名が固有であるか否かを確認することで署名が真正であるか否かを判断する。例えば、特定の実施例では、署名は、初期の又は参照位置に対する装置の特定の動きを比較することで（例えば、装置１０の署名検出モジュールにより）検出されるかもしれない。そのような比較は、その運動の加速シーケンスを記憶済みの空間的署名の特定の加速シーケンスと比較することで立証されてもよい。この特徴はユーザの入力モーション署名の大きさによらずなされてよい。

【００９１】

或る実施例では、装置は、初期地点から移動している装置の位置が空間署名に合致するか否かを確認することで装置の持ち主が署名に合致するか否かを検出できる。

【００９２】

FITBIT 1002
Fitbit v. Immersion

図１４はエムコマース取引の認証として空間署名を使用するシステム例２００を示す．システム２００は携帯装置１０，エムコマースアプリケーション２０２，認証装置２０４及び通信ネットワーク２０６を含む．エムコマースアプリケーション２０２は，ユーザの携帯装置と商取引するための適切な如何なるアプリケーションで構成されてよい．そのような取引は，ウェブサイトによる会社その他のユーザの商物又はサービス等に関する消費者購買，オンライン支払，口座（アカウント）管理又は適切な他の如何なる商取引を含んでもよい．認証装置２０４は，エムコマース取引を完了するために携帯装置１０のユーザによる空間的署名入力を認証又は確認する．認証装置２０４はエムコマース取引の認証用に１以上のユーザの１以上の空間署名を記憶してよい．或る実施例では，認証装置は携帯装置１０の中に，エムコマースアプリケーション２０２の中に又は適切な他の如何なる場所に設けられてもよい．通信ネットワーク２０６は，システム２００の要素間で情報又はデータを伝送することができ，広域ネットワーク（WAN），公衆交換電話網（PSTN），ローカルエリアネットワーク（LAN），インターネット及び／又はグローバルディストリビュートネットワーク（例えば，イントラネット，エクストラネット又は他の形式の無線／有線通信網等）の１以上を含んでよい．通信ネットワーク２０６は，ルータ，ハブ，スイッチ，ゲートウエー等しくは他のハードウエア，ソフトウエア又は組み込まれたロジックの適切な如何なる組み合わせを含んでもよく，それらはシステム２００内で情報交換又はデータ交換を行う多数の通信プロトコルのどれでも実行できるものである．

【００９３】

動作中に，エムコマースアプリケーション２０２の取引を行うためにユーザが携帯装置１０を使用する場合，ユーザはモーション入力を利用し，例えばユーザの３次元署名に応じて装置を動かすことで，認証署名を通知してもよい．一例として，ユーザはクレジットカードの代わりにポイントオブパーチェス（例えば，店舗）でユーザのセル方電話を使用してもよい．輸送及び処理される必要のある書類用紙に署名する代わりに，ユーザはそのユーザの空間署名に従って装置１０を動かすだけでよい．上述したように，ユーザの署名は或る実施例では３より多くの次元を含んでもよい．署名は携帯装置１０又は他のモバイル装置を用いてユーザにより事前に記録されていてもよく，その記録された署名は，携帯装置１０に，エムコマースアプリケーション２０２に，認証装置２０４に又は適切な他の場所に（例えば，複数のエムコマースユーザの署名用の署名格納データベース等に）格納されてもよい．

【００９４】

携帯装置１０の運動はその装置で処理され，その運動を示すモーション出力がエムコマースアプリケーション２０２に伝送されてもよい．エムコマースアプリケーション２０２はそのモーション出力を確認（装置１０で受信されたモーション入力がエムコマースの取引を希望するユーザの署名であったことの確認）用に認証装置２０４に通知してもよい．認証装置２０４がユーザの署名を確認すると，エムコマースアプリケーションはそのユーザとの取引を確定してよい．上述したように，認証装置２０４は，特定の実施例では携帯装置１０内に又はエムコマースアプリケーション２０２に設けられてもよく，装置１０に，エムコマースアプリケーション２０２に又は他の適切などこかに格納された確認用署名にアクセスしてもよい．

【００９５】

エムコマースでないアプリケーションでは，例えばその装置を利用してプライベートな又はセキュアなデータを送信するような機能を実行するのに電子セキュリティが望まれるような場合に，認証は携帯装置によってなされてもよい．携帯装置１０を用いてデータ又は他の情報を送信することを望んでいるユーザは，暗号化プロセスで使うための署名を利用してもよい．空間署名は，ネットワークを介して通信するデータを保護するための様々な手法のどれで使用されてもよく，パブリックキープライベートキー暗号化システムに関して使用されてもよい．例えば，或る実施例では，携帯装置はモーション入力を介して受信したユーザの署名を認証し，伝送データを暗号化するのにそれ自身のプライベートキーを利用してもよい．他の例では，データが携帯装置１０に伝送され，意図される受取人は

FITBIT 1002
Fitbit v. Immersion

解読データを受けるために空間署名を入力しなければならないようにしてもよい。或る実施例では、データは携帯装置１０に無線接続されたコンピュータと通信されてもよく、意図される受取人は、データ解読用にユーザの署名をそのコンピュータに伝送する手段として携帯装置１０を利用しなければならない。更に、特定の実施例では、署名モーションが単に認証用に使用されるのではなく、装置の動きが暗号鍵を生成するように、ユーザの空間署名自体が暗号鍵を表してもよい。場合によっては、署名を等価なプライベートキーに変換することで、装置は加速度の組み合わせを署名として認識してもよい。携帯装置は取引の認証プロセスの一部としてプライベートキーを利用してもよい。

【００２６】

特定の実施例では、空間署名は建物やイベントへの物理的なアクセスを管理するのに使用されてもよい。例えば、装置のユーザによる署名入力は、或るイベントに関して内金を支払って予約したことを１０で確認するように（ｗｉｌｌ－ｃａｌｌ）、入ることが許可された人々のリストに対して検査されてもよい。

【００２７】

特定の実施例では、ユーザは携帯装置のモーション入力を利用し、オーディオ／ビデオ機器、家庭用機器及び装置、コンピュータ装置又は（携帯装置で制御可能な）他の如何なる装置のような他の装置を制御してもよい。セルラー、ブルートゥース及び８０２．１１プロトコルを含む多数の無線又は有線プロトコルのどれでもそれを利用して、装置１０の通信インターフェース２０を介して装置は携帯装置１０によって制御されてよい。或る実施例では、装置１０は、無線又は有線通信を介して、ネットワークを介して他の装置を制御するのにモーション入力を受けてもよい。かくて装置１０のモーション入力により制御される装置は、例えば同じ部屋の中でも或いは地域を越えて、装置１０に対してどこに設けられてもよい。

【００２８】

一例として、携帯装置１０がブルートゥースで動作するセルラ電話であった場合に、セルラ電話の特定のジェスチャー又は他の動きは、パワーポイントのプレゼンテーションを行うために部屋を越えてラップトップのような他の装置を制御するためのコマンドを無線通信してもよい。携帯装置１０のモーション入力を介して制御される他の装置は、テレビジョン、ラジオ、ステレオ装置、衛視受信器、ケーブルボックス、ＤＶＤプレーヤ、ディジタルビデオレコーダ、ライト、空調機器、ヒーター、サーモスタット、セキュリティシステム、台所機器（オーブン、冷蔵庫、フリーザ、電子レンジ、コーヒーメーカー、ブレッドメーカー、トースター等）、ＰＤＡ、デスクトップ及びラップトップＰＣ、コンピュータ周辺機器、プロジェクタ、無線制御車両、ボート、航空機及び他の任意の装置を含んでよい。他の例として、通勤者が或る方法でその人のセルラ電話を捻ざおり、通勤者が家に到着する前に家の中のヒーターを起動させるよう知らせてもよい。或る実施例では、携帯装置は、他の装置に通知するためのコマンド又は意図される機能を決定するために、未処理データを受信及び処理してもよい。他の実施例では、携帯装置のモーション検出器は、装置１０の動きを通して装置１０により制御される１以上の装置に通知するように、モーション検出器予から受信した未処理データを出力する。その結果、装置１０により制御される様々な装置が、装置１０による同じ未処理データを様々に処理してよい。例えば、装置１０の特定のジェスチャーは、装置１０により制御される様々な装置の異なる機能を実行させてもよい。

【００２９】

図１５は、装置１０のモーション入力を通じて複数の他の装置を携帯装置１０が制御するシステム例２２０を示す。システム２２０は、無線又は有線リンクを通じて結合された携帯装置１０　ラップトップ２２２及び画像装置２２４を有し、通信ネットワーク２２６を介して携帯装置１０に結合される。携帯装置１０は、加速度計、カメラ、範囲測定器及び／又はジャイロのようなモーション検出素子を通じて、装置の特定の動きに関する未処理モーションデータを受信する。未処理モーションデータは携帯装置で処理される。ジェスチャーデータベース及びジェスチャーマッピングデータベースのような特定のデータベ

FITBIT 1002
Fitbit v. Immersion

ースは、装置の制御モジュールにより過時される運動に基づいて、合致するジェスチャー及び意図される機能を決定するためにアクセスされる。制御される機能は　ラップトップ２２２又は遠隔装置２２４のような、携帯装置１０により制御される他の装置に関するものかもしれない。従って、モーション入力は、装置１０から制御される装置（非制御装置）へ通知される機能とする操作信号に関するインターフェースである。他の実施例では、装置１０に関する特定のモーション入力を即に示す未処理データ又は他のデータは、装置１０で機能を決定せずに、ラップトップ２２２及び／又は遠隔装置２２４に直接的に送信されてもよい。これらの例では、ラップトップ２２２及び／又は遠隔装置２２４は、未処理モーションデータに基づいて実行されるべき意図される１以上の機能又は動作を判定するために携帯装置１０から受信した未処理モーションデータを自ら処理してもよい。或る実施例では、装置１０のユーザは、モーション又は他の装置を介して、携帯装置１０がそのような通信可能な他の装置の受信される機能又は未処理モーションデータを通知すべきことを装置１０に通知する。携帯装置１０により制御される２つの装置が示されているが、特定の実施例は上述したようなモーション入力を介して携帯装置１０により制御される様々なタイプの装置をいくつ含んでもよいことが理解されるべきである。

【0100】

上述したように、特定の実施例は、携帯装置１０のモーション入力を介して、他のローカルの又はリモートの装置のような他の装置を制御する機能を含む。或る実施例では、携帯装置１０のユーザは、装置１０の特定のモーション入力が制御用に意図されている他の装置を選択する。例えば、ユーザは携帯装置１０のユーザ入力１４を用いて（例えば、ボタンを押すことで又はトラックボールを動かすことで）、ローカルの又はリモートの装置を選択し、該他の装置に関される機能又は動作に対応付けられている特定の運動に従って装置１０を動かす前に制御する。しかしながら特定の実施例ではユーザは次のジェスチャーに従って携帯装置を動かし、装置１０のモーション入力を介してその時点で制御されるように他の装置（例えば、他のローカルの又はリモートの装置）を選択してもよい。かくて特定の実施例は携帯装置１０により制御される他の装置のジェスチャーモーション選択機能をもたらす。

【0101】

携帯装置１０は装置選択ジェスチャーを検出するよう動作する装置認識モジュールを含み、ユーザが特定の装置を選択することを望んでいることを確認してもよい。制御可能な各々の装置は、それ自身のジェスチャーコマンドマップを有してよく、そのマップは、装置１０を用いて入力されるジェスチャーと制御可能な装置のコマンドとを対応付ける。携帯装置の制御モジュールは、制御用に選択された制御可能な装置に対応する特定のコマンドマップを選択する。或る実施例では、装置１０はデバイスロケータを含み、デバイスロケータは、複数のリモート装置の各々について、携帯装置から各リモート装置への方向を検出するように動作可能である。この場合、制御するリモート装置を選択するために、ユーザが制御することを望む特定のリモート装置の方向で、ユーザは携帯装置を動かしてもよい。

【0102】

装置１０のモーション入力は他の装置のそのような制御に使用されてよいが、他のタイプの入力（例えば、入力１４を用いること）が、ジェスチャー入力による制御用に選択された他のローカルの又はリモートの装置を制御するために使用されてもよい。他の実施例では、様々なジェスチャー各々が異なる装置を制御するように対応付けられてよい。他の実施例では、装置１０は制御する可能性のある他の装置と使用する特定のジェスチャーとを表示し、ユーザが装置１０を介してまもなく制御することを望む他の装置に関するユーザの選択肢を示してもよい。本発明による携帯装置は、携帯装置により制御されるローカルの又はリモートの装置の１以上に関する何らかの特定のジェスチャー選択方法を用いてよい。

【0103】

上述したように、特定の実施例は、モーション検出器などを介して装置の運動を検出で

FITBIT 1002
Fitbit v. Immersion

きる携帯装置を含み、検出した運動に従う何らかの手法で装置の振る舞いを変える。或る実施例では、携帯装置１０は、それらの特定の環境をモデル化し、そのような環境に基づいてそれらの振る舞いを以後修正することができる。携帯装置の環境のモデリングと装置の特定のモーションを検出することとの間の１つの違いは、前者には関連する機能が存在するが、後者ではそのような機能は無いことである。一例として、携帯装置が特定のジェスチャーに従って動かされ、その挙動を変える場合、特定の動きを検知又は検出し、検出された動きに基づいて反応するように考えられる。一方、携帯装置がテーブル上でうつぶせに置かれていることを確認し、それに応じて反応する場合、それはその環境をモデリングしていると考えられる。他の例として、携帯装置が左に動き、そのような動きに基づいて自身の振る舞いを変えるとき、それはモーションを検出し、反応していると考えられる。装置が自由落下していることを自身で見出し、差し迫った地面との衝突から生き延びるために電源をオフにする場合、それは環境をモデリングしていると考えられる。更なる区別は、環境モデリングはユーザ入力に速やかに応答することを要しないが、特定のモーションのようなイベント検出は一般にそのような速やかな応答を要する。かくて環境モデリングはモーションのパターン（又はそれが欠けていること）を検知又は検出すること、検出内容を所定の環境条件群と照合すること、及びモデル化した環境に基づいて装置の挙動を修正することを含む。モデル化された環境に基づいて実行される振る舞いも、所望する又は着目する特定のアプリケーションに基づいて異なってよい。場合によっては、装置は、モデル化された環境に基づいて特定のモーションに対する感度を変えてもよい。

【0104】

一例として携帯装置は、加速度計又は他のモーション検出素子を介して、ほぼ水平な面上で静止していることを認識してもよい。そのような認識は、或る面に垂直な加速度が変化無く１ｇであり、装置が動いていない又は静止していることを確認することで得られてもよい。装置は、ユーザの手の中で止まっていることとテーブル上にあることを区別できてもよい。例えば、ユーザの手は一般に装置を完全に止めて保持することはできないからである。その結果、装置は近似的に水平な面上で静止しているという認識に従って、所定の方法で動作してもよい。例えば、テーブル上に静たわっているように携帯装置が認識したならば、携帯装置は或る所定期間の間その場所で横たわっていた後に電源を落としてもよい、別の例として、振動モードのセル電話は、それがテーブルの上にあるように認識すると、呼び出し時に又は（電話機の振動を引き起こす）他の何らかのイベントの際に、より速やかに振動させてもよい。或る実施例では、装置はテーブルに静たわっているときの方向を認識し、「うつぶせの（face　down）」位置で横たわっている場合に或る振る舞い（例えば、電源を落とし）、うつぶせでない位置で横たわっていた場合に別の方法で振る舞ってもよい。携帯装置１０がセル電話を構成するなら、呼び出し時にスピーカモードに入り、テーブル上で「あおむけ（face　up）」の位置にユーザが置いたことを呼び出し時に認識してもよい。一方、セル電話が呼び出され、テーブル上でうつぶせに置かれていた場合、セル電話はミュートモードに入ってもよい。

【0105】

別の例として、携帯装置１０は短期間の間ほぼ０ｇであり自由落下していることを認識し、地面又は他の面との差し迫った衝突に起因するダメージを減らすように振る舞ってもよい。そのような動作は、例えば、チップ及び／又はハードドライブの電源を落とすこと、レンズをリトラクト（格納）すること、カバーで覆うこと、又は他の何らかの装置の挙動を含んでよい。特定の実施例では、携帯式でない装置又は１月用のモーションを検出しない装置は、それらの環境をモデル化することができ、モデル化された環境に基づいて動作することができる。更なる例として、加速度パターンが検出され、携帯装置１０が運動状態（車両）にあること（例えば、車両の中や何かでユーザにより保持されていること）を認識してもよいし、そのような環境の中で装置のより良いパフォーマンスを可能にするように感度、閾値及び／又は他の様々な特性を調整してもよい。

【0106】

他の例では、携帯装置１０はディジタルカメラを構成してよい。モーション検出素子に

FITBIT 1002
Fitbit v. Immersion

より，カメラはそれが三脚に据えられているか否か，あるいは撮影時にユーザが持っているか否かを確認してもよい．カメラはその判断に基づいて写真に対するシャッタースピードを設定してもよい（例えば，三脚に設けられていたならば遅いシャッタースピードにし，ユーザが持っていた場合には速いシャッタースピードにする）．

【0107】

携帯装置１０が，ＰＣのような別の装置と同期するためのクレイドル(cradle)を用いる場合，装置１０はその静止状態（又はサポート状態）及び特定の向きに基づいてそれがクレイドル中にあることを認識してよい．装置はクレイドル中にある状態に応じて動作又は機能してよい（例えば，関連するＰＣに同期してよい．）．

【0108】

図１６は特定の実施例による環境モデリングプロセスを示すフローチャート２３０である．ステップ２３２では，未処理モーションデータが携帯装置１０で受信される．上述したように未処理モーションデータは加速度計，ジャイロ，カメラ，距離測定器又は適切な他の何らかのモーション検出素子の任何なる組み合わせから受信されてもよい．ステップ２３４では，未処理モーションデータがモーション検出出力を生成するよう処理され，その出力から装置の運動及び方向がステップ２３６で決定される．ボックス２３７は，ボックス237aのｚ軸回りの回転，ボックス237bのｘ軸に沿う並進，ボックス237cの特定の角度α，θ，φに向く方向，及びボックス237dの静止等のような装置の運動及び向きの例を示す．これらは装置の運動及び向きの例示に過ぎず，ステップ２３６では判定されるいくつの運動が使用されてもよい．或る実施例では，判定された方向は重力に対する装置の方向をなすかもしれない．

【0109】

ステップ２３８では，携帯装置１０はステップ２３６で判定した運動及び方向に基づいて自身の環境を判定する．ボックス２３９は，ボックス239aのテーブルに対してうつぶせ，ボックス239bの落下中，ボックス239cの列車内及びボックス239dの手の中等のような装置の環境の例を示す．ステップ２３６で判定された運動及び方向に基づいて，環境はいくつでも判定されてもよい．特定の例では，環境決定は，運動，方向の履歴のような装置の履歴に基づいてもよい．例えば，セル電話のスピーカモード機能を使用する場合，短い場合（例えば，テーブルに電話を開いた状態に置いているユーザにより引き起こされた短い時間トーンの呼び出しの最中に水平が検出された場合，装置は静かな期間を検出してよい．電話機は鳴音していることを検出でき，静かに重力に垂直な位置にあることが，鳴音が生じていないことと別の意味を持ってもよい．かくて環境の決定は装置の動作及び方向並びにその履歴に基づいてもよい．履歴は，装置の以前の運動／方向その他の装置の履歴に関する更の如何なる情報を含んでもよい．

【0110】

ステップ２４０では，決定された環境が特定の動作（振る舞い）に対応付けられる．対応付けられた振る舞いは，決定された環境に加えて，ある時点で装置を用いる特定のユーザやある時点で使用中の又は着目する特定のアプリケーションに関する履歴の特性のような，いくつの要因に依存してもよい．例えば，特定のモデル化された環境に対する振る舞いは，ボックス241aの携帯装置のミュート機能を使用可能にすること，及びボックス241bの衝突から生き残るように装置のチップの電源を落とすこと，及びボックス241nの装置のモーション起動閾値を増やすこと等を含んでもよい．ボックス241に示されるミュート動作は，セル電話機の環境が呼び出し中にテーブル上でうつぶせになっていた場合に実行されてもよい．ボックス241bのチップ電源遮断動作は，携帯装置１０の環境が装置の自由落下を示す場合に行われてよい．ボックス241nのモーション起動閾値を増やす動作は，携帯装置の環境が車両内の座席にあり，ユーザのモーション入力を意図されない入力として記録するためにより大きな運動閾値が必要とされる場合に行われてよい．特定の実施例は，１以上のモデル化された環境に対応付けられる振る舞いをいくつでも含んでよい．ステップ２４２では，携帯装置が，ステップ２４０で環境が対応付けられた振る舞いに従って動作する．

FITBIT 1002
Fitbit v. Immersion

【0111】
上述したように、ユーザは特定のジェスチャーに従って携帯装置を動かし、装置が所望の機能、動作又はタスクを実行するよう促す。特定の実施例では、装置のモーション入力として使用されるジェスチャーは、アルファベット文字、数値的な桁又は他の類似な英数字、絵文字又は表現物のような何もって用意しているシンボルで構成されてよい。例えば、モーション入力に使用されるジェスチャーは、何らかの言語でアルファベットの上側及び下側、アラビア数字、ローマ数字及び簡略記号をまねてもよい。事前のジェスチャーは、他のローカルの及びリモートの装置に対しても携帯入力装置用に使用されてよい。携帯装置入力に事前のジェスチャーを利用することは、ジェスチャーモーションインターフェースに関してユーザがプロセスを学習することを促す。
【0112】
図１７は特定の機能に対応付けられるジェスチャー例を示す。例えば、携帯装置１０が セルラ電話を構成する場合、ユーザは装置１０をハート型に動かし（２５０）、そのユーザのガールフレンド、ボーイフレンド又は配偶者を呼び出してもよいし、本の形に動かし（２５２）、ユーザの家に電話してもよい。他の例では、携帯装置が、ファイル又はデータを管理するアプリケーションを実行するPDAその他の装置を構成する場合、Cの形のジェスチャー（２５４）で装置を動かすことは、データをコピーするコマンドでもよいし、Oの形のジェスチャー（２５６）はファイルを開くコマンドでもよいし、Dの形のジェスチャー（２５８）はデータを削除するコマンドでもよいし、Xの形のジェスチャー（２６０）はファイル又はアプリケーションを終了するコマンドでもよい。ジェスチャーとそれらに意図される機能又は動作との間の論理的な関係（例えば、"O"とファイルを開くこと（open）との関係）は、ユーザのやりとり及び学習を更に促す。
【0113】
先在するシンボルはいくつでも、携帯装置の機能、動作又はタスクのいくつでもそれを実行するコマンドと同様にモーション入力のジェスチャーに使用されてよい。更に２次元では多くのジェスチャーが先在している、携帯装置はそのようなジェスチャーを認識してもよい。場合によっては、例えば、携帯装置１０は特定の次元に関する受信をディセーブルにし、ユーザが３次元ジェスチャーを入力しようとしている場合に、３次元中の何らかの動きが受信されないように又は消去されるようにし、その２次元ジェスチャーの認識を促してもよい。場合によっては、携帯装置１０は、先在する２次元ジェスチャーに基づく３次元ジェスチャーを受信してもよい。３次元ジェスチャーを受信及び検出することは、同様に、モーション入力として使用されるジェスチャーの数及びタイプを増やすことによって、装置の性能を高める。
【0114】
図１８は先在するシンボルジェスチャー（文字"O"）をモーション入力とする利用例を示すフローチャートである。ステップ２７２に示されるように、ユーザは携帯装置を文字"O"の形に動かす。ステップ２７４では、携帯装置はモーション検出素子から"O"の動きに関する未処理モーションデータを受信し、ステップ２７６でそのような未処理モーションデータを処理し、装置の実際のモーションを判定する。ステップ２７８では携帯装置１０はジェスチャーデータベース２８０にアクセスし、そのデータベースは、そのモーションとジェスチャー"O"とを対応付けるために、推測により認識可能な複数のジェスチャーを含む。ジェスチャーデータベースの複数のジェスチャーはそれぞれ一連の物理運動により規定されてもよい。装置の実際のモーションは、ジェスチャーデータベースのジェスチャーの１つの一連の加速運動と照合される。ステップ２８２では、携帯装置１０は機能データベース２８４（又はジェスチャーマッピングデータベース）にアクセスすることでジェスチャー"O"を特定の機能に対応付け、機能データベースは装置で動作する１以上のアプリケーションで実行される複数の機能を含む。特定の実施例では、ジェスチャー及び機能データベースは携帯のメモリ１８内で構成されてもよい。ジェスチャー"O"に対応付けられた特定の機能は、その時点でユーザにより使用されているか又は動作する特定のアプリケーションに依存してもよい。例えば、或るアプリケーションでは"O"はコ

FITBIT 1002
Fitbit v. Immersion

ァイルを開くコマンドを構成するが、別のアプリケーションでは或る番号を呼び出すコマンドを構成してもよい。場合によっては、１つのジェスチャーが装置の全てのアプリケーションに対して同じ機能に対応付けられてもよい。ステップ２８６では、ファイルを開くことのような対応付けられた機能に従って装置が動作する。

【0115】

上述したように、携帯装置１０でモーション入力に使用されるジェスチャーは、使用しているまたは着目している特定のアプリケーション、アプリケーションに関する特定の装置状態、或いは特定のモデル化された環境またはそれらの任意の組み合わせ若しくは他の任意のコンテキストのような特定の状況に基づいて異なる意味（例えば、機能、動作、タスク等）を持っていてもよい。例えば、特定のジェスチャーは、装置でウェブブラウザが動作している場合に、ページをスクロールアップするコマンドとして関連付けてもよいし、カレンダープログラムが動作している場合に、そのジェスチャーは別の日を調べるコマンドとして対応付けられてもよい。使用するアプリケーションのような、状況に依存して異なるコマンドに特定のジェスチャーを対応付ける機能は、装置の融通性を大きく向上させる。

【0116】

或る実施例では、ジェスチャーが状況に依存して異なるコマンドにマッピングされるならば、携帯装置は、より簡易なモーション検出素子を利用することができる。一例として、携帯装置は特定のモーション検出素子を含み、携帯装置が２０個の異なるジェスチャーを認識及び区別することしかできないようにしてもよい。各ジェスチャーが４つの異なるアプリケーションの各々について異なる機能に対応付けられる場合、２０個の固有のジェスチャーしか認識できない能力でも、その装置に関して８０個もの異なる機能（アプリケーション毎に２０個ずつ）を可能できる。各ジェスチャーが自身の機能に関連付けられていた場合は、着目しているアプリケーションが何であろうと、装置全体の能力は低減され、いくつかのジェスチャーは何らかのアプリケーションで使用されにくくなるかもしれない。複雑な素子をより少なく利用する能力は、状況に応じてジェスチャーを複数の機能に対応付ける結果、より少ないジェスチャーの組で認識及び区別を行うことができ、その能力は装置で使用される部品のコストを減らす影響をもたらし、装置を制御するのに必要なジェスチャーを物理的に学習するタスクを簡易化することもできる。上述したように、ジェスチャーは、使用中のアプリケーションに、装置の状態に、モデル化した環境に又は他の状況に依存して異なる機能に、動作又はタスクに対応付けられてよい。場合によっては、ジェスチャーは特定のアプリケーションの状態に依存して異なる機能に対応付けられる。例えば、ワードプロセシングプログラムの場合に、或るジェスチャーはプログラムのある状態（例えば、メニュー状態）で或る機能を有するが、ワードプロセシングプログラムの別の状態（例えば、書類編集状態）では同じジェスチャーが異なる機能を有してもよい。この場合、ジェスチャー機能の対応関係に関連するコマンドマップは、そのような状態毎のジェスチャーマッピングを含んでいてもよい。

【0117】

図１９は特定の実施例によるコンテキストベースのジェスチャーマッピングを利用するフローチャート２９０である。図示の例では、或るジェスチャーは着目するアプリケーションに基づいて決められる様々な機能を有する。ステップ２９２では、携帯装置１０は、特定のジェスチャー運動の未処理モーションデータを受信し、装置の画像のモーションを決めるようにステップ２９４でそのような未処理データを処理する。ステップ２９６では、携帯装置１０は例えばジェスチャーデータベースにアクセスすることでモーションをジェスチャーに対応付ける。ステップ２９８では携帯装置１０はどのアプリケーションに着目しているかを判定する。例えば、装置が４つの異なるアプリケーションを実行することができたとすると、その４つのどれに着目しているか或いはその時点でどれが使用されているかが確認される。装置は、着目しているアプリケーションに基づいてそのジェスチャーに関連付けられている機能を実行する。そのような機能の確認は、或る実施例では機能データベースにアクセスすることで達成されてもよく、そのデータベースはジェスチャーテ

FITBIT 1002
Fitbit v. Immersion

ータベース中のジェスチャーを機能に関連付けるので、ジェスチャーマッピングデータベースと呼ばれてもよい。図示の例では、アプリケーション１に着目していたならば、ステップ３００ａで機能１を装置が実行し；アプリケーション２に着目していたならば、ステップ３００ｂで機能２を装置が実行し；アプリケーション３に着目していたならば、ステップ３００ｃで機能３を装置が実行し；そしてアプリケーション４に着目していたならば、ステップ３００ｄで機能４を装置が実行する。

【０１１８】

状況依存型のジェスチャーマッピングの更なる例として、電話機能及びＰＤＡ機能を備えた携帯装置は４つのアプリケーション（電話アプリケーション、カレンダーアプリケーション、ファイル管理アプリケーション及び電子メールアプリケーション）を実行してよいとする。文字“Ｓ”をまねるジェスチャー入力は、着目しているアプリケーションに依存して異なる機能を有するかもしれない。例えば、電話アプリケーションに着目していた場合、ジェスチャー入力“Ｓ”を受信することは、“Ｓ”のジェスチャーに指定された特定の番号を呼び出すコマンドである。カレンダーアプリケーションに着目していた場合、ジェスチャー入力“Ｓ”を受信することは、カレンダーの９月にスクロールするコマンドである。ファイル管理アプリケーションに着目していた場合、ジェスチャー入力“Ｓ”を受信することは、ファイルを保存するコマンドである。電子メールアプリケーションに着目していた場合、ジェスチャー入力“Ｓ”を受信することは、電子メールを送信するコマンドである。特定の実施例は、状況に依存する様々な機能にジェスチャーを対応付ける能力に関して高い柔軟性をもたらす。

【０１１９】

上述したように、ある時点での特定の状況に依存してジェスチャーは様々な機能を有してよい。特定の実施例では、予め定めたジェスチャーに装置の機能をユーザが割り当てることを許容するように携帯装置が仕立てられる（カスタマイズされる）。使用中のアプリケーションに、装置の状態（又はモデル化された環境）に依存して異なる機能をジェスチャーが有するように、その機能は状況依存性である。特定の実施例における携帯装置は、同じ装置の様々なユーザが、様々な機能を同じジェスチャーに割り当てることを許容してもよく、そのような機能も上述の状況依存型である。

【０１２０】

例えば、携帯装置１０は様々な時点で多くの様々なユーザにより使用されるかもしれない。各ユーザは同じジェスチャーについて異なる機能を割り当てるかもしれない。携帯装置がジェスチャー入力を受信する場合、ユーザが装置に実行するよう求める機能を確認するために、その時点でどのユーザがその装置を使用しているかを知る必要がある。装置は様々な如何なる手法でユーザを確認してもよい。或る実施例では、ユーザはユーザ名及びパスワードを用いて又はそれ以外の方法で使用前に装置にログインするかもしれない。他の実施例では、携帯装置は或る手法（装置を用いてユーザがジェスチャーをなすように、ユーザがモーション入力用に装置を動かす手法）に基づいてユーザを確認できるかもしれない。上述したように、各ユーザは、装置で着目するアプリケーションに基づくように、状況に依存してコマンドをジェスチャーに割り当ててもよい。特定のユーザに基づいて機能をジェスチャーに対応付ける携帯装置の機能は、装置の柔軟性及び柔軟性を高め、このことは装置が特定数のジェスチャーしか認識及び区別できない場合に特に有利である。

【０１２１】

図２０は特定の実施例によるユーザベースのジェスチャーマッピングを利用するフローチャート３１０を示す。図示の例では、ジェスチャーは装置を用いるユーザに基づいて割り当てられる様々な機能を有する。ステップ３１２では、携帯装置１０が特定のジェスチャー運動の未処理モーションデータを受信し、ステップ３１４でそのような未処理モーションデータを処理し、装置の実際のモーションを判定する。ステップ３１６では、携帯装置１０は構えたジェスチャーデータベースにアクセスすることでモーションをジェスチャーに対応付ける。ステップ３１８では携帯装置１０はどのユーザがその装置を利用しているかを確認する。そのような確認は例えばシステムの機能（ユーザが使用前に装置にログ

FITBIT 1002
Fitbit v. Immersion

インした環境）を通じて行われてよい。携帯装置１０は更に他の適切な方法を通じて現在のユーザを判定してもよい。ステップ３２０では、その装置を利用しているユーザに基づいて、装置はジェスチャー入力に割り当てられている機能を実行する。４つのユーザの可能性があるプロセスを記述する図示の例では、ユーザ１が装置を利用していたならば、ステップ３２０ａで装置は機能１を実行し；ユーザ２が装置を利用していたならば、ステップ３２０ｂで装置は機能２を実行し；ユーザ３が装置を利用していたならば、ステップ３２０ｃで装置は機能３を実行し；ユーザ４が装置を利用していたならば、ステップ３２０ｄで装置は機能４を実行する。

【０１２２】

上述したように、或る実施例では、装置を使用しているユーザ及び状況の双方に基づいてジェスチャーは様々な機能に割り当てられてよい。この状況では、上述で説明されたフローチャート３１０は、その時点での状況（コンテクスト）を判定する追加のステップを有してもよい（例えば、フローチャート２９０のステップ２９８は着目しているアプリケーションを確認する。）。所定のジェスチャーにより実行するよう望まれる特定の機能は、その時点で装置を使用しているユーザ及びその状況（例えば、その時点で着目している特定のアプリケーション等）の双方に依存する。

【０１２３】

以前に説明されたように、或る実施例はモーション入力用のジェスチャーとして先在するシンボルを受信する機能を備えた携帯装置を有する。そのような実施例に加えて他の実施例は、ユーザについて、機能及び／又はキーにマッピングするそれら自身のジェスチャーを作成する能力を備えてもよい。そのジェスチャーは、ユーザの作成したシンボルその他の適切の如何なるもので構成されてもよく、装置が実行できる１以上の特定の機能、動作又はタスクに関し、ユーザがモーション入力として使用することを希望するものである。ユーザは何らかの個人的な意味を有する動き（モーション）を作成し、ユーザがモーションコマンド又は意図する機能を更に覚えやすくすることができる。

【０１２４】

図２１はユーザの作成したジェスチャーに対する割当プロセスを示す特定の実施例によるフローチャート３３０である。ステップ３３２では、ジェスチャーの作成に関する指示がユーザから受信される。その指示は（例えば、キー、トラックボール、モーション等のような）適切な入力フォーマットのどれを使用してもよく様々な手法のどれで受信されてもよい。ユーザはユーザの作成したジェスチャーに従って装置を動かし、そのユーザの作成したジェスチャーに関する未処理モーションデータがステップ３３４で携帯装置で受信される。未処理モーションデータは、装置の安定化後の基準参照位置から位置の変動を中止する指示が受信されるまでの一連の加速度測定で構成されてよい。ユーザの作成したジェスチャーを記録することの開始及び終了の指示は、動的な指示又は下動の指示（例えば、キー押下及びキーの開放）を含んでよい。未処理モーションデータはステップ３３６で処理される。ステップ３３８では、モーションは例えばジェスチャーデータベースでジェスチャーとして格納される。特定の実施例では、ジェスチャー生成の指示は、ユーザの作成したジェスチャーに従ってユーザが装置を動かした後に受信されてもよい。例えば、ユーザはユーザの作成したジェスチャー（現在その装置にとっては認識できない）に従って装置を動かしてもよい。認識されてないジェスチャーを特定の機能に備えて格納することをユーザが希望するか否かを判定するために、装置はユーザに問い合わせを行う。ユーザは肯定的に応答し、ユーザはそのジェスチャーを将来のモーション入力に使用可能にしてもよい。

【０１２５】

ステップ３４０では、ジェスチャーに関する機能マッピング情報がユーザから受信される。機能マッピング情報は、ユーザの作成した命令するジェスチャーに対応することが望まれる特定の機能、動作又はタスクを含んでよい。特定の実施例では、そのような機能マッピング情報は、或るジェスチャーが命令する一連の機能（例えば、マクロ）で構成されてもよい。ユーザは着目するアプリケーションに応じて様々な機能をジェスチャーに割り

FITBIT 1002
Fitbit v. Immersion

当ててもよい、場合によっては、ユーザは装置の様々なキーまたはキーストロークに様々なジェスチャーを対応付けることを望むかもしれない。一連の動作をジェスチャーに対応付けることの一例は、長い文字列をジェスチャーに対応付けることを含む（例えば、電話番号が複数のポーズを含む場合）。ステップ３４２では、機能マッピング情報が例えば機能データベースまたはジェスチャーマッピングデータベースに格納される。

【0126】

上述したように、ユーザにとって、１以上のジェスチャーに関して、ジェスチャーが入力として使用されるたびに携帯装置１０を同じ精度で動かすことは困難かもしれない。特定の実施例はジェスチャー入力に関する精度を変えることを許容する。精度は、装置により認識されたジェスチャーと、装置によりアクセスされたジェスチャーデータベースに含まれているジェスチャーとで一致をなすのにどの程度正確にジェスチャーが実行されなければならないかを規定する。ユーザの生成したモーションがジェスチャーデータベース中のジェスチャーに近接することを必要とすればするほど、そのようなジェスチャーモーションを成功裏に実行することが困難になる。上述したように、特定の実施例では、検出された運動の一連の加速度とジェスチャーデータベース中のジェスチャーのものとを照合することで、運動がジェスチャーデータベースのジェスチャーと照合される。

【0127】

認識に必要なジェスチャーの精度が高まるにつれて、潜在的に認識可能なジェスチャーを（同程度の頻繁さで）よりうまく有するかもしれない。一例として、必要とされる精度がゼロであった場合、装置は単純のジェスチャーしか認識できないが、それを容易に認識するであろう、なぜならユーザの行ったものは何でもそのジェスチャーとして認識されるからである。しかしながら、必要とされる精度が無限大であったならば、それはジェスチャーを形成するユーザにとって仮想的で不可能であるが、そのジェスチャーは装置によって認識され、その装置は、無数のジェスチャーをほんの僅かの違いでそれらを見分けながらサポートできる。精度の条件が特別に適用される分野の１つは、空間署名の分野である。空間署名では、精度レベルはセキュリティレベルに大きく関係するからである。

【0128】

特定の実施例では、ジェスチャー入力に関して携帯装置１０に必要とされる精度は変化させられてよい。異なる精度レベルは、異なるユーザ、「ジェスチャー空間」の異なる領域（例えば、或るようなジェスチャーは認識するのに高い精度で実行することを要するが、非常に複雑的なジェスチャーは実行の際に同程度に多くの精度を要しないかもしれない、）、署名のような様々な個々のジェスチャー、及び或るジェスチャーに対応付けられる様々な機能（例えば、より重要な機能は、認識されるそれら各自のジェスチャー入力に関して、より高い精度を要するかもしれない、）に必要とされるかもしれない。更に、或る実施例では、ユーザは、１以上のジェスチャー空間中のジェスチャー又は全部又は一部のジェスチャーについて必要な精度レベルを設定できてもよい。一例として、ユーザは、空間署名に関して要求される精度を、そのユーザの他のジェスチャーに関するものより高く設定し、空間署名入力のセキュリティを高めてもよい。

【0129】

上述したように、特定の実施例では、意図されるジェスチャーに関して装置がユーザにより或る経路に沿って動かされる場合に、ジェスチャーは装置の一連の加速度を検出することで認識されてよい。ジェスチャーデータベース中のジェスチャーに対して、装置により照合された一連の加速度が一致した場合に、認識がなされる。

【0130】

或る実施例では、携帯装置１０で認識可能な各ジェスチャーまたはジェスチャーデータベース中の各ジェスチャーは、３次元座標の行列を含んでもよい。更に、ジェスチャー入力として意図されるユーザの動きは、３次元座標の行列を含んでよい。携帯装置１０は、その加速度の行列を認識可能なジェスチャー（ジェスチャーデータベース中の各ジェスチャー）の各行列と比較し、意図されるジェスチャーを判定してもよい。判断の行列が意図されるジェスチャーの行列の各地点（座標）と関連するようにユーザが装置を動かすならば、

FITBIT 1002
Fitbit v. Immersion

ユーザは、完全な精度で認識されるジェスチャーを入力するように考えられる。ジェスチャー入力に必要な精度が少なくなると、ユーザのジェスチャーの運動とジェスチャー認識用のジェスチャーデータベース中の意図されるジェスチャーとの間の許容可能な差分が大きくなる。

【0131】

図２は精度レベルを変える携帯装置を利用する３つのジェスチャー入力を示す。図示の例では、意図されるジェスチャーは"0"を構成する。ジェスチャー運動３５０は完全な"0"、即ち意図されるジェスチャーに対して１００％の精度としての入力である。ジェスチャー運動３５２は、完全な"0"を形成しない場合であり、１００％より低い精度の入力である。ジェスチャー３５４はジェスチャー運動３５２より低い精度の入力である。ジェスチャー"0"の入力に対する精度条件は、精度レベルの変更を受け入れる携帯装置で設定される。ジェスチャー運動３５０だけがジェスチャー"0"として認識されるように、ジェスチャー運動３５０及び３５２双方がジェスチャー"0"として認識されるように、又はジェスチャー運動３５０、３５２、３５４全てがジェスチャー"0"として認識されるように、精度レベルが設定されてよい。上述したように、精度条件を広くすると、追加的な認識可能なジェスチャーに利用可能な空間が増える。例えば、例えば、携帯装置１０の精度レベルが、ジェスチャー運動３５０だけがジェスチャー"0"として認識されるように設定されていたならば、ジェスチャー運動３５２、３５４は別個のジェスチャーとして認識されてよい。

【0132】

特定の実施例では、携帯装置はユーザの個人的な正確さに基づいて、特定の機能を実行するために認識されるジェスチャーを変えてよい。このようにして、携帯装置はジェスチャーマッピングの動的な学習機能を有する。例えば、ジェスチャーデータベース中の特定のジェスチャーが特定の機能に対応付けられ、そのジェスチャーを入力するためのユーザの反復的な試みが一貫した方法では精度不足であった場合に、携帯装置はジェスチャーデータベース中のジェスチャーを、そのユーザの不得手でないジェスチャー運動に変え、ユーザの首尾一貫したジェスチャー入力が特定の機能に対応付けられるようにしてもよい。

【0133】

一例として、或る特定のジェスチャーが四角い運動で構成され、そのジェスチャーについて行われたユーザのモーションが一貫して（例えば、複数の連続的な回数で）三角の運動を何度も行っていた場合、携帯装置は意図されるジェスチャーと実際のユーザの運動とのその一貫した相違を認識し、望まれる機能に対応するジェスチャーデータベース中の意図されるジェスチャーを、ユーザの実際の一貫した動き（例えば、三角運動）に変える。かくてそのような変更がなされた後は、ユーザが三角のジェスチャーを入力する時はいつでも、以前に四角のジェスチャーに対応付けられた機能が命令される。装置は、如何なる入力形式でもそれを介して例えばユーザとの双方向通信により、種々な如何なる手法で意図されるジェスチャーを決定してもよい。特定の実施例では、このようにユーザ入力の特徴を動的に学習することがユーザ固有に適用されてよい。例えば上述の例で、別のユーザは同じ携帯装置を用いて同じ機能を命令するのに四角いジェスチャーを結果として入力してもよい。

【0134】

上述したように、意図されるジェスチャーに関するユーザ運動の精度が高いと、機能に対応付けるのに利用可能なジェスチャー数が増える。或る実施例では、携帯装置は、ユーザの反復さが時と共に高まることを認識し、その結果その装置は利用可能なジェスチャーを増やしてもよい。入力に利用可能なジェスチャーを増やすことは、ジェスチャー入力を通して通信可能な機能も増やせるかもしれない。

【0135】

一例として、ジェスチャーを入力するためのユーザの個人的な正確さは、携帯装置で認識される所定のジェスチャー数をユーザが入力できることだけにしてよいかもしれない。しかしながら時間がたつにつれてユーザの個人的な正確さは増えるかもしれない。この面

FITBIT 1002
Fitbit v. Immersion

加は携帯装置で認識されるかもしれないし，その結果その装置は，ジェスチャー入力としてユーザが利用してよいジェスチャーを追加可能にしてよい。一例では，ジェスチャーを追加可能にすることは、ユーザの習熟が或る特定の閾値又は測定の精度レベルを超えて増えた場合になされる。ユーザの習熟が増やされるので，ユーザがこれらの追加的なジェスチャーを入力しようとすることを携帯装置は認識することができる。上述したように、ユーザによる入力に追加的なジェスチャーを用意することは、各ジェスチャーが様々な機能に割当付けられるので，ジェスチャー入力を通じてユーザが指令できる機能数も増やすかもしれない。

【0136】

特定の実施例では携帯装置は装置のノイズ閾値をユーザが設定すること及び変えることを許容してよい。ノイズ閾値は、ユーザの意図されるモーション入力とみなすために検出されなければならない装置の運動の大きさである。例えば、ノイズ閾値が低く設定されていたとすると，装置の僅少に小さなモーションでもモーション入力として装置によりみなされるかもしれない。しかしながら、ノイズ閾値が高く設定されていたならば、そのユーザにより意図される入力かモーションと考えられるにはイそれに先だってより大きな装置の運動が必要とされる。例えばユーザが車ででこぼこ道を走っていたとすると，ユーザはノイズ閾値を高く設定し、道のでこぼこに起因して装置が動いた場合に、そのような動きが意図されるモーション入力として装置に認識されないようにすることを望むかもしれない。

【0137】

特定の実施例では、ノイズ閾値はモデル化された環境に基づいて装置で自動的に変化してもよい。例えばその環境が車での移動中であるように装置が確認した場合，装置はノイズ閾値を自動的に増やし，車に起因する小さな動きがユーザの意図したモーションとして誤認されないようにしてもよい。

【0138】

図２３はここで説明される多数の特徴を用いるジェスチャー認識アロセスを示す特定の実施例によるフローチャート３７０である。ステップ３７２では特定のジェスチャー運動の未処理モーションデータが受信される。未処理モーションデータはステップ３７４で処理され，装置の実際の運動が確認される。　そのような処理は複数の検出又は検知条件によるデータに関する様々な選別法（フィルタリング）及び融合を含んでもよい。実際の運動とジェスチャーとの対応付けは，ユーザ設定データベース３８８にアクセスすることを含んでよく，そのデータベースはユーザデータ（例えば、ユーザの正確さ、ノイズ特性又は閾値、ユーザの作成したジェスチャー，及びその他のユーザ識別子３８１を含むユーザ特定のデータ又は情報より成る）を含んでよい。例えば携帯装置の様々なユーザは様々な設定及びモーション入力特性を有するので，ユーザ固有の情報は重要である。例えば、年配の人は、ジェスチャー入力時に若い人よりも正確さに欠けるかもしれないので、年配の人はより少ないジェスチャーを利用してもよい。更に，より熟練した人はジェスチャー入力を通じてより多くの機能を使いこなせるかであろう。

【0139】

ユーザ設定データベース３７８は，その時点で利用可能なジェスチャーを決める際の要因である環境モデル情報も含んでよい。上述したように，環境モデリングを通じて，装置は、ジェスチャー認識でその環境が与える影響のある影響及び傾向を内部的に示すことができる。例えば，ユーザが列車内にいるとき、装置はノイズ閾レベルを自動的に増やしてもよい。特定のジェスチャー認識でジェスチャー空間がどの程度混雑しているかに依存して，装置は要求される精度を減らしてもよい。実際のモーションとジェスチャーとの対応付けは，ジェスチャーデータベース３８８にアクセスすることを含んでもよい。

【0140】

ステップ３７６では，ジェスチャーが装置の機能に対応付けられる。このステップは，ジェスチャー及び機能間の関係（情報）を含む機能マッピングデータベース３８６にアクセスすることを含んでよい。異なるユーザは，異なる機能及び異なるユーザの作成した各

FITBIT 1002
Fitbit v. Immersion

能にジェスチャーをマッピングする対応関係を有していてもよい。かくて機能マッピングデータベース３８６は、特定のジェスチャーを１以上の機能に対応付けるのに適用可能な、ユーザ固有のマッピング命令又は特徴、ユーザの作成した機能（例えば、マクロ及び／又は電話番号ト及び他の如何なる機能情報をも含んでよい。或る実施例ではジェスチャーは個々のキーストローク（キー打ち）に対応付けられてもよい。ユーザの身元（識別子）３８１もこのステップでアクセスされてよい。更に、装置の状況（コンテキスト）情報３８４もアクセスされてよく、そのジェスチャーで使用されてよい。状況情報は、環境モード情報３８９、現在しているアプリケーションの情報３９０及び装置状態情報３９１（例えば、時間及び日付情報、位置情報、バッテリ状態及びモード情報（例えば、サイレントモードト等を含んでもよい。ステップ３９２では、装置は適切に対応付けられた１以上の機能を実行し、例えば、ステップ392aで機能１を、ステップ392bで機能２を、ステップ392cで機能３を実行してよい。

【0141】

上述したように特定の実施例では携帯装置１０はここで説明される多くの機能を備えたセルラ電話機を構成してもよい。例えば、モーション入力機能を備えたセルラ電話機は上述したようなパターンメニューに対してモーション入力を使用してもよい。セルラ電話機は、自由落下中であること、セルラ電話機がうつぶせであること又は押付けてあること等のような装置状態及び環境を検出し、ミュート、スピーカ電話及びパワーオフ等のような動作を対応付けてもよい。装置状態の他の検出法は、その電話機がミュート不使用又はスピーカフォン状態にあることの検出を含んでもよい。セルラ電話機は（例えば、身振りによる素早いダイヤルにより）ダイヤルを制御し又は装置のキーパッドをロック／アンロークしてもよい。例えば、家に電話するために時計回りに、職場に電話するのに反時計回りに及び大切な人に電話するのにハート型に装置が動かされてもよい。ユーザはカスタマイズされたジェスチャーのマッピングに対してセルラ電話機をプログラムしてもよい。

【0142】

特定の実施例では、携帯装置１０はディジタルカメラを構成し、ここで説明された機能の少なくともいくつかに対してモーション入力を使用する。例えば、モーション入力機能を備えたディジタルカメラは上述したようなメニューを平坦化するためにモーション入力を用いてよい。モーションは、ユーザが静止画又は動画を拡大（及び縮小）し、より円滑でより直感的な機能でより詳しく調べるために使用されてもよい。モーションは写真又は映像クリップの多数のサムネイルをズームイン及びズームアウトするのに使用され、１以上の検討するものを選びやすくしてもよい。或想的なデスクトップは、カメラを並進させることで又はジェスチャー入力を使用することで、多くのディジタル写真やビデオクリップをレビューするために、或いは多くのディジタル写真やビデオクリップの多数のサムネイルをレビューするのに使用されてもよい。フラッシュ設定、焦点タイプ及び光検出モード等のような、ディジタル静止画及び動画カメラの様々な設定を変更するように、ジェスチャー及び単独のモーションが、他のインターフェース機構と組み合わせて又は単独で使用されてもよい。更に、自由落下が検出され、差し迫った衝突によるダメージから何らかの手法でカメラ自身を保護するように誘導してもよい。そのような保護はカメラの全部又は一部の電源を落とすこと、レンズカバーを閉じることおよびレンズを引っ込めること等を含んでよい。

【0143】

特定の実施例では、携帯装置１０はディジタル時計を構成し、ここで説明された機能の少なくともいくつかに対するモーション入力を利用してもよい。例えば、モーション入力機能を備えたディジタル時計は、上述したメニューを平坦化するためにモーション入力を利用してもよい。或る実施例では、時計針を軽くたたくこと（タッピング）又は特定のジェスチャーが時計をサイレントモードにするのに使用されてもよい。タップ、円転、並進及び他のより複雑なジェスチャーを通じて他の機能がアクセスされてもよい。これらの機能は、時間帯を変更すること、時計を設定すること（例えば、時間を設定すること、他の調整可能な設定を行うこと）、モードを変更すること（例えば、時計、アラーム

FITBIT 1002
Fitbit v. Immersion

，ストップウォッチ等），バックライトを起動すること、ストップウォッチを使用すること（ストップウォッチを開始，停止及び分割(splitting)等すること）及び他のタイマーを開始したり止めたりすること等を含む．

【0144】

特定の実施例では、モーション検出はディスプレイと別でもよい．例えば、ディスプレイが眼鏡やコンタクトに設けられ，携帯装置の他の部分がユーザの体に分散され，ディスプレイがモーション入力装置又は電子と物理的に同じ要素の一部でないようにしてもよい．

【0145】

上述したように、特定の実施例で行われる様々な方法，フローチャート及びプロセスを特定の図面は示していた．本発明の範囲から逸脱せずに様々な実施例の中で、ステップは如何なる順序でなされてもよいこと．特定の方法，フローチャート又はプロセス中のステップは他の方法，フローチャート又はプロセスと組み合わせられてよく、或いは同一の方法，フローチャート又はプロセス中の他のステップと組み合わせられてよいことが理解されるべきである．

【0146】

以上本発明が特定の実施例に関して詳細に説明されてきたが，様々な他の変更、置換及び代替が本発明の範囲及び精神から逸脱せずにそれらになされてよいことが理解されるべきである．例えば、本発明は携帯装置１０に含まれる様々な要素に関連して説明されてきたが，これらの要素は特定のアーキテクチャ又は要請に応じて組み合わせられ，編成され又は設けられてよい．更に、これらの要素のどれでもが適切ならば別個の外部要素として用意されてもよい．本発明はそれらの内的な関係に加えてこれらの外的な要素配置にも及ぶ大きな柔軟性も規定している．

【0147】

多くの他の変更、置換，変形，代替及び修正が当業者に確認され，本発明は特許請求の範囲の発明範囲及び精神の中にそのような変更，置換，変形，代替及び修正の全てを包含するよう意図される．

【図面の簡単な説明】

【0148】

【図１】特定の実施例によるモーションインターフェース機能を備えた携帯装置を示す図である．

【図２】特定の実施例による図１の携帯装置のモーション検出器を示す図である．

【図３】特定の実施例による図１の携帯装置のモーション検出素子の利用例を示す図である．

【図４】特定の実施例によるモーション検出機能を備えた携帯装置例を示す図である．

【図５】特定の実施例による携帯装置の支配的な運動の選択及び増幅の様子を例示する図である．

【図６】特定の実施例による好ましいモーション選択を説明するためのフローチャートである．

【図７】特定の実施例による携帯装置の基準点を設定するためのフローチャートを示す．

【図８】仮想的なデスクトップナビゲーションに関する特定の実施例での携帯装置によるスクラッピング機能を例示する図である．

【図９】特定の実施例による図８のスクラッピングプロセスを示すフローチャートである．

【図１０Ａ】特定の実施例によるジェスチャー入力を用いるナビゲーションメニュー例を示す図である．

【図１０Ｂ】特定の実施例による携帯装置で様々な機能を実行するのに使用されるジェスチャー例を示す図である．

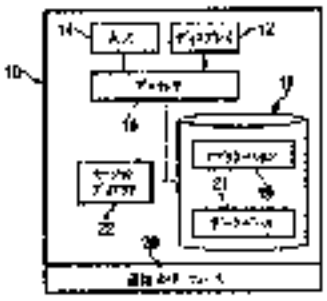
【図１１】特定の実施例によるモーション入力を用いるナビゲーションマップ例を示す図である．

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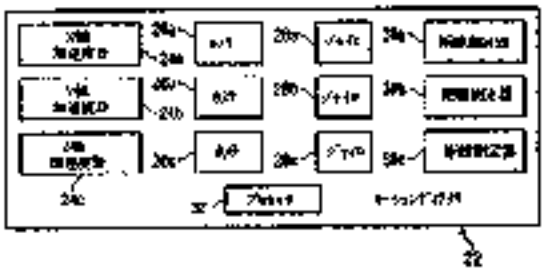
【図24】特定の実施例による或る形式のモーション入力カーソルナビゲーションを示す図である。
【図25】特定の実施例による別の形式のモーション入力カーソルナビゲーションを示す図である。
【図3】モーション入力に応答するフィードバックを利用するプロセスを利用する特定の実施例によるフローチャートである。
【図4】特定の実施例による携帯装置で空間署名を使用するシステム例を示す図である。
【図5】携帯装置のモーション入力が複数の他の装置を制御する特定の実施例によるシステム例を示す図である。
【図6】特定の実施例による携帯装置の環境モデリングプロセスを示すフローチャートである。
【図7】特定の実施例による携帯装置の様々な機能に対応付けられるジェスチャー例を示す図である。
【図8】先在するシンボルジェスチャーを利用する特定の実施例によるフローチャートである。
【図9】特定の実施例によるコンテキストベースのジェスチャーマッピングを利用するフローチャートである。
【図10】特定の実施例によるユーザベースのジェスチャーマッピングを利用するフローチャートである。
【図11】ユーザの作成したジェスチャーに対する割当プロセスを示す特定の実施例によるフローチャートである。
【図12】精度レベルを変える携帯装置を利用する特定の実施例による３つのジェスチャー入力を示す図である。
【図13】多数の特徴を利用するジェスチャー認識プロセスを示す特定の実施例によるフローチャートである。

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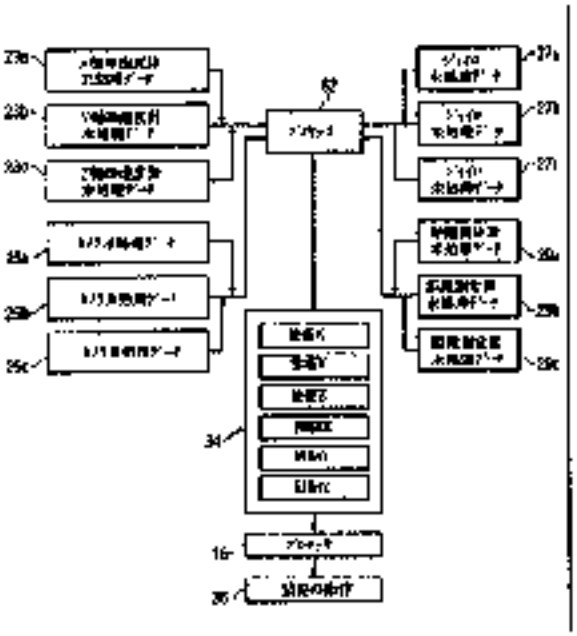
【図1】



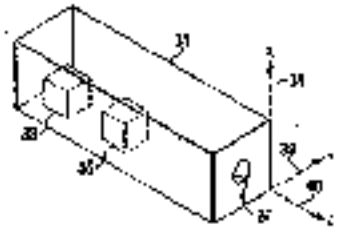
【図2】



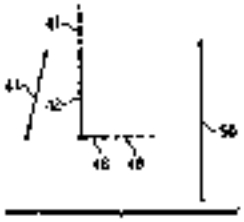
【図3】



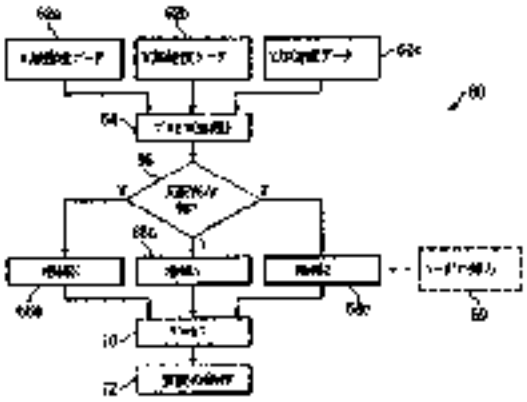
【図4】



【図5】

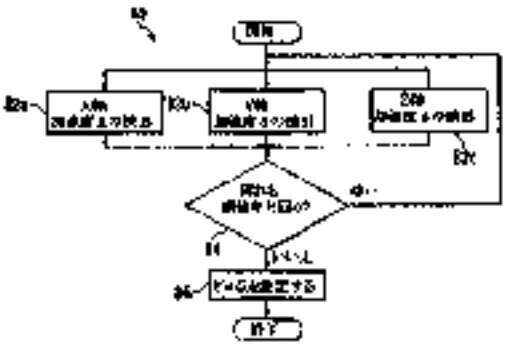


【図6】

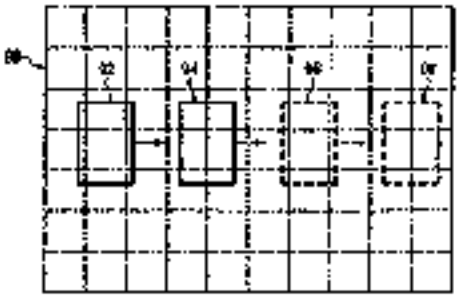


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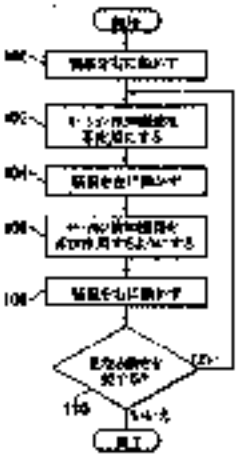
【図7】



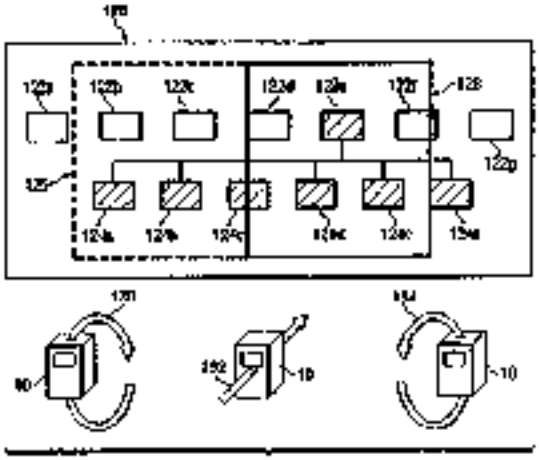
【図8】



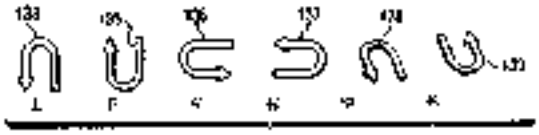
【図9】



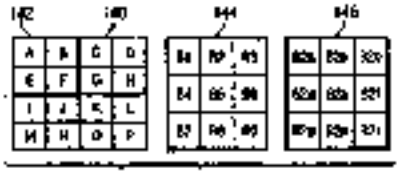
【図10A】



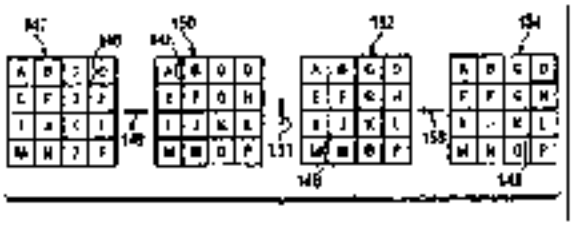
【図10B】



【図11】

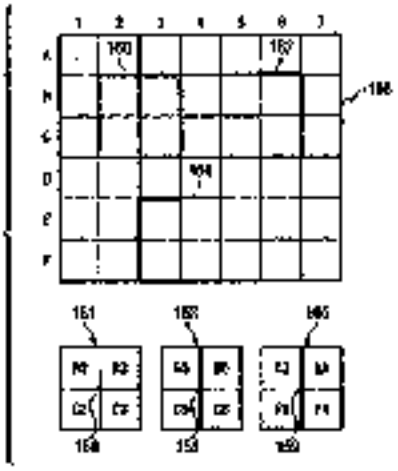


【図12】

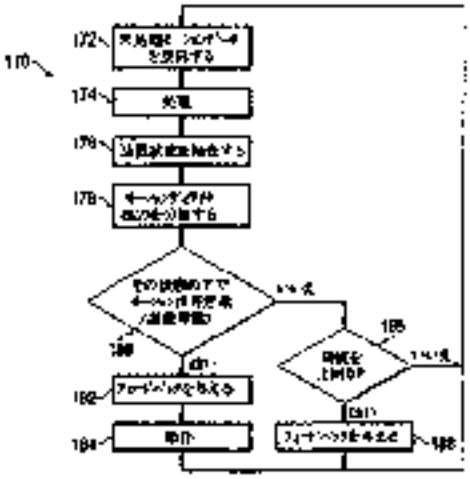


FITBIT 1002
Fitbit v. Immersion

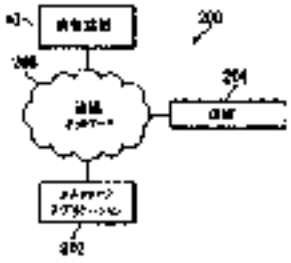
【図2B】



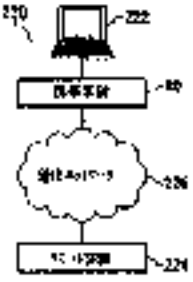
【図3】



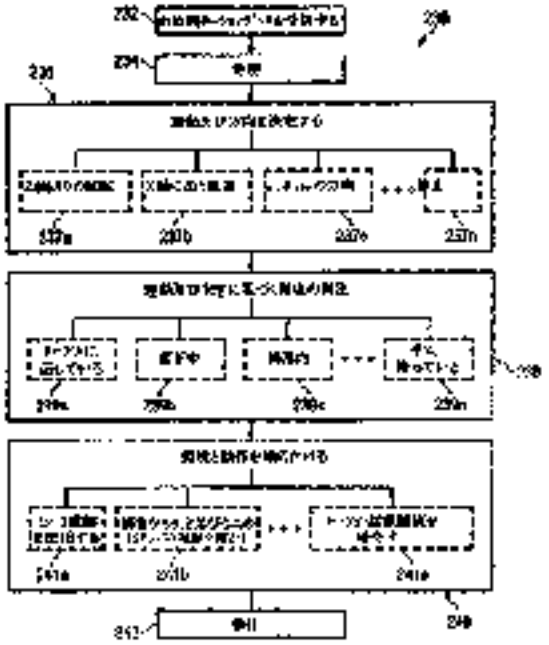
【図4】



【図5】

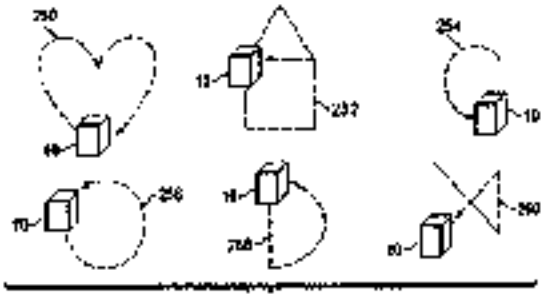


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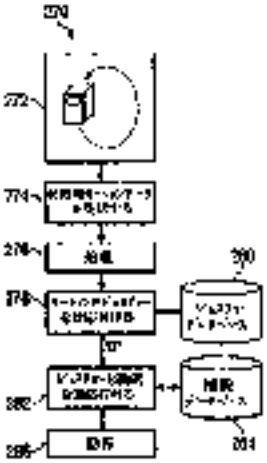


FITBIT 1002
Fitbit v. Immersion

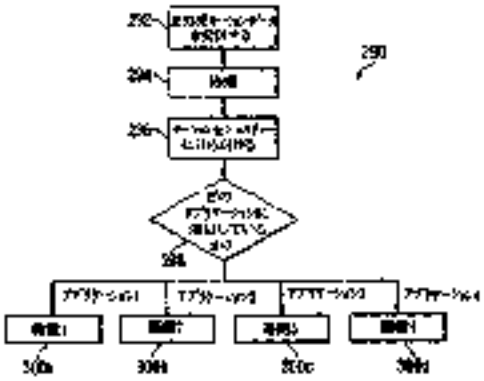
【図17】



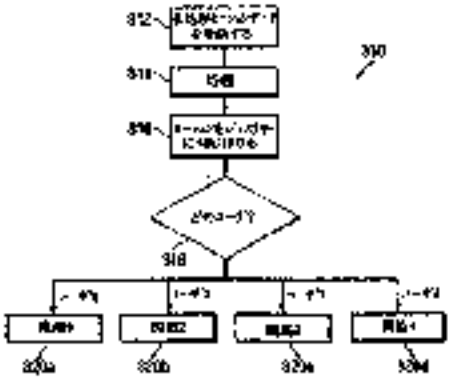
【図18】



【図19】



【図20】

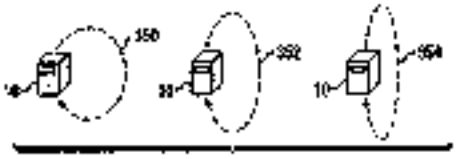


FITBIT 1002
Fitbit v. Immersion

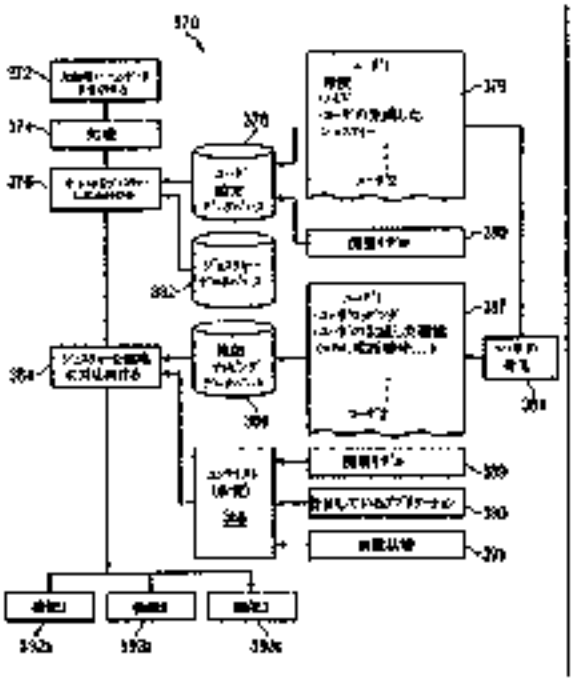
【図1】



【図2】



【図3】



FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

PCT/US2005/007409

IPC 7 G06F1/16

IPC 7 G06F

EPO-Internal, WPI Data, PAJ, IBM-TDB

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 01/86920 A (LAPIDOT, ZVI) 15 November 2001 (2001-11-15) page 3, line 5 - line 12 page 5, line 15 - page 9, line 20; figures 1-4 page 10, line 18 - line 25; figure 6	1-27
X	US 2004/027330 A1 (BRADSKI GARY R) 12 February 2004 (2004-02-12) paragraph '0019! paragraphs '0025! - '0035!; figures 2A-2C,3A-3C,4,5 paragraph '0049! - paragraph '0062! paragraphs '0064!, '0003!, '0004! -/--	1-3,9, 10, 12-14, 19-21, 26,27

X Further documents are listed in the continuation of box C.

X Patent family members are listed in annex.

Date of the actual completion of the international search	Date of mailing of the international search report
13 October 2005	03/11/2005
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax (+31-70) 340-3016	Authorized officer Legrand, J-C

FITBIT 1002
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INTERNATIONAL SEARCH REPORT

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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
T	US 2002/190947 A1 (FEINSTEIN DAVID Y) 19 December 2002 (2002-12-19) paragraph '0060!; figures 2,5 paragraph '0066! - paragraph '0073!; figures 7A-7E paragraph '0087! - paragraph '0091!; figures 14-16	1-3, 9-14, 19-21, 26,27
A	GB 2 378 878 A (* IMMERSION L[MITED) 19 February 2003 (2003-02-19) page 9, line 15 - page 12, line 12; figures 2a,2b,7a-7d,8 page 13, line 25 - page 16, line 4; figures 9b-9d	5,10,16, 23
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A	WO 03/001340 A (MOTION SENSE CORPORATION; MOSTOV, KIRILL; VERMES, JOHN) 3 January 2003 (2003-01-03) page 6, line 22 - page 8, line 34; figures 2,3	9,19,26

FITBIT 1002
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FITBIT 1002
Fitbit v. Immersion

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(32)優先日　平成16年3月23日(2004.3.23)
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(33)優先権主張国　米国(US)
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FITBIT 1002
Fitbit v. Immersion

EP(AT,BE,BG,CH,CY,CZ,DE,DK,EE,ES,FI,FR,GB,GR,HU,IE,IS,IT,LT,LU,MC,NL,PL,PT,RO,SE,SI,SK,TR),OA(BF,BJ,CF,CG,CI,CM,GA,GN,GQ,GW,ML,MR,NE,SN,TD,TG),AE,AG,AL,AM,AT,AU,AZ,BA,BB,BG,BR,BW,BY,BZ,CA,CH,CN,CO,CR,CU,CZ,DE,DK,DM,DZ,EC,EE,EG,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KP,KR,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MN,MW,MX,MZ,NA,NL,NO,NZ,OM,PG,PH,PL,PT,RO,RU,SC,SD,SE,SG,SK,SL,SM,SY,TJ,TM,TN,TR,TT,TZ,UA,UG,US,UZ,VC,VN,YU,ZA,ZM,ZW

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FITBIT 1002
Fitbit v. Immersion

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METHOD AND APPARATUS FOR CONTENT MANAGEMENT AND CONTROL

Inventor(s):

Applicant(s):

Classification: - international: *G06F1/16; G06F3/00; G06F3/01; G06F3/033; G06F3/048; H04M1/00*
- cooperative: G06F1/1626; G06F1/1684; G06F1/1694; G06F3/011; G06F3/0346; G06F3/0481

Application number: JP20070506186 20050304

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Abstract not available for JP2007531158 (A)
Abstract of corresponding document: WO2005103860 (A1)

A handheld electronic device (100) includes at least one context sensor (120) and a microprocessor (204), and a user interface (104). The context sensor detects (306) either a contextual characteristic of the device (e.g., ambient light, motion of the device or proximity to or contact another object or how the user is holding the device) and generates a virtual output (310) representative of the sensed characteristic. The sensed contextual characteristic is associated with a data management function of the device and a virtual physical representation to be output in response to the execution of the data management function is determined (308). The virtual physical representation is related to the sensed contextual characteristic or the data management function. The virtual physical representation is output by a user interface of the device.

Last updated: 13.01.2013 Worldwide Database 5.8.6.7.92p

FITBIT 1002
Fitbit v. Immersion

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H04M	1/00	(2006.01)	H04M	1/00	R	5K027

審査請求 有　予備審査請求 未請求　(全 30 頁)

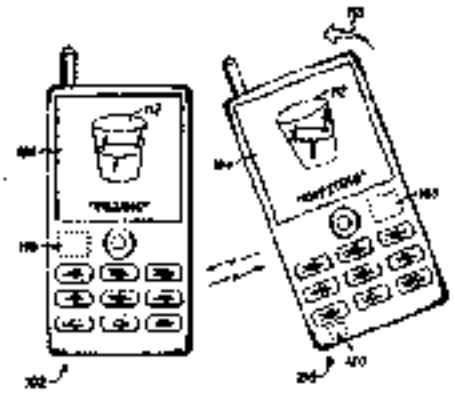
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最終頁に続く

(54)【発明の名称】コンテンツの管理及び制御の方法及び装置

(57)【要約】
携帯電子デバイス（１００）には、少なくとも１つのコンテキストセンサ（１２０）及びマイクロプロセッサ（２０４）と、ユーザインタフェース（１０４）とがある。コンテキストセンサは、デバイスのコンテキストの特徴（例えば、周辺光、デバイスの動きか別のオブジェクトへの近接又は接触、どのようにユーザがデバイスを把持しているかなど）を検出し（３０６）、感知した特徴を表現する仮想的な出力を生成する（３１０）。感知したコンテキストの特徴はデバイスのデータ管理機能に関連付けられ、データ管理機能の実行に呼応して出力されるべき仮想物理表現を判断する（３０８）。仮想物理表現は感知したコンテキストの特徴又はデータ管理機能に関する。仮想物理表現はデバイスのユーザインタフェースにより出力される。



FITBIT 1002
Fitbit v. Immersion

【特許請求の範囲】
【請求項1】
コンテキストセンサを有する電子デバイスにおいてコンテンツ管理を実現する方法であって、
コンテキストセンサから信号群を受信する工程と、
前記受信したコンテキストセンサ信号群に基づいて前記デバイスのコンテキストの特徴を判断する工程と、
前記判断したコンテキストの特徴を前記デバイスのデータ管理機能と関連付ける工程と、
前記データ管理機能の実行に呼応して、出力されるべき仮想物理表現を判断する工程と、を含む方法。
【請求項2】
前記仮想物理表現を前記感知したコンテキストの特徴に関係付ける工程を更に含む請求項1に記載の方法。
【請求項3】
前記仮想物理表現を前記データ管理機能に関係付ける工程を更に含む請求項1に記載の方法。
【請求項4】
前記仮想物理表現を前記デバイスのユーザインタフェースによって表示する工程を更に含む請求項1に記載の方法。
【請求項5】
前記コンテキストセンサ信号に呼応して前記デバイスのデータ管理機能を制御する工程を更に含む請求項4に記載の方法。
【請求項6】
前記コンテキストセンサ信号を受信する工程に呼応して前記デバイスの第1のデータ管理機能を実行し、このとき前記デバイスが第1のモードで動作しており、
前記コンテキストセンサ信号を受信する工程に呼応して前記デバイスの第2のデータ管理機能を実行し、このとき前記デバイスが第2のモードで動作している、工程を更に含む請求項5に記載の方法。
【請求項7】
前記コンテキストセンサ信号に呼応して前記デバイスのデータ管理機能を比例的に実行する工程を更に含み、前記仮想物理表現が前記データ管理機能の実行に比例的に表示される請求項4に記載の方法。
【請求項8】
前記コンテキストセンサが、静電容量式タッチセンサ、モーションセンサ、温度センサ、光センサ、近接センサ、赤外線センサ、カメラ、マイクロホンのうちの少なくとも1つである請求項1に記載の方法。
【請求項9】
前記タッチセンサが、前記デバイスのハウジングに保持されている複数のタッチセンサである請求項8に記載の方法。
【請求項10】
電子デバイスにおけるコンテンツ管理の方法であって
転送する、第1のデバイスに保存されているデータを選択する工程と、
前記第1のデバイスのコンテキストの特徴を感知する工程と、
前記第1のデバイスと第2のデバイスとの間を接続する工程と、
前記選択したデータを前記第2のデバイスに転送する工程と、
前記デバイスの感知したコンテキストの特徴の仮想表現を表示する工程と、を含む方法。
【請求項11】

FITBIT 1002
Fitbit v. Immersion

携帯通信デバイスで感知されたジェスチャから結果として生じるコマンドを実行する方法であって、
前記携帯デバイスの第１の動作モードを作動させる工程と、
前記携帯デバイスの所定のジェスチャに対応するジェスチャセンサから入力信号群を受信する工程と、
前記コマンドに呼応して又は前記センサの測定が第１の基準を満たしたことに呼応して前記携帯通信デバイスにおけるアルゴリズムを実行する工程と、
物理的原理の仮想表現を前記デバイスのユーザインタフェースに呈示する工程と、を含む方法。
【請求項12】
電子デバイスであって、
ハウジングと、
前記ハウジングに保持されているマイクロプロセッサと、
前記マイクロプロセッサに結合され前記ハウジングに保持されているユーザインタフェースと、
前記マイクロプロセッサに電気的に結合されているコンテキスト検出センサと、
前記マイクロプロセッサに結合されており、前記コンテキストセンサからの信号に呼応して仮想物理表現を前記ユーザインタフェースに呈示する仮想物理表現制御モジュールと、を備えたデバイス。
【請求項13】
所定のコンテキストの特徴の作動に呼応して前記デバイスコンテキスト検出センサが入力信号を前記マイクロプロセッサに選択的に供給する、請求項１２に記載のデバイス。
【請求項14】
前記コンテキストセンサが、静電容量式タッチセンサか、モーションセンサか、温度センサか、光センサか、近接センサか、赤外線センサか、カメラか、マイクロホンである請求項１３に記載のデバイス。
【請求項15】
前記仮想物理表現制御モジュールが、前記コンテキストセンサにより感知されたコンテキストに関連付けられた周知の物理的な現象の仮想表現を生成し、前記仮想物理表現制御モジュールが前記仮想表現を前記ユーザインタフェースに送る、請求項１３に記載のデバイス。
【請求項16】
前記ユーザインタフェースがディスプレイである請求項１５に記載のデバイス。
【請求項17】
周知の物理的な現象の仮想表現が、前記ディスプレイに呈示されるグラフィカルアニメーションである請求項１６に記載のデバイス。
【請求項18】
前記ディスプレイに呈示されるグラフィカルアニメーションが容器の中の液体の仮想表現である請求項１７に記載のデバイス。
【請求項19】
容器の中の液体の前記仮想表現が、前記デバイスによって行われた注ぐジェスチャを感知する前記コンテキストセンサに呼応して前記容器から注ぎだされる前記液体のアニメーションである請求項１８に記載のデバイス。
【請求項20】
前記仮想物理表現制御モジュールが、前記マイクロプロセッサに結合されかつ前記デバイスに対するコンテキスト検出センサからの入力を受信するジェスチャ変換モジュールであり、前記仮想物理表現制御モジュールが、前記デバイスを動作させるために前記デバイスの動きを制御コマンドに変換する請求項１２に記載のデバイス。
【請求項21】
前記ユーザインタフェースが、ディスプレイか、スピーカか、ハプティクスか、マイクロ

FITBIT 1002
Fitbit v. Immersion

ホンか、キーパッドか、ジョイスティックか、カメラか、スキャナか、上記のものの組み
【発明の詳細な説明】「１２に記載のデバイス。
【技術分野】
【0001】
本発明は一般にコンテンツ管理に関し、特に、デバイスコンテキストに基づくコンテン
ツ管理に関する。
【背景技術】
【0002】
装置内の多数の電子デバイス間相互間のデータ管理は、一般に装置のユーザには見えない
。データは一般に、表示とユーザインタフェースの使用とを介して管理されている。ユー
ザインタフェースがユーザに、ユーザが命令する又は入力をする方法を提示するのに加
え、データの管理や特徴や処理の表現、例えば、データの移動やプログラムの実行やデー
タの転送なども表示する。しかしデータの管理又はデータの移動を表示するのに使われて
いる現行の方法では、ユーザは行われているデータ管理タスクと容易に又は相互に作用す
るよう関連付けることはできない。ユーザは通例、コンテンツを扱う又はコンテンツを関
連付けるのに苦労する。この問題は、デジタル化された音楽などの認可を受けているコン
テンツに関しては特に顕著で、認可を受けコンテンツをダウンロードしたユーザが、特定
のコンテンツをなしているビット及びバイトを物理的に見ることができない。従って、こ
のタイプの情報を管理するとユーザには直観的に分かりにくくなる。
【0003】
電子デバイス内及び電子デバイス間相互間でのデータの実際の物理的な管理で使われて
いる方法は、一般に知られている。データは、制御装置又はマイクロプロセッサと、制御
装置又はマイクロプロセッサと相互に作用するソフトウェアとによって、デバイス内で管理
される。ユーザはソフトウェアと相互に作用して、データをどのように管理するか制御装
置に指図する。例えば、データは一方のデバイスから他方のデバイスへユーザにより手作
業で転送されたり、あるアプリケーションのコマンド群に呼応して自動的に転送されたり
する。いずれにしても、データは電線及びケーブルによって転送されたり、無線によって
転送されたりし、実際の転送処理は一般にユーザには見えない。転送処理について又は進
捗状況についてソフトウェアで生成される描写の１つの例は、グラフ表現群であり、これ
がユーザインタフェースに表示されるのでユーザは行われている動作を視覚的に追いかけ
ることができる。１つの例は、デバイスのディスプレイへの「プログレスバー」の表示で
あり、プログレスバーは転送するデータの量又はデータ転送に関する時間特性を表現する
。しかし、データ管理の表現のこういった現行の方法は相互に作用する方法ではなく、ユ
ーザにデータの実際の管理を関連付けさせたり相互に作用させたりはしない。この為に、
デバイスの制御は更に難しくなる。
【発明の開示】
【発明が解決しようとする課題】
【0004】
求められているものは、ユーザがデータの管理を、デバイスのコンテキストに関する直
観的なやり方で関連付けこれと相互に作用することを可能にする方法及び装置であり、こ
れによって使いやすさが向上する。
【課題を解決するための手段】
【0005】
情報の制御を集積化して、コンテキストの情報に呼応して電子デバイスに保存されてい
る情報を相互に作用するように管理する方法を開示する。電子デバイスには、通常データ
又はコンテンツと呼ばれている情報があり、電子デバイスの中に保存されている。コンテ
ンツ管理に含まれるのは、デバイスの制御、デバイスの中のデータの制御又は管理、別の
デバイスへの情報の転送などである。デバイスの内部に又は外部に保持されているセンサ
群が、他のオブジェクト又はユーザに対してデバイスの環境の特徴又はコンテキストの特
徴を感知する。感知した環境の特徴に呼応して、デバイスのコンテンツ又は動作に対して

FITBIT 1002
Fitbit v. Immersion

動作又は機能が行われる。コンテキストの特徴は静的であったり動的であったりする。デバイスに維持されているユーザインタフェースがユーザに対し、感知した環境の特徴又はコンテキストの特徴に対応するフィードバックを行う。フィードバックは仮想物理フィードバックの形でよい。仮想物理フィードバックは、一般に、広く理解される共通の物理的特性を図示する情報の呈示である。仮想物理表現は、ユーザが以下の基本的な物理科学の原理群にたやすく関連付けることのできる情報であり、通常はユーザに分かるものである。加えて、環境の特徴に呼応して、デバイスは１つの機能を行う場合があり、このときデバイスは第１のモードであり、同一の環境の特徴に呼応して、デバイスは第２の機能を行う場合もあり、このときデバイスは第２のモードである。

【発明を実施するための最良の形態】

【0006】

以下に記載される添付の図面による以下の発明を実施するための最良の形態を慎重に考慮すると、本発明の種々の態様、特徴、利点が、当業者には更に十分に明らかとなる。

本発明は種々の形式の実施形態によって達成可能であるが、本開示は本発明の例証であると考えられるべきであり本発明を、最初に含まれる特定な実施形態に制限することは意図していないという了解の下で、本模範的な実施形態が図面に示され以下に記載される。

【0007】

図１では、第１の電子デバイス１００の１つの模範的な実施形態が示されており、第１の電子デバイス１００はコンテキストの特徴を感知し、感知した特徴の仮想物理表現をユーザに呈示する。この実施形態では、感知したコンテキストの特徴は、データを一方のデバイスから他方のデバイスへ転送する機能に対応する。コンテキストの特徴を感知し次第、第１のデバイス１００はデータ管理機能を実行し、データ管理機能とは、この模範的な実施形態では、第２の電子デバイス１０２への希望のデータの転送である。この実施形態では、第１のデバイス１００には第１のディスプレイ１０４があり、第２のデバイス１０２には第２のディスプレイ１０６がある。第１のデバイス１００には更に送信機１０８があり、送信機１０８はデータを無線で第２のデバイス１０２の受信機１１０に送信する。送信は図１の模範的な実施形態では無線ではあるが、データは同様に有線の接続で転送される場合もある。

【0008】

図１の模範的な実施形態では、感知したコンテキストの特徴は、第１のデバイス１００によって行われた「注ぐ（ｐｏｕｒｉｎｇ）」ジェスチャである。示されている第１のディスプレイ１０４には、水でいっぱいのコップ１１２が描写されており、水は転送されるコンテンツを表現している。第１のデバイス１００が、矢印１１４により示されている、傾斜させる（傾き注ぐ）１１４、というコンテキストの特徴を感知すると、コンテンツを第２のデバイス１０２に注ぐかのように、第１のディスプレイ１０４に示されているコップの流体が空けられ始め、第１のデバイス１００の注ぐジェスチャに呼応して注がれているかのように注ぐのと同じように傾く。この相互に作用するデータ管理によって、ユーザはコンテンツの実際の転送と分かりやすい物理的特性とを関連付けることができる。感覚的な水をコップから注ぐシミュレーションは、第１のデバイス１００から第２のデバイス１０２へのコンテンツの転送に直接判定している。

【0009】

コンテキスト特徴センサ１２０は、第１のデバイス１００の注ぐジェスチャを感知し、この模範例では（データ管理機能（例えば、第２のデバイスへのデータ転送）と水がコップから空けられる表示とを実行する。感知されたコンテキストの特徴は更に、第１のデバイス１００と第２のデバイス１０２との間のリンクの変換又はリンクの確立し直しする。電子デバイス１００の傾きが大きくなるにつれ、仮想的なコップの中身がどんどん減っていく。データは、注ぐ角度の変化の加速度が変化した際に、デバイス間上瞬で異なる速度で変換されるかどうか分からない。１つの模範的な実施形態では、データは最高速度で転送される、しかし、ユーザは転送するデータの量を制御する場合がある。この模範的な実施形態では、ユーザがデバイスを傾けるのを止めると、データ転送は（仮想的なコップの水

FITBIT 1002
Fitbit v. Immersion

と共に終了又は一時停止する。データのすべてが既に転送されている場合、分配制御メッセージが第２のデバイスに送信され、第２のデバイスは、コンテキストの特定のコマンドにより又された所望の量のデータを切り捨てるよう指示される。

【００１０】

第２のデバイス１０２が同一の能力又は異様な能力を備えている場合、このデータが転送される際に、第２のデバイスは、水で満たされてゆくコップを第２のディスプレイ１０６に表示する。しかし、仮想物理表現のグラフ表現は、第１のデバイス１００（送信するデバイス）と第２のデバイス（受信側）とで同一である必要はない。第２のデバイス１０２のユーザは、データ転送の間に表示されるよう異なるグラフ表現を選択してもよい。第１のデバイス１００に保存されているものと同一のアニメーション又は仮想物理表現が第２のデバイス１０２にはない実施形態では、第１のデバイス１００は、補助の（ｃｏｍｐｌｉｍｅｎｔａｒｙ）アニメーショングラフィックスが一対となるよう、そのアニメーションを転送する。この実施形態では、データの受信などの異なる機能を割り当てるために、ユーザ達が仮想物理表現群を選んだり特定用途向けに作成したりする。第１のデバイスから第２のデバイスにコンテンツを送ることは、本発明の１つの模範的な実施形態である。デバイス１００のコンテキストと動作を関連付けることと、その動作を仮想物理形式で呈示することとは、当業者には分かるように、非常に多くの操作と操作の表現の形式を取ることができる。他の様々の模範的な実施形態が以下に開示されるが、開示されるのは網羅的なリストではなく、本発明を説明する際の模範的なものとして示される。

【００１１】

次に図２を見ると、本発明に係る模範的な電子デバイス２００がブロック図で示されている。この模範的な実施形態は、本発明を組み込んだセルラー無線電話である。しかし、もちろん、本発明は無線電話に限定されておらず、無線通信能力を持つ他の電子デバイスによる利用も可能であり、他の電子デバイスには、ゲーム機や、電子手帳や、ページング装置、種種情報端末、持ち運びできる計算装置などの無線通信デバイス等がある。模範的な本実施形態では、ＣＭＯＳのＡＳＩＣなどのフレーム発生装置である特定用途向け集積回路（ＡＳＩＣ）２０２とマイクロプロセッサ２０４とがまとまって、セルラーシステムで動作するのに必要な通信プロトコルを生成する。マイクロプロセッサ２０４はメモリ２０６を使用し、メモリ２０６には、ＲＡＭ２０７と、ＥＥＰＲＯＭ２０８と、ＲＯＭ２０９とがあり、マイクロプロセッサ２０４とメモリ２０６とは望ましくは１つのパッケージ２１０に統合されており、プロトコルを生成するのに必要な工程を実行し、無線通信デバイスの他の機能、例えば、ディスプレイ２１２への書き込み又はキーパッド２１４からの情報の受け取りを行う。コンテンツなどの情報は、メモリ２０６に保存されていてもよいし、加入者識別モジュール（ＳＩＭ）３９０又は他の脱着可能なメモリに保存されていてもよく、他の脱着可能なメモリは、例えば、コンパクトフラッシュカード、セキュアデジタル（ＳＤ）カード、スマートメディア、メモリスティック、ＵＳＢフラッシュドライブ、ＰＣＭＣＩＡなどである。ディスプレイ２１２は、液晶ディスプレイ（ＬＣＤ）や、発光ダイオード（ＬＥＤ）ディスプレイや、プラズマディスプレイや、情報を表示するその他の手段などでよい。ＡＳＩＣ２０２は、マイクロホン２２０から入ってきて音声回路２１８により変換された音声と音声回路２１８により変換されてスピーカ２２２へと出て行く音声とを処理する。

【００１２】

マイクロプロセッサ２０４にコンテキストセンサ２２４が結合されている。コンテキストセンサ２２４は単一のセンサでも複数のセンサでもよい。この模範的な実施形態では、タッチセンサ２１１と、加速度計２１３と、赤外線（ＩＲ）センサ２１５と、フォトセンサ２１７とか、　　など又は任意の組み合わせでコンテキストセンサ２２４を構成している。このすべてが、マイクロプロセッサ２０４に結合されている。上記のリストは網羅的ではない模範的なリストであり、もちろん、カメラ２４０や、スキャナ２４２や、マイクロホン２２０などの他のコンテキストセンサが用いられてもよい。第１のデバイス１００は更に、触覚フィードバックをユーザにもたらすハイブレータ２１６を備えていてもよいし

FITBIT 1002
Fitbit v. Immersion

，発熱体（図示せず）を備えていてもよく，この両方ともマイクロプロセッサ２０４に直接的に又はＩ／Ｏドライバ（図示せず）を介して結合されている。

【００１３】

コンテキストのセンサ２２４は，デバイス１００に関連付けられた環境の特徴又はコンテキストの特徴を感知して適切な信号をマイクロプロセッサ２０４に送る為のものである。マイクロプロセッサ２０４は，個々のセンサから全ての入力信号を取り込み，入力信号と入力信号レベルとの組み合わせに依存してデバイスコンテキストを判断するアルゴリズムを実行する。更に同一の機能をコンテキストセンサモジュール２４４が行う場合もあり，コンテキストセンサモジュール２４４はマイクロプロセッサ２０４に結合したりマイクロプロセッサ２０４に埋め込んだりすればよい。任意選択で，近接センサが第２の無線通信デバイスの近接を感知する。センサは，他のオブジェクト又は第２の無線通信デバイスと実際に接触したことを感知する，又は少なくとも極めて近接したことを感知する。

【００１４】

図２は更に任意選択のトランシーバ２２７を示し，トランシーバ２２７には受信回路２２８があり，受信回路２２８には，多数のモードを持つ通信デバイスの動作の要求に応じ，少なくとも１つの帯域幅のＲＦ信号群，任意選択で更に多くの帯域幅のＲＦ信号群を受信する能力がある。受信機２２８には，第１の受信機と第２の受信機があってもよいし，二つ以上の帯域幅で受信する能力を持つ１つの受信機があってもよい。動作のモードに依存している受信機は，ＡＭＰＳ，ＧＳＭ，ＣＤＭＡ，ＵＭＴＳ，ＷＣＤＭＡ，ブルートゥース，ＷＬＡＮを受信するように，例えば，８０２．１１の通信信号などを受信するように適合させればよい。任意選択で，受信機の一つは，無線ローカルエリアネットワークへのリンク確立用データ転送の送信については非常に低い電力で送信できる。送信回路２３４には，前述の動作モードに従って，少なくとも１つの帯域幅のＲＦ信号を送信する能力がある。更に送信機には，２つの異なる帯域幅で送信するために，第１の送信機２３８と第２の送信機２４０とがあってもよいし，少なくとも２つの帯域で送信する能力を持つ１つの送信機があってもよい。第１の帯域幅又は第１の組の帯域幅は，セルラーサービスプロバイダなどの通信システムとの通信用である。第２の帯域幅又は第２の組の帯域幅は，２つのデバイス間土間又はデバイスとＷＬＡＮとの間の二点間通信用である。

【００１５】

受信機２２８と送信回路２３４とからなるトランシーバ２２７と，マイクロプロセッサ２０４と，コンテキストのセンサ２２４と，メモリ２０６とを，ハウジング２４２が収容している。メモリ２０６には，任意選択で，アドホックネットワーク化アルゴリズム２４４とデータベース２４６とが保存される。センサ２２４はマイクロプロセッサ２０４に結合されており，第２の無線通信デバイスを感知した後，マイクロプロセッサ２０４にアドホックリンク確立アルゴリズム２４４を実行させる。

【００１６】

その上更に図２には，ＤＲＭエージェントとしても知られているデジタルコンテンツ管理モジュール２５０が，マイクロプロセッサ２０４に結合されている，又はソフトウェアとしてメモリに保存されておりマイクロプロセッサ２０４により実行可能である。

【００１７】

次に図３を見ると，本発明に従って，概略的なフロー図により，第１のデバイス１００のコンテキストの特徴群を感知する工程と，仮想物理出力を表示する工程とが図示されている。第１のデバイス１００から第２のデバイス１０２へと転送されるコンテンツが選択される３０２，次にそのコンテンツで行われる動作が選択される３０１。第１のデバイス１００はコンテキストセンサ１３０を介して第１のデバイス１００のコンテキストを感知する３０６。感知したコンテキストの特徴に呼応して，選択された動作が起動される３０８。仮想物理表現の表示が，第１のデバイス１００のユーザインタフェースを介して出力され，この概略的な実施形態ではユーザインタフェースはディスプレイ１０４である。

【００１８】

更に詳細に，図４から図７と本発明とに従って，概略的なフロー図を示す。まず，第２

FITBIT 1002
Fitbit v. Immersion

のデバイス１０２に転送する歌を選択する４０２．次に第１のデバイス１０１又は第１のデバイス１００の注ぐジェスチャ又は動きを感知する４０４．任意選択で、ユーザは感知されたコンテキストを選択してもよい．このコンテンツを管理する為に、ユーザにより選択されるコンテキスト特徴を複数使用してよい．第１のデバイス１００は更に、第１のデバイス１１０のコンテキストの特徴を自動的に感知する．図１に示されているような注ぐジェスチャを感知したことに呼応して、第１のデバイス１００は、４０２で選択された歌の第２のデバイス１０２へのデータ転送を起動する４０６．更に、注ぐジェスチャを感知したことに呼応して、第１のデバイス１００は、液体を注いでいるコップの仮想物理表現をディスプレイ１０４に呈示する４０８．次に第１の電子デバイス１００は、注ぐジェスチャの終了を感知する４１０．第１の電子デバイス１００は、第２のデバイス１０２へのデータ転送が完了したかどうかを判断する４１２．データ伝送が完了した場合は、コップの仮想物理表現によって空のコップが示され、第２のデバイス１０２へのリンクは終了する４１４．データ伝送が完了していない場合は、コップの仮想物理表現は、転送される残りのデータの量に比例した水の量が残っているコップを示す．この時点で、第１のデバイス１００はユーザがデータ転送の完了４１８又はデータ転送の一時停止４２０を希望しているかどうかを判断する４１６．ユーザがデータ転送の一時停止４２０を望む場合、第２のデバイス１０２に転送されるデータは部分的に転送される、又はデータ転送はその後で再開される．この模範的な実施形態では、ユーザは第１のデバイス１００により注ぐジェスチャを用いて、第２のデバイス１０２が受信するデータの量を制御する．ユーザは、第２のデバイス１０２が受信するコンテンツの量が所望の量になるまで、コンテンツを「注ぐ（ｐｏｕｒ）」．データ転送が完了したかどうかにかかわらず、ユーザは注ぐジェスチャを止めてデータ転送を終了させる．

【００１９】

コンテキストの特徴センサ１２０は、単一のセンサでもよいしセンサ群のシステムでもよい．センサ群のシステムは、同一のタイプのセンサの一群でもよいし異なるタイプのセンサの一群でもよい．例えば、第１のデバイス１００の環境の特徴センサ１２０は、加速度計などの単一のモーションセンサでよい．図１と図４とに図示の実施形態については、第１のデバイス１００の注ぐジェスチャを感知する為に、単一の加速度計又は多数の加速度計がデバイスに保持されていればよい．当業者には分かるように、デバイスの環境に対してのデバイスの位置を感知する為の、動き及び位置の検出には、他の形式が使用されてもよい．代案として、再現可能なやり方で所望のコンテキストを確実に感知すべく、多数のタイプのセンサを使用してしてもよい．例えば、第１のデバイス１００は注ぐジェスチャのように扱われても、ユーザにはデータを転送する意図はないことがある．他のコンテキストのセンサをモーションセンサと組み合わせて用いて、例えば、以下に論ずるように、感知したコンテキストの特徴を検証又は確認する．

【００２０】

第１のデバイス１００に保持されうる他のセンサは、第１のデバイス１００の第２のデバイスへの近接を感知する近接センサである．第１のデバイス１００が第２のデバイス１０２にかなり近接すると、データ転送が起動され、この模範的な実施形態では、仮想物理表現がユーザインタフェースに呈示される．直接にデバイスを形成するデータを転送する又は受け取る能力によって第１のデバイスを第２のデバイス１０２に確実に接触させる為に、近接センサは識別能力を備えている．第２のデバイス１０２は、第２のデバイス１０２と、第２のデバイスの能力と、この組み合わせのうちのどれかを識別するコードを送信する．更に第２のデバイスは無線周波数情報を送信する場合があり、この無線周波数情報を次に第１のデバイス１００が用いて第２のデバイス１０２との通信リンクを確立する．

【００２１】

更にもうひとつの模範形態では、第１のデバイス１００はタッチセンサ（ＭＥＭＳ）を保持する．タッチセンサはハウジング１０４の外部から作動化可能であり、よって、ユーザなどの外部オブジェクトが接触しているとは極めて近接していると、タッチセンサが作動す

FITBIT 1002
Fitbit v. Immersion

る．ユーザ又はオブジェクトによるタッチセンサの作動化によって，所望のデータ管理の動作が起動される．第１のデバイス１００には，第１のデバイス１００のハウジング５００の多数の独立した場所に複数のタッチセンサが保持されていてよい．場所は，デバイスのそれぞれ異なる面に対応するかそれぞれ異なるユーザインタフェースかユーザインタフェースの部分に対応する．ハウジングに対するタッチセンサの場所は，第１のデバイス１００が所定の位置に把持されているときに，ユーザの指及び身体の他の部分などのオブジェクトが接触する箇所に合致する．次にタッチセンサは，第１のデバイス１００がある一定の把握のやり方で把持されているときを判断し，その接触情報はデバイス１００により判断されたものである．

【0022】

図５は，第１のデバイス１００などの携帯的な電子デバイスを図示しており，この電子デバイスにはハウジング５００に保持されている複数のタッチセンサがある．ハウジング５００は，この例証的な実施形態では，ハンドヘルドデバイスに適しておりユーザが容易に握ることができる．複数のタッチセンサのうち第１のタッチセンサ５０２がデバイス１００の第１の面５０４に保持されている．第２のタッチセンサ５０６（図示せず）がハウジング５００の第２の面５０８に保持されている．第３のタッチセンサ５１０がハウジング５００に保持されスピーカ５１２に隣接している．第４のタッチセンサ５１４がハウジング５００に保持されディスプレイ５１６に隣接している．第５のタッチセンサ５１８がマイクロホン５２０に隣接して保持されている．第６のタッチセンサ５２２はハウジングの裏面にある（図示せず）．第１の面５０４には更に第７のタッチセンサ５２４と第８のタッチセンサ５２６とがある．例証的な本実施形態では，第７のタッチセンサ５２４及び第８のタッチセンサ５２６はスピーカ音量を制御したり，ディスプレイ５１６に表示する情報の種類を制御する為に使用されたりする．

【0023】

総合的なデバイスコンテキストセンサに含まれている８つのタッチセンサの，ハウジング５００における構成又は相対的な場所のおかげで，マイクロプロセッサ２０４は，例えば，どのようにハウジング５００がユーザに把持されているか又はハウジング５００が所定の面に特定のやり方で配置されているかどうかを判断できる．ハウジング５００がユーザに把持されているとき，複数のタッチセンサのうちタッチセンサのサブセットが，ユーザの手の接触によって作動する一方で，残りのタッチセンサは作動しない．作動するタッチセンサ部（ｔｏｕｃｈ　ｓｅｎｓｏｒ）のうちの特定のサブセットは，ユーザがハウジング５００を握ったやり方と相互に関連している．例えば，電話をかけるためにユーザがデバイスを握っていると，即ち，タッチセンサのサブセットと接触しているとき，ハウジング５００の裏面の第６のタッチセンサ５２２に加えて，第１のタッチセンサ５０２及び第２のタッチセンサ５０６も作動する．残りのタッチセンサは作動しない．従って，８つのタッチセンサのうち３つからの信号群が受信され，相対位置が既知である各センサと組み合わせて，デバイス１００のソフトウェアがその情報を所定の握り方に関連させる．特に，このタッチセンサのサブセットの作動化パターンによって，ユーザがデバイスを電話モードで把持しておりディスプレイ５１６がユーザと向き合っていることが示される．

【0024】

別の例証的な実施形態では，１つのタッチセンサがそれに隣り合うユーザインタフェースに電気的に関連付けられている．例えば，スピーカ５１２に隣接している第３のタッチセンサ５１０は，スピーカを制御するよう動作する．スピーカに隣接している領域に触れると，スピーカがオン又はオフに切り換わる．これによって，電子デバイス動作の直感的で相互に作用する制御及び管理がもたらされる．

【0025】

タッチセンサは，例証的な本実施形態では，ハウジング５００の外側に保持されている．ハウジング５００及びタッチセンサを図示する断面が図６に示されている．接触センサ又はタッチセンサには，ハウジング５００に隣接して配置された導電材料６１２がある．導電材料は，隣り合った外部オブジェクトとともに容量性回路を形成するならば，必ずし

FITBIT 1002
Fitbit v. Immersion

も、図６に示されているようにハウジングの背部にある必要はない。導電材料６０２をハウジング５００の一つ以上の場所に選択的に配置すればよい。この模範的な実施形態では、ハウジング５００に炭素を付着させており、ハウジング５００はプラスチック製である。炭素は導電性又は半導性である。導電材料６０２又は炭素付着物のサイズは、タッチセンサにより生じる所望の接触領域に依存している。例えば、ユーザの手のハウジングの握り方を感知する設計であるタッチセンサの方が、音量調節に用いられるよう設計されたタッチセンサよりも大きい、即ち、表面積が広い。導電材料６０２を保護するために、導電材料６０２の層に保護層６０４が積層している。この模範的な実施形態では、保護層６０４は導電材料６０２に塗布された塗料の被膜である。この実施形態では、炭素の導電材料６０２を覆うために非導電性の塗料が使用されている。表面に塗料が塗られていることでタッチセンサが判らない場合、塗料には、タッチセンサの設置されている位置を示すしるしが付けられることがある。

【0026】

図７に移ると、模範的なタッチセンサ回路７００が示されている。この模範的な実施形態では、静電容量を利用されている発振回路が、タッチセンサ７０１との接触を感知するために使用されている。回路７００は、タッチセンサ７０１との接触がないときは、所定の周波数で動作する。回路の周波数は、タッチセンサ７０１との接触（実質的にはすぐ近くにある状態）の結果、低くなる。タッチセンサ７０１には、導電材料６０２でできたセンサプレート７０２がある。センサプレート７０２は第１の測定増幅器７０４に結合されており、これにより、回路７００は基準周波数で動作し、基準周波数はこの模範的な実施形態では２００ｋＨｚである。模範的なタッチセンサ回路７００では、センサプレート７０２に隣接して接地プレート７０６が配置されている。接地プレート７０６はセンサプレート７０２に対し絶縁されている。接地プレート７０６は第２の測定増幅器７０８に結合されており、第２の測定増幅器７０８はバッテリの接地に結合されている。発振周波数は、センサプレートとセンサプレート７０２に隣接しているオブジェクトとの間の静電容量に影響される。発振周波数は、タッチセンサに接触することによってもたらされた静電容量の値に反比例している。センサプレート７０２に接触することによってもたらされた静電容量が大きくなるに従い、発振周波数の変化も大きくなる。従って、静電容量が増大すると、発振回路の周波数はゼロに近づく。周波数の変化、即ち２００ｋＨｚからの低下により、センサプレートに隣接しているよってハウジング５００に関係している何らかのオブジェクトがあることが示される。静電容量は、センサプレート７０２のサイズと、オブジェクトと接触しているセンサプレート７０２のパーセントとの関数である。この結果、回路の周波数は、センサプレート７０２に対する被覆率又は接触の量に従い変動する。従って、デバイス１００の別個の機能には、別個の回路周波数が割り当てられる。例えば、タッチセンサの低い部分に触れると、スピーカ音量が５０％の音量に上がり、タッチセンサの実質上すべてに触れると、スピーカ音量が１００％の音量に上がる。

【0027】

図５に戻ると、模範的なハウジング５００には、任意選択で赤外線（ＩＲ）センサがある。この模範的な実施形態では、ＩＲセンサ５２８はハウジング５００に装置されディスプレイ５１６に隣接しているが、当業者は分かるように、ハウジング５００の他の場所に設置しても良い。この模範的な実施形態では、ＩＲセンサ５２８は、ユーザの身体などの他のオブジェクトの近接を感知する。特に、ＩＲセンサは、デバイス１００から例えばユーザの顔までがどのくらいの距離かを感知する場合がある。ＩＲセンサ５２８が、ハウジング５００がオブジェクト（即ちユーザの頭）に隣接していることを感知したとき、デバイス１００はスピーカの音量を適当なレベルまで下げる。

【0028】

別の実施形態では、ＩＲセンサ５２８からの出力と複数のタッチセンサからの出力とを、デバイス１００のコンテキストの環境を判断する為に利用する。例えば、以上に論じたように、オブジェクト群の近接、中でも特にユーザの頭の近接を感知することにより、音量を制御する。適切な時間に所望の動作（即ちこの模範的な実施形態ではスピーカの音量

FITBIT 1002
Fitbit v. Immersion

の既知が確実に行われるようにする為に、付加的なコンテキストの情報を用いてもよい。例えば、ハウジング５００に保持されているタッチセンサ５０２，５０６，５１０，５１４，５１８，５２４，５２６を用い、デバイスは、ハウジング５００がユーザの耳に隣接して把持されているのと同時にハウジングがユーザに握られているときを判断する。従って、マイクロプロセッサ２０４に送られたのは入力信号群を組み合わせたものである。スピーカ音量を変えるには、タッチセンサのサブセットのうち１つ又は１つのセットと、オブジェクト（即ちユーザの頭）が極めて近接していることを表現するＩＲセンサ５２８からの信号とが必要になる。オブジェクトが極めて近接しているかどうか感知した結果は、デバイス１００のモードに依存する。例えば、デバイス１００が無線電話であっても通話中ではない場合、コンテキストの特徴を感知した結果、音量は変わらない。

【００２９】

同様に、図８に図示されているように、ハウジング５００には光センサが保持されていてもよい。この模範的な実施形態では、光センサ８０２は存在する周辺光のレベルを感知する。この模範的な実施形態では、デバイス１００が、例えばテーブル上に、そのハウジングを裏返しに配置されている場合、光センサ９０２に当する光が無いかほとんど無い。この構成では、第６のタッチセンサ５２２も、デバイス１００にあれば、作動する。読み取った光がゼロであることと第６のタッチセンサ５２２が作動したこととが組み合わさって、デバイス１００には、あるアルゴリズムとマイクロプロセッサ２０４とによって、デバイスが裏返しになっていることが示される。当業者には、このことと、以上に論じた組み合わせとにより、他の構成とコンテキストの状況とが示されることが分かる。所定の設定により、特定の組み合わせのセンサが作動したことにより、どのような結果又は出力される機能が所望のものであるかが判断される。関して、デバイス１００のコンテキストのセンサにより感知されたコンテキストに関する最も一般的な結果又は所望の機能がプログラムされ、感知された入力に対する出力応答としてもたらされる。

【００３０】

スピーカ音量の変化をもたらすコンテキストの変化に関して以上に論じた例と同様に光センサ８０２が実質的にはゼロを読み込んだとき、デバイス１００は、１つの模範的な実施形態では例えばテーブルなどの上に裏返しに配置されていると見なされる。この模範的な実施形態では、デバイス１００は自動的にスピーカーホンモードを構成しそれに応じて音量が調整される。光センサにより感知された光が実質上ゼロでありＩＲセンサによりオブジェクトが極めて近接していることを感知すると、別のコンテキストの特徴が生じる。これにより示されるのは、デバイス１００の前面も裏面もがユーザのシャツのポケットに入っていることなどにより覆われていることである。このコンテキストの特徴が感知されたとき、デバイスは振動モードに変わる。

【００３１】

他のコンテキストのセンサは、マイクロホン、全地球測位システム（ＧＰＳ）受信機、速度センサ等でよい。マイクロホンは、デバイスの環境を判断する為に周辺雑音を感知する。周辺雑音は、他のコンテキストの特徴センサのいずれかと組み合わさって、デバイスのコンテキストを判断する為に使用される。ＧＰＳ技術がサイズの点で縮小され保算が取れるようになったため、ＧＰＳ技術はますます電子デバイスに実装されるようになった。ＧＰＳ受信機能を持つことによって、場所及び動きについての情報が別のコンテキストの特徴として与えられる。デバイス１００の温度も、単独で又はデバイス１００の他のコンテキストのセンサのいずれかと組み合わせられてコンテキストの特徴と見なされる場合がある。

【００３２】

デバイスのコンテキストの特徴に関する仮想物理表現は、ユーザが分かりコンテキストの特徴の性質と関連付けられる表現でよい。以上に論じたように、注くジェスチャに関連してシャツを空ける表現をハウジング５００によって行った。コップから液体を注ぐというのは、ユーザに分かりやすいごく普通のことである。

【００３３】

FITBIT 1002
Fitbit v. Immersion

以上に論じられたようなコップから液体を注ぐジェスチャは、デバイス１００により認知されるコンテキストの特徴の１つの例である。以上にリストアップされたものを含むコンテキストのセンサの任意の組み合わせにより感知される他のコンテキストの特徴には、デバイス１００を把持する方法と、デバイス１０と他のオブジェクト群との関係と、速度、加速度、温度、モード、周辺光、受信した信号強度、送信電力、充電レベルとを含むデバイスの動きと、デバイスの範囲内の基地局の数と、インターネットアクセスポイントの数とが含まれ、更に、その他の、デバイスに関するコンテキストについての特徴も含まれる。

【００３４】

１つの物理的な実施形態では、仮想物理表現は、第１のデバイス１００のディスプレイ上のプランジャのグラフ表現である。プランジャの動き又はアニメーションは、ハウジング１００を押したり引いたりする動きコンテキストの特徴を一致する。例えば、ユーザがデータを第２のデバイスに又はネットワークに「押」そうとする、ユーザがデバイス１００で物理的に押す動きのジェスチャをし、デバイス１００のディスプレイはデータを押すプランジャの仮想物理表現をディスプレイ上に示す。データを第２のデバイスに転送し、第２のデバイス１０２にディスプレイがある、という１つの実施形態では、データを転送したときに、第２のデバイスのディスプレイ１０６もプランジャの動きをしているデータの仮想物理表現をディスプレイ上に示す。ある実施形態では、プランジャの形式と同様な注射器の表現が表示され、その動きも世間の人々にはよく分かる動作である。ある実施形態では、注射器の仮想表現を組み込むには、更に、デバイス１００に可動に結合された物理的なプランジャが伴う。物理的なプランジャはデバイスに対し往復運動をする。物理的なプランジャの往復運動の動きは、デバイス１００のコンテキストの特徴として、モーションセンサ群により感知される。往復運動の動きから結果としてデータの転送などの機能が生じ、仮想的なプランジャ又は注射器は更にユーザインタフェースに表示される。物理的な運動の概念を利用する種々の例例が、プランジャや注射器などの実際の物理デバイスの仮想物理表現の取り入れることの恩恵を受けることが分かる。更に分かるのは、他の物理デバイスを仮想的な物理デバイスとして組み込む場合があることと、この与えられた模範的な実施形態群に本発明が限定されていないことである。

【００３５】

別の実施形態では、データを管理する為にハウジング５００を振る動きが使用される。１つの例では、振る動きが感知されると、データは第２のデバイス１０２に転送される。別の例では、振るジェスチャは、「デスクトップ」をまとめたり現在作動中のファイルを削除したりといった機能を行う。振る動きは、加速度計により感知されたり、デバイスに保持されている他の動きを検出するセンサ群により感知されたりする。

【００３６】

更なる別の模範的な実施形態では、第１のデバイス１００の特殊な動き又は動きのパターンが取り込まれ、場合によっては保存される。動きは、転送されるコンテンツに関連付けられており、ある実施形態では１のデバイス１００に保持されている加速度計に取り込まれる。電気信号が、加速度計によりマイクロプロセッサ２０４に送信され、動きのデータや、動きのパターンのデータや、動きの「指紋」などとして保管され、デバイスの動きを表現するものである。次に動きのデータはコンテンツプロバイダに送信される。第２のデバイス１０２は、その動きを繰り返す為に使用され、第２のデバイス１０２の加速度計は、動きのデータを保管し、動きのデータをコンテンツプロバイダに送信する。コンテンツプロバイダは動きのデータを突き合わせ、コンテンツを第２のデバイス１０２に送る、言い換えると、デバイスから受信した信号に基づき、データ転送をデバイス自身からでなくネットワークから行うことが可能である。次にデバイス１００は、データを転送する為にコマンドをネットワークに送る一方で、データ転送の仮想物理表現又はシミュレーションを表示する。

【００３７】

データは、デバイス１００のコンテキストの特徴の変化の直接の結果として与えられる

FITBIT 1002
Fitbit v. Immersion

場合もある。ある一定の機能を行うにはデバイスの温度が低すぎる場合、デバイスの音量は１つの模範的な実施形態では抑下するか一時停止する。コンテキストの特徴の別の例は投げる動きである。例えば、第１のデバイス１００は、情報を第２のデバイス１０２に「投げる」為に、投げる動きのジェスチャをするために使用される。更なる別の例では、物理的な「引金」を引くことにより、ディスプレイ１１６に表示されている仮想的な「発射体」を打ち上げ、データの転送を表現する。

【００３８】

以上に論じられたような音楽などのデータを、一方のデバイスから他方のデバイスへ転送するとき、コンテンツが保護される場合があり、そのコンテンツにデジタル権利が関連付けられる。従って、データを別のデバイスに転送する際には、デジタル著作権管理（ＤＲＭ）を考慮に入れなくてはならない。以上に論じられた、データを送る例では、データは第２のデバイスに送信される。コンテンツの所有者と対応する所有物の権利を守る為に、第２のデバイスへの転送の一部としてデジタル著作権管理を行う必要がある。１つの模範的な実施形態では、転送されるコンテンツに関連付けられた権利を判断する為に、第１のデバイス１００のＤＲＭエージェントが使用される。転送可能性はＤＲＭエージェントにより制御される又は管理される権利なので、コンテンツには別のデバイスに転送される権利が必要である。コンテンツが転送されたとＤＲＭエージェントが判断し次第、コンテンツは第２のデバイスに転送される。転送可能性は模範的な目的に用いられるが、更に、コンテンツには、他の権利や制約が関連付けられている場合があり、転送が行われるよりも前にそれを満たす必要がある。当業者には分かるように、コンテンツに関連付けられた権利が多数あり、この権利は履行され、よって、コンテンツに伴うあらゆる動作に先立ち、この権利を満たす必要がある。

【００３９】

図９はデータ転送の方法の模範的なフロー図であり、コンテンツ１０４にはデジタル権利が関連付けられている。この模範的な実施形態では　ＤＲＭエージェントは、デバイス１００に保存されておりこれにより実行されるエンティティである。前にたように、ＤＲＭエージェントは、権利オブジェクトに保存されているコンテンツに関連付けられている許可を管理する。例えば、ＤＲＭエージェントは、模範的な本実施形態では、第１のデバイス１０２に、コンテンツを、この模範的な実施形態では第２のデバイス１０２である別のデバイスに、直接的に又は間接的に転送させる。コンテンツの管理は、この実施形態がコンテンツに関連付けられている権利オブジェクトに保存されている権利を守らなくてはならない。権利オブジェクト及びＤＲＭエージェントは一緒に、コンテンツをどのように管理するかを制御する。この模範的な実施形態では、コンテンツをアクセスできるようにする為に、デバイスにＤＲＭエージェントの存在が必要である。

【００４０】

この模範的な実施形態では、コンテンツが第２のデバイス１０２に転送される又は第２のデバイス１０２に用いられるよりも前に、第２のデバイス１０２は、コンテンツに対する権利オブジェクト、即ち適切な権利又は許可を受信する。まず、転送するコンテンツを選択する９０２。次にコンテキストの特徴を第１のデバイス１００のコンテキストセンサ（単数又は複数）により感知する９０４。次にコンテンツを第２のデバイス１０２にコンテンツプロバイダの識別情報と共に転送する９０６。第２のデバイス１０２はコンテンツを使用する為のコンテンツプロバイダの許可を要求する９０８。コンテンツプロバイダは、第２のデバイスに適正な権利があるのか、又は第２のデバイスはコンテンツを使用する為の権利を取得する必要があるのかを判断する９１０。次にコンテンツプロバイダは、コンテンツを使用する為の権利又は許可を第２のデバイス１０２に送る９１２。この実施形態では、次に第２のデバイス１０２はコンテンツを使用する。

【００４１】

別の模範的な実施形態では、コンテンツプロバイダ１１０、又はコンテンツの権利を支持する部分は、権利オブジェクトを第２のデバイス１０２に送り、権利オブジェクトはＤＲＭエージェントと連携して、コンテンツを使用する為の権利を獲得するという選択肢を

FITBIT 1002
Fitbit v. Immersion

呈示する，第２のデバイス１０２又は第２のデバイス１０２のユーザは、その機構を了解する又は却下するという応答を送る。第２のデバイス１０２が了解した場合、コンテンツプロバイダはコンテンツを送る。代替の模範的な実施形態では，コンテンツは第２のデバイス１０２にもとから存在し、コンテンツプロバイダはコンテンツの権利オブジェクトのみを第２のデバイス１０２に送る．加えて，この処理で送信側のコンテンツの権利も修正され，コンテンツの送信側は受信デバイスにコンテンツ及び権利の両方とも没収される．

【００４２】

１つの模範的な実施形態では，ある一定のタイプのコンテンツがある一定のジェスチャのみによって扱われるよう予め決められている．例えば，音楽コンテンツが注ぐジェスチャのみに呼応して転送されるよう設定されている。加えて、この模範的な実施形態では、歌の再生が転送されるコンテンツである．歌を再生している間，注ぐジェスチャが感知され，この感知により自動的に再生されている歌の第２のデバイスへの転送がトリガされる．第２のデバイスは，第１のデバイスに最も近接したデバイスであったり所定のリストから選ばれたデバイスであったりする．コンテンツが転送される元であるソースは、コンテンツの特徴に依存していてよい．ソースは更に、コンテンツを送受信するデバイスを供給しているサービスプロバイダの操作に依存していてもよい．例えば、コンテンツが大きいデータファイルである場合は，第１のデバイス１００以外の，蓄積量が広く処理能力の大きいソース，例えばコンテンツプロバイダなどから，コンテンツを転送することがより効率的かつ迅速である。コンテンツが、例えば，着信音，連絡先，アイコンなどの、相対的に小さい情報のセットである場合、コンテンツは第１のデバイス１００から第２のデバイス１０２へと直接転送される。コンテンツプロバイダから，もっと大きいファイル，例えば，音声や音楽や動画などのメディアファイル及びマルチメディアファイルが，転送される場合もある。

【００４３】

一方のデバイスから他方のデバイスへのデータの転送を、以上に論じられたようなデータを注ぐなどの動作が要求するとき、データパスが確立される．データは，第１のデバイス１００から第２のデバイス１０２へと直接転送されたり，セルラー無線電話の通信システムで通常用いられる基地局などの媒介物や、リピータスは８０２．１１（ＷｉＦｉとしても知られている）又は８０２．１６（ＷｉＭＡＸ）などのインターネットアクセスポイントなどの他のノードにより転送されたりする．例えば，無線デバイスは，ＣＤＭＡ，ＧＳＭ，ＴＤＭＡ，ＷＣＤＭＡの無線通信システムで通信するようプログラムされることがある．無線デバイスは，直接通信リンク及び媒介通信リンクの両方を介してデータを転送することもある。

【００４４】

データは第１のデバイス１００から第２のデバイス１０２へと又は反対方向に転送される。データを転送するあらゆる方法又はデータ転送のプロトコルを用いてよい．ある実施形態では，例えばブルートゥースなどのアドホック無線通信リンクを使用して，第１のデバイス１００と第２のデバイス１０２との間の直接接続を確立し、その次に所望のデータを転送する。どんな場合でも，データの転送は所定の感知された環境の特徴又はジェスチャによって起動され，そのデータが独立したノードを通じて中継されるか第２のデバイスに直接送信されるかには関わらない．

【００４５】

無線通信リンクが，複数の方法又はプロトコルに従ってデータを転送する為に２つの模擬したデバイス同士間で直接（即ち二点間で）確立される．この模範的な実施形態では、接続は第１のデバイス１００と第２のデバイス１０２との間で直接確立され、媒介するネットワークノード，例えば，ＷＬＡＮアクセスポイント又は基地局１０６などの助けを借りない。

【００４６】

ある実施形態では，第１のデバイス１００のユーザは、データを受信することが望まれるユーザのグループを選択する．デバイスを識別する方法には，例えば，電話番号，電子

FITBIT 1002
Fitbit v. Immersion

シリアル番号（ＥＳＮ）、モバイル識別番号（ＭＩＮ）など、たくさんある。受信者に指定されるデバイスは現に、触れる又は全体として最も近接していることにより指定される場合がある。

【００４７】

この実施形態で互いに直接送受信する能力を持つデバイスは、所定のチャネル又はチャネルのセットを常時監視するか、他の選択した無線通信デバイスを監視するチャネル又はチャネルのセットを割り当てられていなくてはならない。１つの模範的な実施形態では、同様なデバイスにより監視されている単一の所定のＲＦチャネル又は複数の所定のＲＦチャネルによって、要求が送信される。この同様なデバイスは同一のネットワークで普通に動作するデバイスであり、ネットワークは、例えば、アッシュトクトークＰＩＭＲＳネットワーク、ＣＤＭＡネットワーク、ＧＳＭネットワーク、ＷＣＤＭＡネットワーク、ＷＬＡＮなどである。しかし、模範的な本実施形態で開示したように、同様なデバイスが、隣接したデバイス群と直接通信する能力のみを必要とする。直接通信能力に加えて、デバイスはＣＤＭＡデバイスとしても動作するので、ＧＳＭデバイスとして動作するデバイスへの直接リンクにより通信する、リンクが確立され次第、データはデバイス同士間で転送される。

【００４８】

当業者に既知のアドホックネットワーク又はメッシュネットワークを形成する方法は多数ある。その中には、例えば、アドホックネットワークプロトコルの幾つかの単数があり、これに含まれるものは、アドホックネットワークのＺＲＰ（Ｚｏｎｅ ｒｏｕｔｉｎｇ ｐｒｏｔｏｃｏｌ）、ＡＯＤＶ（Ａｄ Ｈｏｃ Ｏｎ Ｄｅｍａｎｄ Ｄｉｓｔａｎｃｅ Ｖｅｃｔｏｒ）ルーティング、モバイルアドホックネットワークのＤＳＲ（Ｄｙｎａｍｉｃ Ｓｏｕｒｃｅ ｒｏｕｔｉｎｇ ｐｒｏｔｏｃｏｌ）、ＴＢＲＰＦ（Ｔｏｐｏｌｏｇｙ Ｂｒｏａｄｃａｓｔ ｂａｓｅｄ ｏｎ Ｒｅｖｅｒｓｅ－Ｐａｔｈ Ｆｏｒｗａｒｄｉｎｇ）、大規模アドホックネットワークのＬＡＮＭＡＲ（Ｌａｎｄｍａｒｋ ｒｏｕｔｉｎｇ ｐｒｏｔｏｃｏｌ）、アドホックネットワークのＦＳＲ（Ｆｉｓｈｅｙｅ Ｓｔａｔｅ Ｒｏｕｔｉｎｇ Ｐｒｏｔｏｃｏｌ）、アドホックネットワークのＩＥＲＰ（Ｉｎｔｅｒｚｏｎｅ Ｒｏｕｔｉｎｇ Ｐｒｏｔｏｃｏｌ）、アドホックネットワークのＩＡＲＰ（Ｉｎｔｒａｚｏｎｅ Ｒｏｕｔｉｎｇ Ｐｒｏｔｏｃｏｌ）、アドホックネットワークのＢＲＰ（Ｂｏｒｄｅｒｃａｓｔ Ｒｅｓｏｌｕｔｉｏｎ ｐｒｏｔｏｃｏｌ）などである。

【００４９】

本発明と今のところ本発明の最良の形態であると考えられるものとか、本発明の特有が本発明者によって確立されるよう、かつ当業者が本発明を作成して使用できるように記載されたが、本明細書で開示された模範的な実施形態には多くの同等物があることと、その同等物に、本発明の範囲と精神から逸脱することなく、無数の修正及び変形がなされる場合があることが分かり認識され、本発明の範囲と精神は模範的な実施形態によってではなく添付の請求項によって制限される。

【図面の簡単な説明】

【００５０】

【図１】模範的な電子デバイス。

【図２】無線通信デバイスの模範的な回路のブロック図。

【図３】データ管理処理の模範的なフロー図。

【図４】データ管理処理の模範的なフロー図。

【図５】模範的な電子デバイス。

【図６】タッチセンサの模範的な断面図。

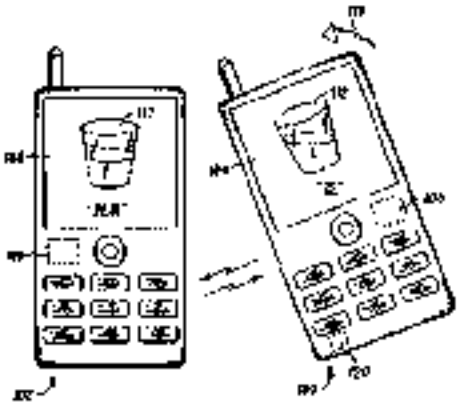
【図７】模範的なタッチセンサ回路の図。

【図８】電子デバイスの模範的な斜視図。

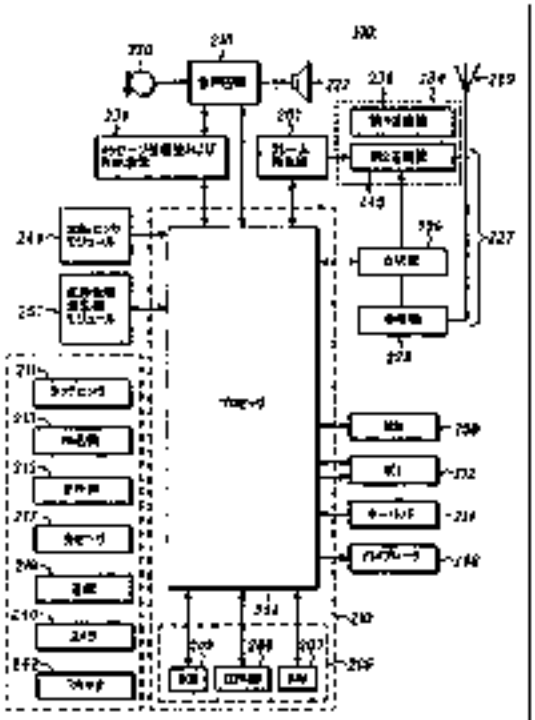
【図９】データ管理処理の模範的なフロー図。

FITBIT 1002
Fitbit v. Immersion

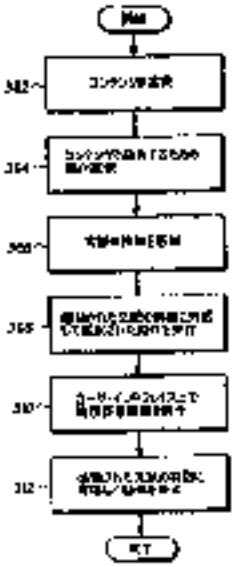
【図1】



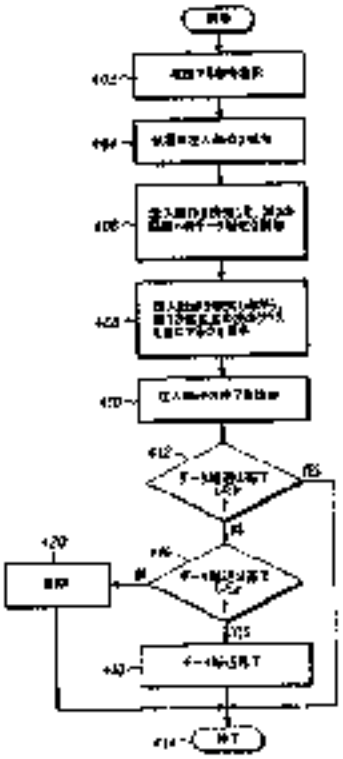
【図2】



【図3】



【図4】



FITBIT 1002
Fitbit v. Immersion

【図5】

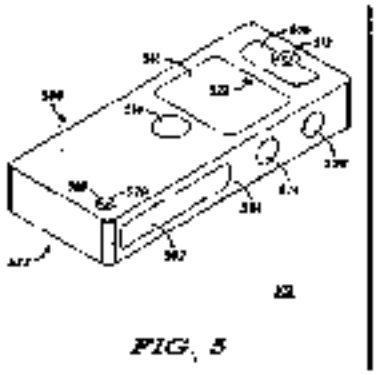


FIG. 5

【図6】

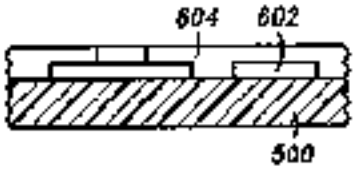


FIG. 6

【図7】

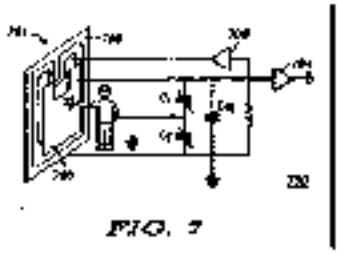


FIG. 7

【図8】

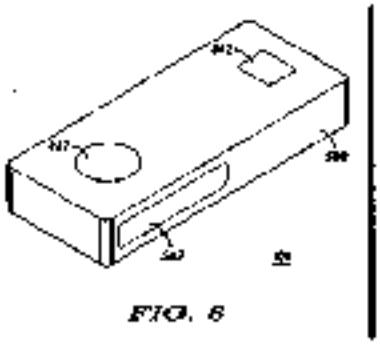
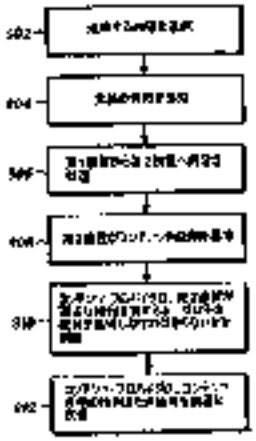


FIG. 8

【図9】



FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2005/007044

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 G06F1/16 G06F3/00 G06F3/033

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/140625 A1 (KIDNEY NANCY G ET AL) 3 October 2002 (2002-10-03) paragraphs '0001! - '0024!	1-21
X	US 2002/021278 A1 (HINCKLEY KENNETH P ET AL) 21 February 2002 (2002-02-21) paragraphs '0007! - '0010! paragraphs '0027! - '0035! paragraphs '0078!, '0100!	1-21
A	US 2002/167488 A1 (HINCKLEY KENNETH P ET AL) 14 November 2002 (2002-11-14) the whole document	1-21

[ ] Patent family annex listed in the continuation of Box C.

[X] Patent family members are listed in annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
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FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

Information on patent family members

PCT/US2005/007040

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
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			EP 1388046 A2	11-02-2004
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FITBIT 1002
Fitbit v. Immersion

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１．コンパクトフラッシュ

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Ｆターム(参考)　5D037 AA09　DE31　EE03　EG01
5K027 AA11　BB01

FITBIT 1002
Fitbit v. Immersion

No documents available for this priority number

Espacenet

Bibliographic data: JP2007535273 (A) — 2007-11-29

DEVICE AND METHOD FOR HANDS-FREE PUSH-TO-TALK FUNCTIONALITY

Inventor(s):

Applicant(s):

Classification: - international: ***H04B1/40; H04B1/46; H04B1/52; H04M1/00; H04M1/05***
- cooperative: H04B1/46; H04B1/52; H04L29/06442; H04L29/06217; H04M1/6058; H04M2250/12

Application number: JP20070510700 20041015

Priority number (s): WO2004US34135 20041015 ; US20040709345 20040429

Also published as: JP4330649 (B2) WO2005112287 (A1) US2005245203 (A1) US8095081 (B2) EP1741197 (A1) more

Abstract not available for JP2007535273 (A)
Abstract of corresponding document: WO2005112287 (A1)

A device for hands-free push-to-talk functionality may include a push-to-talk sensor or switch operable by at least one of a preset audible signal a predetermined movement of the sensor or switch, air pressure or the like. The device may also include means to control operation of a communications device in response to signals from the push-to-talk sensor or switch.

Last updated: 13.03.2013 Worldwide Database 5.8.0.7 - 52p

FITBIT 1002
Fitbit v. Immersion

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特表2007-535273
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(43)公表日　平成19年11月29日(2007.11.29)

(51)Int.Cl.			F I			テーマコード（参考）
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H04M	1/00	(2006.01)	H04M	1/00	Z	5K023
H04M	1/05	(2006.01)	H04M	1/05	A	5K027

審査請求 有　予備審査請求 有　（全 21 頁）

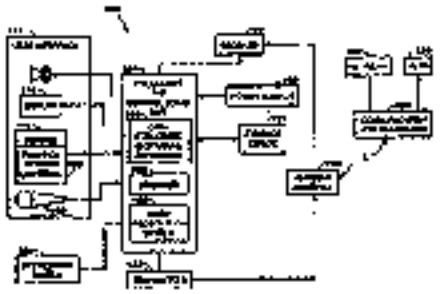
(21)出願番号　特願2007-510700 (P2007-510700)
(86)(22)出願日　平成16年10月15日 (2004.10.15)
(85)翻訳文提出日　平成18年8月28日 (2006.8.28)
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(33)優先権主張国　米国 (US)

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弁理士 村上 邦明
(74)代理人　100094673
弁理士 赤 裕三

最終頁に続く

(54)【発明の名称】ハンズフリー・プレス・トーク方式の機能のための装置および方法

(57)【要約】
ハンズフリー・プレス・トーク方式の機能のための装置は、例もってセットされた可聴信号、センサまたはスイッチの手から与えられた動き、空気圧などの少なくとも1つにより動作するプレス・トーク方式のセンサまたはスイッチを含む。この装置はプレス・トーク方式のセンサまたはスイッチからの信号に応じて通信装置の動作を制御する手段を含んでもよい。



FITBIT 1002
Fitbit v. Immersion

【特許請求の範囲】
【請求項１】
ハンズフリー・プレス・トーク方式の機能のための装置であって、
前もってセットされた可聴信号、センサまたはスイッチのあらかじめ決められた動き、または空気圧の少なくとも１つにより動作するプレス・トーク方式のセンサまたはスイッチと、
前記プレス・トーク方式のセンサまたはスイッチからの信号に応答して通信装置の動作を制御する手段と、
を含む、プレス・トーク方式の機能のための装置。
【請求項２】
前記プレス・トーク方式のセンサまたはスイッチは、可聴信号検出器、加速度計、および感圧スイッチの少なくとも１つを含む、請求項１記載のプレス・トーク方式の機能のための装置。
【請求項３】
前記プレス・トーク方式のセンサまたはスイッチは傾きセンサを含み、所定の遅延時間前記傾きセンサが或る標準化された角度から予め決められた角度より大きく傾いたことに応答して前記通信装置の送信モードを起動する、請求項１記載のプレス・トーク方式の機能のための装置。
【請求項４】
選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが前記予め決められた角度より大きく傾いたことを検出したことの少なくとも１つに応答して前記通信装置を通信モードに保持するための手段を更に含む、請求項３記載のプレス・トーク方式の機能のための装置。
【請求項５】
選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが予め決められた角度より大きく傾いたことを検出したことの少なくとも１つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えるための手段を更に含む、請求項３記載のプレス・トーク方式の機能のための装置。
【請求項６】
前記プレス・トーク方式のセンサまたはスイッチは可聴信号検出器を含み、前もってセットされた可聴信号を前記可聴信号検出器が検出したことに応答して前記通信装置の送信モードを起動する、請求項１記載のプレス・トーク方式の機能のための装置。
【請求項７】
選択された時間遅れの後に音声信号を検出したことまたは前もってセットされた可聴信号を検出したことの少なくとも１つに応答して前記通信装置を送信モードに保持するための手段を更に備える、請求項６記載のプレス・トーク方式の機能のための装置。
【請求項８】
選択された時間遅れの後に音声信号を検出したことまたは前もってセットされた可聴信号を検出したことの少なくとも１つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えるための手段を更に含む、請求項６記載のプレス・トーク方式の機能のための装置。
【請求項９】
前記プレス・トーク方式のセンサまたはスイッチは感圧スイッチを含み、前もってセットされた空気圧を前記感圧スイッチが受けたことに応じて前記通信装置の送信モードを起動する、請求項１記載のプレス・トーク方式の機能のための装置。
【請求項１０】
選択された時間遅れの後に音声信号を検出したことまたは前もってセットされた空気圧を検出したことの少なくとも１つに応答して前記通信装置を送信モードに保持するための手段を更に備える、請求項９記載のプレス・トーク方式の機能性のための装置。
【請求項１１】

FITBIT 1002
Fitbit v. Immersion

選択された時間遅れの後に音声信号を検出したことまたは前もってセットされた空気圧を検出したことの少なくとも１つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えるための手段を更に含む、請求項９記載のプレス・トーク方式の機能のための装置。

【請求項12】

前記通信装置は無線通信装置である、請求項１記載のプレス・トーク方式の機能のための装置。

【請求項13】

前記通信装置は、ラジオ、携帯電話、コードレス電話、パーソナル・ディジタル・アシスタント、およびコンピュータの１つである、請求項１記載のプレス・トーク方式の機能のための装置。

【請求項14】

ヘッドセットを更に含み、前記プレス・トーク方式のセンサまたはスイッチを前記ヘッドセットに取り付ける、請求項１記載のプレス・トーク方式の機能のための装置。

【請求項15】

ハンズフリー・プレス・トーク方式の機能を含む通信装置であって、

前もってセットされた可聴信号、予め決められた動き、または空気圧の少なくとも１つにより動作するプレス・トーク方式のセンサまたはスイッチと、

前記プレス・トーク方式のセンサまたはスイッチからの信号に応答して前記通信装置の動作を制御するプロセッサと、

を含む通信装置。

【請求項16】

前記プレス・トーク方式のセンサまたはスイッチは、可聴信号検出器、加速度計、および感圧スイッチの少なくとも１つを含む、請求項１５記載の通信装置。

【請求項17】

前記プレス・トーク方式のセンサまたはスイッチは傾きセンサを含み、所定の時間前記傾きセンサが或る標準化された角度から予め決められた角度より大きく傾いたことに応答して前記通信装置の送信モードを起動する、請求項１５記載の通信装置。

【請求項18】

選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが前記予め決められた角度より大きく傾いたことを検出したことの少なくとも１つに応答して前記通信装置を送信モードに保持するための手段を更に含む、請求項１７記載の通信装置。

【請求項19】

前記プレス・トーク方式のセンサまたはスイッチは可聴信号検出器を含み、前もってセットされた可聴信号を前記可聴信号検出器が検出したことに応答して前記通信装置の送信モードを起動する、請求項１５記載の通信装置。

【請求項20】

前記プレス・トーク方式のセンサまたはスイッチは感圧スイッチを含み、前もってセットされた空気圧を前記感圧スイッチが受けたことに応答して前記通信装置の送信モードを起動する、請求項１５記載の通信装置。

【請求項21】

ヘッドセットを更に含み、前記プレス・トーク方式のセンサまたはスイッチを前記ヘッドセットに取り付ける、請求項１５記載の通信装置。

【請求項22】

ハンズフリー・プレス・トーク方式の機能のための方法であって、

前もってセットされた可聴信号、予め決められた動き、または空気圧の少なくとも１つを検出することと、

前記前もってセットされた可聴信号、予め決められた動き、または空気圧の少なくとも１つがあるかないかを検出したことに応答して前記通信装置の動作を制御することと、

を含む、プレス・トーク方式の機能のための方法。

FITBIT 1002
Fitbit v. Immersion

【請求項23】
前記前もってセットされた可聴信号を検出することは、音声信号、前触信号、白色雑音信号、または予め定義された音や語または数のグループの１つを検出することをさらに含む、請求項２２記載のプレス　トーク方式の機能のための方法。
【請求項24】
前記前もってセットされた可聴信号を検出したことに応じて前記通信装置の送信モードを起動することを更に含む、請求項２２記載のプレス・トーク方式の機能のための方法。
【請求項25】
予め決められた時間中に傾きセンサが現在測定された角度から予め決められた角度より大きく傾いたことを検出することを更に含む、請求項２２記載のプレス・トーク方式の機能のための方法。
【請求項26】
所定の継続時間前記傾きセンサが前記標準化された角度から前記予め決められた角度より大きく傾いたことを検出したことに応答して前記通信装置の送信モードを起動することを更に含む、請求項２５記載のプレス・トーク方式の機能のための方法。
【請求項27】
選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが前記予め決められた角度より大きく傾いたことを検出したことの少なくとも１つに応答して前記通信装置を送信モードに保持することと、
前記選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが前記予め決められた角度より大きく傾いたことを検出したことの少なくとも１つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えまたは保持することと、
をさらに含む、請求項２５記載のプレス・トーク方式の機能のための方法。
【請求項28】
前もってセットされた空気圧より大きな空気圧を検出することを更に含む、請求項２２記載のプレス　トーク方式の機能のための方法。
【請求項29】
前記前もってセットされた空気圧より大きな空気圧を検出したことに応じて前記通信装置内の送信モードを起動することを更に含む、請求項２８記載のプレス・トーク方式の機能のための方法。
【請求項30】
選択された時間遅れの後に音声信号を検出したことまたは前記前もってセットされた空気圧を検出したことの少なくとも１つに応答して前記通信装置を送信モードに保持することと、
前記選択された時間遅れの後に音声信号または前記前もってセットされた空気圧の少なくとも１つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えまたは保持することと、
をさらに含む、請求項２９記載のプレス・トーク方式の機能のための方法。
【請求項31】
ハンズフリー・プレス・トーク方式の機能のための物品を製作する方法であって、
前もってセットされた可聴信号　センサまたはスイッチの予め決められた動き、または空気圧の少なくとも１つにより動作するプレス・トーク方式のセンサまたはスイッチを形成することと、
前記プレス　トーク方式のセンサまたはスイッチからの信号に応答して通信装置の動作を制御する手段を形成することと
を含む、装置を製作する方法。
【請求項32】
前記プレス　トーク方式のセンサまたはスイッチを形成することは、可聴信号検出器、加速度計、および空気感圧スイッチの少なくとも１つを形成することを含む、請求項３１

FITBIT 1002
Fitbit v. Immersion

記載の装置を製作する方法。
【請求項33】
前記プレス・トーク方式のセンサまたはスイッチを形成することは、
傾きセンサを形成することと、
前記傾きセンサを通じさせて、所定の継続時間前記傾きセンサが或る標準化された角度から予め決められた角度より大きく傾いたことに応答して前記通信装置の送信モードを起動させることと、
を含む、請求項３１記載の装置を製作する方法。
【請求項34】
前記プレス・トーク方式のセンサまたはスイッチを形成することは、
可聴信号検出器を形成することと、
前記可聴信号検出器を通じさせて、前もってセットされた可聴信号を前記可聴信号検出器が検出したことに応答して前記通信装置の送信モードを起動させることと、
を含む請求項３１記載の装置を製作する方法。
【請求項35】
前記プレス・トーク方式のセンサまたはスイッチを形成することは、
感圧スイッチを形成することと、
前記感圧スイッチを通じさせて、前もってセットされた空気圧を前記感圧スイッチが検出したことに応答して前記通信装置の送信モードを起動させることと、
を含む、請求項３１記載の装置を製作する方法。
【請求項36】
ヘッドセットを形成することと、
前記ヘッドセット内に前記プレス・トーク方式のセンサまたはスイッチを取り付けることと、
を更に含む、請求項３１記載の装置を製作する方法。
【請求項37】
或る方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体であって、
前もってセットされた可聴信号、予め決められた動き、または空気圧の少なくとも１つを検出することと、
前記前もってセットされた可聴信号、予め決められた動き、または空気圧の少なくとも１つがあるかないかを検出したことに応答して通信装置の動作を制御することと、
を含む、或る方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。
【請求項38】
前記前もってセットされた可聴信号を検出することは、音声信号、着信信号、自色雑音信号、または予め定義された音や語または複数のグループの１つを検出することを含む、請求項３７記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。
【請求項39】
前記前もってセットされた可聴信号を検出したことに応答して前記通信装置の送信モードを起動することを更に含む、請求項３７記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。
【請求項40】
所定の継続時間傾きセンサが或る標準化された角度から予め決められた角度より大きく傾いたことを検出することを更に含む、請求項３７記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体
【請求項41】
所定の継続時間前記傾きセンサが前記標準化された角度から前記予め決められた角度より大きく傾いたことを検出したことに応答して前記通信装置の送信モードを起動すること

FITBIT 1002
Fitbit v. Immersion

を更に含む、請求項４０記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。

【請求項42】

選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが前記予め決められた角度より大きく傾いたことを検出したことの少なくとも１つに応答して前記通信装置を送信モードに保持することと、

前記選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが前記予め決められた角度より大きく傾いたことを検出したことの少なくとも１つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えまたは保持することと、

を更に含む、請求項４０記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。

【請求項43】

前もってセットされた空気圧より大きな空気圧を検出することを更に含む、請求項３７記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。

【請求項44】

前記前もってセットされた空気圧より大きな空気圧を検出したことに応答して前記通信装置の送信モードを起動することを更に含む、請求項４３記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。

【請求項45】

選択された時間遅れの後に音声信号を検出したことまたは前記前もってセットされた空気圧を検出したことの少なくとも１つに応答して前記通信装置を前記送信モードに保持することと、

前記選択された時間遅れの後に音声信号または前記前もってセットされた空気圧の少なくとも１つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えまたは保持することと、

を更に含む、請求項４４記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。

【発明の詳細な説明】

【技術分野】

【０００１】

本発明は通信装置に関するもので、特に、通信装置に関連するハンズフリー・プレス・トーク方式の機能のための装置および方法に関するものである。

【背景技術】

【０００２】

ウォーキー・トーキーまたはプレス・トーク方式の通信サービスは、通信機器がかかる機能またはサービスを提供するよう進化するにつれて、通信サービス・プロバイダから広く利用できるようになった。ウォーキー・トーキー通信サービスは低コストなどの多くの利点を有する。なぜなら、かかるサービスは一般に月額の料金が定額であって、ユーザの特定の加入計画により割り当てられるユーザの月極め使用時間に対して料金が課されるものではないからである。更に、このサービスでは一般に電話番号をダイアルする必要がなく、また通常は複数の話者が同時に互いに話をすることができる。

【発明の開示】

【発明が解決しようとする課題】

【０００３】

これらのサービスはプレス・トーク方式（ＰＴＴ）の機能を用いる。すなわち、ユーザは、話しかけモードすなわち送信モードにするにはボタンを押して保持しなければならないし、受信モードすなわち聴取モードに切り替えるにはボタンを離さなければならない。したがって、双方向の会話を行うには、ユーザはＰＴＴボタンを絶えず押したり離したりしなければならない。特に、ユーザがかかる行動を取ることができない場合、またはユー

FITBIT 1002
Fitbit v. Immersion

ザが両手を使わなければならない活動を行っている場合は、これは厄介でありまた不便である。

【課題を解決するための手段】

【0004】

本発明の或る実施の形態では、ハンズフリー・プレス・トーク方式の機能のための装置は、前もってセットされた可聴信号、センサまたはスイッチの予め決められた動き、または空気圧の少なくとも１つにより動作するプレス・トーク方式のセンサまたはスイッチを含んでよい。またこの装置は、プレス・トーク方式のセンサまたはスイッチからの信号に応じて通信装置の動作を制御する手段を含んでよい。本発明の別の実施の形態では、ハンズフリー・プレス・トーク方式の機能を含む通信装置は、前もってセットされた可聴信号、予め決められた動き、または空気圧の少なくとも１つにより動作するプレス・トーク方式のセンサまたはスイッチを含んでよい。また通信装置は、プレス・トーク方式のセンサまたはスイッチからの信号に応じて通信装置の動作を制御するプロセッサを含んでよい。

【0005】

本発明の別の実施の形態では、ハンズフリー・プレス・トーク方式の機能のための方法は、前もってセットされた可聴信号、予め決められた動き、または空気圧の少なくとも１つを検出することを含んでよい。またこの方法は、前もってセットされた可聴信号、予め決められた動き、または空気圧の少なくとも１つがあるかないかを検出したことに応じて通信装置の動作を制御することを含んでよい。本発明の別の実施の形態では、ハンズフリー・プレス・トーク方式の機能のための装置を操作する方法は、前もってセットされた可聴信号、センサまたはスイッチの予め決められた動き、または空気圧の少なくとも１つにより動作するプレス・トーク方式のセンサまたはスイッチを提供することを含んでよい。またこの方法は、プレス・トーク方式のセンサまたはスイッチからの信号に応じて通信装置の動作を制御する手段を提供することを含んでよい。

【0006】

本発明の別の実施の形態では、或る方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体は、前もってセットされた可聴信号、予め決められた動き、または空気圧の少なくとも１つを検出することを含んでよい。この方法は、前もってセットされた可聴信号、予め決められた動き、または空気圧の少なくとも１つがあるかないかを検出したことに応じて通信装置の動作を制御することも含んでよい。

【実施例】

【0007】

好ましい実施の形態の以下の詳細な説明は、本発明の特定の実施の形態を示す添付の図面を参照する。異なる構造および動作を有する他の実施の形態は本発明の範囲から逸れない。

【0008】

図１は、本発明の或る実施の形態に係るハンズフリー・プレス・トーク方式（ＰＴＴ）の装置１０２または機能を含む通信装置１００の一例の概ブロック図である。ＰＴＴ装置１０２は、前もってセットされた可聴信号、センサまたはスイッチの予め決められた動き、または空気圧の少なくとも１つにより動作するＰＴＴスイッチまたはセンサでよい。ＰＴＴ装置１０２（センサまたはスイッチ）の例として、限定されるものではないが、可聴信号検出器、加速度計、傾きセンサ、感圧スイッチまたは空気感圧スイッチ、または同様の装置がある。加速度計または傾きセンサの例として、Ｋｉｏｎｉｘ（Ｒ）ｍｉｃｒｏ ＫＸＧ２０加速度計、Ａｎａｌｏｇ Ｄｅｖｉｃｅｓ（Ｒ）ＡＤＸＬ０５加速度計、Ｍｏｔｏｒｏｌａ（Ｒ）ＭＭＡ１２６０Ｅ加速度計、電解質センサ（ｅｌｅｃｔｒｏｌｙｔｉｃ ｔｉｌｔ ｓｅｎｓｏｒ）などがある。感圧スイッチまたは空気感圧スイッチの一例は、カリフォルニア州サニベルのＩｎｌｅｇａｘ製のマイクロ電機システム（ＭＥＭＳ）圧力センサ、または同様のセンサである。

【0009】

通信装置１４０はＰＴＴセンサおよび／または制御論理ユニット１４４を含んでよい。ＰＴＴセン

FITBIT 1002
Fitbit v. Immersion

ッチまたはスイッチ１０２はプロセッサおよび制御論理ユニット１０４に結合されて通信装置１００の動作を制御し、または通信装置１００に信号を送ってその動作を制御してよい。これについては後で詳細に説明する。プロセッサおよび制御論理ユニット１０４はマイクロプロセッサなどでよい。プロセッサおよび制御論理ユニット１０４はコンピュータが実行可能なまたはコンピュータが読み取り可能な命令を含むデータ構造またはソフトウエア・プログラム１０６を含んで通信装置１００とその構成要素の動作を制御してよい。データ構造またはソフトウエア・プログラム１０６は、後で詳細に説明するＰＴＴ機能を行うためのコンピュータが実行可能な命令を含んでよい。またプロセッサおよび制御論理ユニット１０４はブラウザ１０８および音声認識装置１１０を含んでよい。

【００１０】

通信装置１００は、電話またはその他の通信を開始または行うことを含む通信装置１００の制御動作を容易にするためのオペレータすなわちユーザ・インターフェース１１２を含んでよい。ユーザ・インターフェース１１２は、通信装置１００の状態および動作について加入者すなわちユーザに可視信号を提供するディスプレイ１１４を含んでよい。ディスプレイ１１４はカラー画像を提示する機能を有する液晶ディスプレイ（ＬＣＤ）などでよい。ディスプレイ１１４は、画像、テキスト、数字、文字、グラフィカル・ユーザ・インターフェース（ＧＵＩ）などの形で情報をユーザすなわちオペレータに提供してよい。またユーザ・インターフェース１１２はキーパッド１１６と、ジョイスティックなどの位置指示装置を含むファンクション・キーまたはボタン１１８とを含んでよい。キーパッド１１６とファンクション・ボタンおよびジョイスティック１１８とにより、ユーザは通信装置１００にコマンドを送って、電話番号をダイアルし、呼を開始しまた終了し、他の通信を確立する（インターネットにアクセスする、電子メールやテキスト・メッセージを送信および受信するなどことができる。またキーパッド１１６とファンクション・ボタンおよびジョイスティック１１８とを用いて通信装置１００の他の動作を制御する（例えば、ＰＴＴ機能または料金などの特殊な機能を可能にする）ことができる。

【００１１】

ユーザ・インターフェース１０４はマイクロホン１２０およびスピーカ１２２も含んでよい。マイクロホン１２０はユーザまたは音源（ラジオ、テレビジョンなど）からオーディオ信号または音響信号を受ける。マイクロホン１２０はオーディオ信号または音響信号を電気信号に変換する。マイクロホン１２０はプロセッサおよび論理ユニット１０４に接続され、プロセッサおよび論理ユニット１１２は電気信号をベースバンド通信信号に変換する。プロセッサおよび論理ユニット１０４は送信機１２２に接続され、送信機１２２は主プロセッサおよび論理ユニット１１２からのベースバンド信号を無線周波数（ＲＦ）信号に変換する。送信機１２２は、ＲＦ信号を通信媒体またはシステム１２６に送るためにアンテナ組立体１２４に接続される。

【００１２】

アンテナ組立体１２４は電波でＲＦ信号を受信し、またＲＦ信号を受信器１２８に転送する。受信器１２８はＲＦ信号をベースバンド信号に変換する。ベースバンド信号はプロセッサおよび論理ユニット１０４に与えられ、ユニット１０４はベースバンド信号を電気信号に変換する。プロセッサおよび論理ユニット１０４は電気信号をスピーカ１１６に送り、スピーカ１１８は電気信号をユーザが理解できるオーディオ信号に変換する。

【００１３】

電源１３０はプロセッサおよび論理ユニット１０４に接続されて、通信装置１００を動作させるための電力を供給する。電源１３０は再充電可能な電池などでよい。また通信装置１００は少なくとも１つのデータ記憶装置１３２を含んでよい。データ記憶装置１３２は電話番号のリストを記憶する。この１つの例としては、ユーザが入力して記憶した電話番号（例えば、記憶装置１３２の電話帳部分、ミスしまたは応答しなかった時の電話番号、通信装置１００が指令した電話番号など）を含んでよい。データ記憶装置１３２は、本発明の実施の形態に関して述べられる特殊な動作または機能を実行するためにコンピュータが実行可能なまたはコンピュータが使用可能な命令またはデータ構造（データ構造１０

FITBIT 1002
Fitbit v. Immersion

らなど）を記憶するためのコンピュータが読み取り可能な媒体でよい。
【００１４】
通信装置１００は、本発明の実施の形態に係る通信システムまたは媒体１２６に関連して動作する。通信システムまたは媒体１２６は、移動体、無線、セル方通信システム、または同様のシステムでよい。通信システム１２６は通信装置１００を別の通信ネットワーク１３４に、または公衆交換電話網１３６に結合する。
【００１５】
通信装置１００は、コードレス電話、セル方電話、パーソナル・ディジタル・アシスタント（ＰＤＡ）、通報器、コンピュータ装置などでよく、任意の特定の通信標準（例えば、アドバンスト・モバイル・ホン・サービス（ＡＭＰＳ）、ディジタル・アドバンスト・モバイル・ホン・サービス（Ｄ－ＡＭＰＳ）、移動体通信用グローバル・システム（ＧＳＭ）、符号分割多元接続（ＣＤＭＡ）、時分割多元接続（ＴＤＭＡ）など）に特有なものではない。図１に示すレイアウトおよび設計は本発明を説明するためのものであって、本発明はいかなる特定の設計にも限定されるものではない。図１に示す通信装置１００は無線通信装置であるが、本発明は有線またはハード・ワイヤド通信装置およびシステムにも適用できる。
【００１６】
図２は、本発明の或る実施の形態に係るハンズフリー・プレス・トーク方式（ＰＴＴ）の動作または機能のための方法２００の流れ図である。方法２００の要素および特徴は通信装置１００およびＰＴＴセンサまたはスイッチ１０２により具現化しまたは実行してよい。ブロック２０２で、音声により作動するＰＴＴ機能が付勢される。ブロック２０４で、前もってセット（設定）された可聴信号または音声信号が検出されたかどうか判定する。前もってセットされた可聴信号または音声信号は、受けるとＰＴＴ機能を作動するであろう予め決められた音でよい。また前もってセットされた可聴信号または音声信号は、予め決められたキーワードまたは語、一連の語または語の組合せ、並びまたは音でよい。前もってセットされた可聴信号または音声信号は、図１のマイクロホン１２０および音声認識装置１１０と同様の通信装置に関連するマイクロホンおよび認識装置により、または図１のＰＴＴセンサまたはスイッチ１０２などの別個の可聴センサまたはスイッチにより受ける。ブロック２０４で前もってセットされた可聴信号または音声信号が検出されない場合は、方法２００はブロック２１０に進む。ブロック２１０で、通信装置は受信モードまたは待機モードのままでいる。ブロック２０４で前もってセットされた可聴信号または音声信号が検出された場合は、方法２００はブロック２０６に進む。
【００１７】
ブロック２０６で、前もってセットされた可聴信号または音声信号に応答して通信装置により送信モードが作動する。ブロック２０８で、選択された時間遅れの後に音声または前もってセットされた可聴信号が検出されたかどうか判定する。選択された時間遅れの後に音声または前もってセットされた可聴信号が検出された場合は、方法２００はブロック２０６に戻って、送信モードは起動したままである。選択された時間遅れの後に音声または前もってセットされた可聴信号が検出されない場合は、方法２００はブロック２１０に進む。ブロック２１０で、伝播する信号を通信装置が受けるために受信モードまたは待機モードを起動する。前もってセットされた可聴信号または音声が検出されると方法２００はブロック２０４に戻り、付勢された音声ＰＴＴ手が操作無効化されるかまたは通信装置がオフされるまでは、方法２００は上に述べたように進む。
【００１８】
図３は、本発明の他の実施の形態に係るハンズフリー・プレス・トーク方式（ＰＴＴ）の機能のための方法の流れ図である。方法３００の要素および特徴は図１の通信装置１００およびＰＴＴセンサまたはスイッチ１０２により具現化しまたは実行できる。ブロック３０２で、音声により作動するＰＴＴ機能を付勢する。ブロック３０４で、傾きセンサを標準化（ｎｏｒｍａｌｉｚｅ）しまたはセットしてよい。傾きセンサは、図１のＰＴＴセンサまたはスイッチ１０２に関して説明した傾きセンサと同じでよい。ブロック３０ｎ

FITBIT 1002
Fitbit v. Immersion

で、所定の時間より長く傾きセンサが作動したか判定する。所定の時間より長く傾きセンサが作動しなかった場合は、方法２００はブロック３１２に進む。ブロック３１２で、所定の時間より長く傾きセンサが作動しなかったことに応答して通信装置は受信モードまたは待機モードのままでいる。ブロック３０６で、所定の時間より長く傾きセンサが作動した場合は、方法２００はブロック３０８に進む。ブロック３０８で、所定の時間より長く傾きセンサが作動したことに応答して通信装置は送信モードが起動される。傾きセンサが作動すると、所定の時間より長く規準角度（ｎｏｒｍａｌｉｚｅｄ　ａｎｇｌｅ）に対して傾きセンサが予め決められた角度より大きく傾いたことに応答して通信装置の送信モードは起動される。または、ブロック３０８で、すでに送信モードにあるときは通信装置は送信モードのままでいる。

【００１９】

ブロック３１０で、選択された時間遅れの後に、音声が検出されたか、または傾きセンサがまだ作動しているかまたは規準角度に対して予め決められた角度より大きく傾いているか、について判定を行う。音声が検出されたかまたは傾きセンサが作動している場合は、方法２００はブロック３０８に戻り、通信装置は送信モードのままでいる。ブロック３１０で選択された時間遅れの後に音声または傾きセンサが作動していない場合は、方法３００はブロック３１２に進む。ブロック３１２で、選択された時間遅れの後に音声または傾きセンサが作動していないことに応答して、通信装置は受信モードまたは待機モードに切り替えられる。所定の時間より長く傾きセンサが作動したかまたは予め決められた角度より大きく傾いたことに応答して方法３００はブロック３０６に戻り、方法３００に前に述べたように進む。

【００２０】

図４Ａは、本発明の或る実施の形態に係るヘッドセット４０２内に図のように取り付けられたハンズフリー・プレス・トーク方式の動作または機能のための装置４００の一例である。図４Ｂは、図４Ａのハンズフリー・プレス・トーク方式（ＰＴＴ）の装置４００の詳細な図である。ＰＴＴ装置４００は加速度計または傾きセンサでよく、図１のＰＴＴセンサ１０２について上に述べたまたは用いた方法３００に関連して動作する。前に説明したように、ＰＴＴ装置４００として用いてよい加速度計または傾きセンサの例として、Ｋｉｏｎｉｘ（Ｒ）ｍｏｄｅｌ　ＫＸＧ２０加速度計、Ａｎａｌｏｇ　Ｄｅｖｉｃｅｓ（Ｒ）ＡＤＸＬ０５加速度計、Ｍｏｔｏｒｏｌａ（Ｒ）ＭＭＡ１２００加速度計、電解傾きセンサなどがある。所定の時間すなわち起動時間より長い間、ヘッドセット４０２のユーザすなわち装着者４０４が、ゼロまたは規準角度から予め決められた角度より大きく頭を傾けると、ＰＴＴ装置４００または装置は作動されて、通信装置はユーザ４０４が話す音声通信を送信する送信モードに切り替えられる。

【００２１】

例えば、ゼロまたは規準角度シータ（θ）を約４５度とする。図４Ｂに示すＸ方向およびＹ方向の傾きセンサ４００の出力は次式で表わすことができる。

すなわち、

$$O_{(x)} = KF_g \cos\theta \qquad (1)$$

$$O_{(y)} = KF_g \sin\theta \qquad (2)$$

ただし、Ｋは或る定数、F_gは重力による力である。説明の目的でKF_gを１と仮定して、異なる角度シータのについての出力の例を次の表に示す。

FITBIT 1002
Fitbit v. Immersion

シータ（θ）	$O_{(x)}$	$O_{(y)}$
４５°	．７１	．７１
３５°	．８２	．５７
５５°	．５７	．８２

【００２２】
したがって、所定の時間または継続時間中に、ＰＴＴ装置４００（傾きセンサまたは加速度計）を約４５度の標準またはゼロの角度から約１０度以上傾けるとＰＴＴ機能が作動し、傾きセンサまたはＰＴＴ装置４００に結合されまたは関連する通信装置は送信モードになる。図ではヘッドセット４０２内に取り付けられているが、ＰＴＴ機能を容易にするものであればＰＴＴ装置４００は通信装置に関連する任意の付属品またはその他の構成要素内に設けてよい。
【００２３】
図５は、本発明の別の実施の形態に係るハンズフリー・プレス・トーク方式（ＰＴＴ）の機能のための方法５００の流れ図である。方法５００の要素および特徴は、図１の通信装置１００およびＰＴＴセンサまたはスイッチ１０２により具現化または実行できる。ブロック５０２でＰＴＴ機能が付勢される。ブロック５０４で、圧力スイッチまたは静的雑音スイッチ（ｓｔａｔｉｃ　ｎｏｉｓｅ　ｓｗｉｔｃｈ）が作動されているかどうか判定する。圧力スイッチまたは静的雑音スイッチは、ＰＴＴ機能を行うようにユーザがセンサに息を吹きかけるかまたは予め決められた音をたてることにより作動する。圧力スイッチまたは静的雑音スイッチは図１のＰＴＴセンサまたはスイッチ１０２に対応してよい。ブロック５０４で圧力スイッチまたは静的雑音スイッチが作動していなかった場合は、方法５００はブロック５１０に進み、通信装置は受信モードまたは待機モードを起動し、またはそのモードのままでよい。ブロック５０４で圧力スイッチまたは静的雑音スイッチが作動した場合は、方法２００はブロック５０６に進む。ブロック５０６で、空気圧が前もってセットされた空気圧より高いことを圧力スイッチが検出したことに応答して通信装置の送信モードが起動されまたは送信モードに切り替えられる。空気圧が前もってセットされた空気圧より高いことを検出したことに応答して関連する通信装置内の送信モードが起動される。
【００２４】
ブロック５０８で、選択された時間遅れの後に、音声が検出されたか、または前もってセットされた圧力より高い圧力を検出したことにより圧力スイッチまたは静的雑音スイッチが作動したか、について判定を行う。選択された時間遅れの後に音声が検出されかまたはスイッチが作動した場合はこの方法はブロック５１６に戻り、通信装置は送信モードのままである。選択された時間遅れの後に音声が検出されないかまたはスイッチが作動しない場合は、方法２００はブロック５１０に進む。前に説明したように、ブロック５１０で通信装置は送信モードまたは待機モードで起動され、またはそのままでいる。ブロック５１０から、圧力スイッチまたは静的雑音スイッチが作動したことに応答して、方法５００はブロック５０４に戻る。次に、方法５００は前に説明したように進む。
【００２５】
図６は、本発明の別の実施の形態に係るヘッドセット６０２に図のように取り付けられたハンズフリー・プレス・トーク方式の動作または機能のための別の装置６００の一例である。装置６００は、方法５００に関連して用いられる圧力スイッチまたは静的雑音スイッチでよい。装置６００（圧力スイッチまたは静的雑音スイッチ）は、図１に関して説明したＰＴＴセンサまたはスイッチ１０２に対応してよい。ユーザは装置６００に息を吹き

FITBIT 1002
Fitbit v. Immersion

つけ、静的雑音（ｓｔａｔｉｃ　ｎｏｉｓｅ）、白色雑音、またはその他の音を生成して、ＤＴＶ機能を作動させる。図ではハンズフリー動作のために装置６００をヘッドセット内に取り付けているが、装置６００は、ユーザが装置に圧力を与えることや、静的雑音、白色雑音、またはその他の前もってセットされた可聴信号または音を生成することを容易にする任意の場所にまたは任意の付属品（ａｃｃｅｓｓｏｒｙ）または部品上に取り付けてよい。

【００２６】

本発明の要素はハードウエアで、および／またはソフトウエア（ファームウエア、常駐ソフトウエア、マイクロコードなどを含むコンピュータ・プログラムとして）で実現できる。また、図２、３、５のそれぞれの方法２００、３００、５００などの本発明の要素は、図１の通信装置１００または図１Ａ、１Ｂ、５の装置４００および６００などの、装置またはシステムによりまたはこれらに関して用いられる構成で実現される。コンピュータが使用可能なまたはコンピュータが読み取り可能なプログラム・コードを有するコンピュータが使用可能なまたはコンピュータが読み取り可能な記憶媒体上でコンピュータ・プログラム製品の形をとってよい。かかる媒体の例は、図１にネットワーク１３４、媒体１２６、記憶装置１３２、または同様の装置で示されている。コンピュータが使用可能なまたは読み取り可能な媒体は、装置またはシステムによりまたはこれらに関して用いられるプログラムを、含み、記憶し、通信し、または転送する任意の媒体でよい。例えば媒体は、電気的、磁気的、光学的、電磁気的、赤外線、または半導体のシステムなどでよい。また媒体は、コンピュータ・プログラム製品をインターネットなどのネットワークを介して「ダウンロード」したときに検索される単なる情報のストリングでよい。またコンピュータが使用可能なまたは読み取り可能な媒体は、プログラムをその上にプリントすることのできる紙またはその他の適当な媒体でよい。

【００２７】

特定の実施の形態についてここに図示して説明したが、当業者が理解するように、図示された特定の実施の形態の代わりに同じ目的を達成するよう考慮された任意の機構を用いてよく、また本発明は別の環境で別のアプリケーションを有してよい。このアプリケーションは本発明の任意の適応や変形をカバーするものである。特許請求の範囲はここに説明した特定の実施の形態に本発明の範囲を限定するものではない。

【図面の簡単な説明】

【００２８】

【図１】本発明の例える実施の形態にかかるハンズフリー・プレス・トーク方式の機能を含む通信装置の一例のブロック図である。

【図２】本発明の例える実施の形態にかかるハンズフリー・プレス・トーク方式の機能のための方法の流れ図である。

【図３】本発明の別の実施の形態にかかるハンズフリー・プレス・トーク方式の機能のための方法の流れ図である。

【図４Ａ】本発明の例える実施の形態にかかるヘッドセット内に図に示すように取り付けられたハンズフリー・プレス・トーク方式の動作または機能のための装置の一例である。

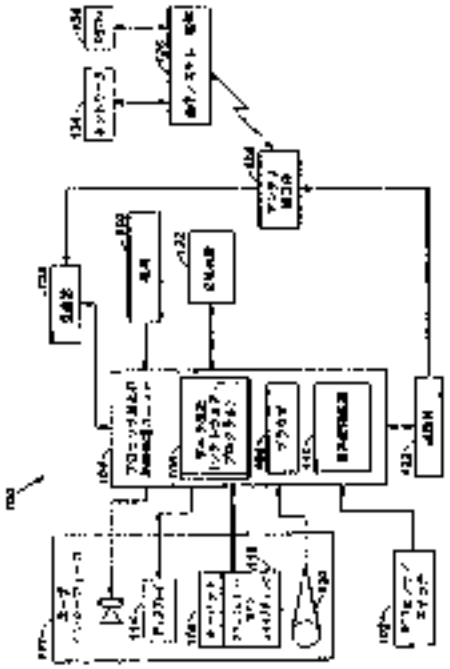
【図４Ｂ】図４Ａのハンズフリー・プレス・トーク方式の装置の詳細な図である。

【図５】本発明の別の実施の形態にかかるハンズフリー・プレス・トーク方式の機能のための方法の流れ図である。

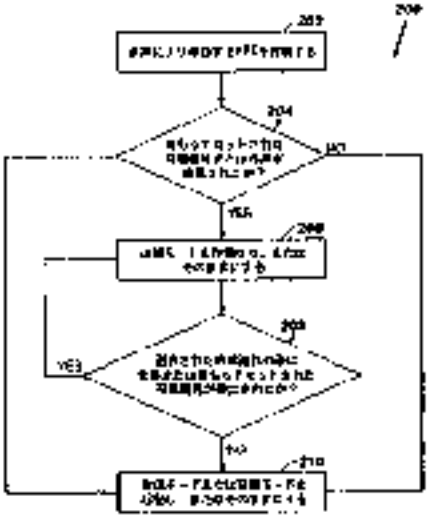
【図６】本発明の別の実施の形態にかかるヘッドセット内に図に示すように取り付けられたハンズフリー・プレス・トーク方式の動作または機能のための別の装置の一例である。

FITBIT 1002
Fitbit v. Immersion

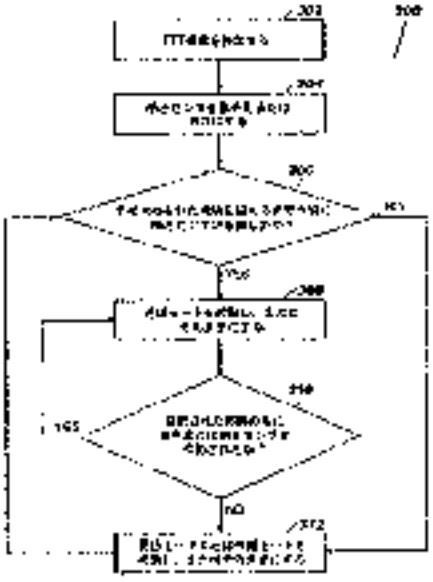
【図1】



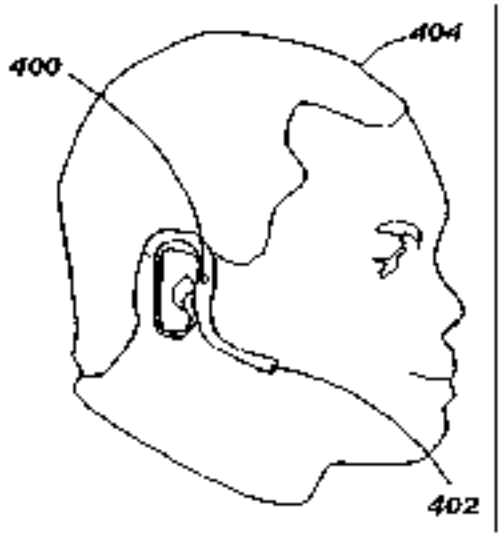
【図2】



【図3】

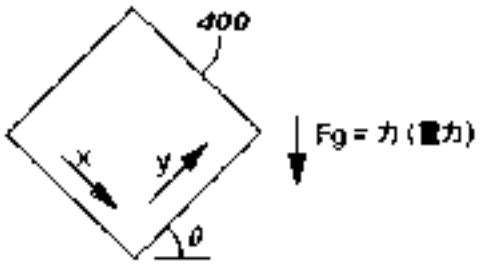


【図4A】

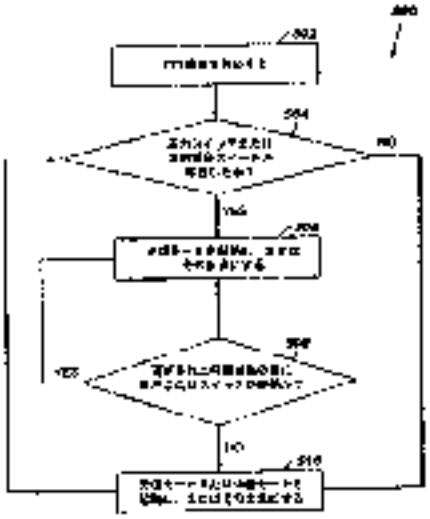


FITBIT 1002
Fitbit v. Immersion

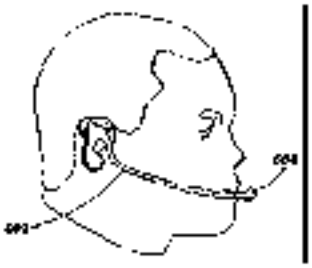
【図4B】



【図5】



【図6】



【手続補正書】
【提出日】平成18年2月6日(2006.2.6)
【手続補正1】
【補正対象書類名】特許請求の範囲
【補正対象項目名】全文
【補正方法】変更
【補正の内容】
【特許請求の範囲】
【請求項1】
ハンズフリー・プレス・トーク方式の機能のための装置であって、
プレス・トーク方式のセンサまたはスイッチであって、前記センサまたはスイッチの予め決められた傾き、または空気圧が少なくとも1つにより動作し、加速度計および空気圧スイッチの少なくとも1つを含む、プレス・トーク方式のセンサまたはスイッチと、
前記プレス・トーク方式のセンサまたはスイッチからの信号に応じて通信装置の動作を制御する手段と、
を含む、プレス・トーク方式の機能のための装置。
【請求項2】
前記プレス・トーク方式のセンサまたはスイッチは傾きセンサを含み、所定の継続時間前記傾きセンサが或る規準化された角度から予め決められた角度より大きく傾いたことに応じて前記通信装置の送信モードを起動する、請求項1記載のプレス・トーク方式の機能のための装置。
【請求項3】
選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが前記予め決められた角度より大きく傾いたことを検出したことの少なくとも1つに応答して前記通信装置を送信モードに保持するための手段を更に含む、請求項2記載のプレス・トーク方式

FITBIT 1002
Fitbit v. Immersion

の機能のための装置。

【請求項4】

選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが予め決められた角度より大きく傾いたことを検出したことの少なくとも1つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えるための手段を更に含む、請求項2記載のプレス・トーク方式の機能のための装置。

【請求項5】

前記プレス・トーク方式のセンサまたはスイッチは可聴信号検出器を含み、前もってセットされた可聴信号を前記可聴信号検出器が検出したことに応答して前記通信装置の送信モードを起動する、請求項1記載のプレス・トーク方式の機能のための装置。

【請求項6】

選択された時間遅れの後に音声信号を検出したことまたは前もってセットされた可聴信号を検出したことの少なくとも1つに応答して前記通信装置を送信モードに保持するための手段を更に備える、請求項5記載のプレス・トーク方式の機能のための装置。

【請求項7】

選択された時間遅れの後に音声信号を検出したことまたは前もってセットされた可聴信号を検出したことの少なくとも1つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えるための手段を更に含む、請求項5記載のプレス・トーク方式の機能のための装置。

【請求項8】

前もってセットされた空気圧を前記空気感圧スイッチが受けたことに応答して前記通信装置の送信モードを起動する、請求項1記載のプレス・トーク方式の機能のための装置。

【請求項9】

選択された時間遅れの後に音声信号を検出したことまたは前もってセットされた空気圧を検出したことの少なくとも1つに応答して前記通信装置を送信モードに保持するための手段を更に備える、請求項8記載のプレス・トーク方式の機能のための装置。

【請求項10】

選択された時間遅れの後に音声信号を検出したことまたは前もってセットされた空気圧を検出したことの少なくとも1つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えるための手段を更に含む、請求項8記載のプレス・トーク方式の機能のための装置。

【請求項11】

前記通信装置は無線通信装置である、請求項1記載のプレス・トーク方式の機能のための装置。

【請求項12】

前記通信装置は、ラジオ、携帯電話、コードレス電話、パーソナル・ディジタル・アシスタント、およびコンピュータの1つである、請求項1記載のプレス・トーク方式の機能のための装置。

【請求項13】

ヘッドセットを更に含み、前記プレス・トーク方式のセンサまたはスイッチを前記ヘッドセットに取り付ける、請求項1記載のプレス・トーク方式の機能のための装置。

【請求項14】

ハンズフリー・プレス・トーク方式の機能を含む通信装置であって、

プレス・トーク方式のセンサまたはスイッチであって、予め決められた傾き、または空気圧の少なくとも1つにより動作し、加速度計および空気感圧スイッチの少なくとも1つを含むプレス・トーク方式のセンサまたはスイッチと、

前記プレス・トーク方式のセンサまたはスイッチからの信号に応答して前記通信装置の動作を制御するプロセッサと、

を含む通信装置。

【請求項15】

FITBIT 1002
Fitbit v. Immersion

前記プレス・トーク方式のセンサまたはスイッチは傾きセンサを含み、所定の継続時間前記傾きセンサが或る標準化された角度から予め決められた角度より大きく傾いたことに応答して前記通信装置の送信モードを起動する、請求項１４記載の通信装置。

【請求項16】

選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが前記予め決められた角度より大きく傾いたことを検出したことの少なくとも１つに応答して前記通信装置を送信モードに保持するための手段を更に含む、請求項１５記載の通信装置。

【請求項17】

前記プレス・トーク方式のセンサまたはスイッチは可聴信号検出器を含み、前もってセットされた可聴信号を前記可聴信号検出器が検出したことに応答して前記通信装置の送信モードを起動する、請求項１４記載の通信装置。

【請求項18】

前もってセットされた空気圧を前記空気感圧スイッチが受けたことに応答して前記通信装置の送信モードを起動する、請求項１４記載の通信装置。

【請求項19】

ヘットセットを更に含み、前記プレス・トーク方式のセンサまたはスイッチを前記ヘッドセットに取り付ける、請求項１４記載の通信装置。

【請求項20】

ハンズフリー・プレス・トーク方式の機能のための方法であって、

加速度計による予め決められた動きまたは空気圧の少なくとも１つを検出することと、

前記予め決められた動きまたは空気圧を検出したことに応じて通信装置の動作を起動することと、

を含む、プレス・トーク方式の機能のための方法。

【請求項21】

予め決められた時間中に傾きセンサが或る標準化された角度から予め決められた角度より大きく傾いたことを検出することを更に含む、請求項２０記載のプレス・トーク方式の機能のための方法。

【請求項22】

所定の継続時間前記傾きセンサが前記標準化された角度から前記予め決められた角度より大きく傾いたことを検出したことに応答して前記通信装置の送信モードを起動することを更に含む、請求項２１記載のプレス・トーク方式の機能のための方法。

【請求項23】

選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが前記予め決められた角度より大きく傾いたことを検出したことの少なくとも１つに応答して前記通信装置を送信モードに保持することと、

前記選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが前記予め決められた角度より大きく傾いたことを検出したことの少なくとも１つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えまたは保持することと、

を更に含む、請求項２１記載のプレス・トーク方式の機能のための方法。

【請求項24】

前もってセットされた空気圧より大きな空気圧を検出することを更に含む、請求項２０記載のプレス・トーク方式の機能のための方法。

【請求項25】

前記前もってセットされた空気圧より大きな空気圧を検出したことに応じて前記通信装置の送信モードを起動することを更に含む、請求項２４記載のプレス・トーク方式の機能のための方法。

【請求項26】

選択された時間遅れの後に音声信号を検出したことまたは前記前もってセットされた空気圧を検出したことの少なくとも１つに応答して前記通信装置を送信モードに保持するこ

FITBIT 1002
Fitbit v. Immersion

とと．
前記選択された時間遅れの後に音が聞き取れまたは前記所もってセットされた空気圧の少なくとも１つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えまたは保持することと．
を更に含む．請求項２５記載のプレス・トーク方式の機能のための方法。
【請求項27】
ハンズフリー・プレス・トーク方式の機能のための装置を製作する方法であって、
センサまたはスイッチが予め決められた動きまたは空気圧の少なくとも１つにより動作するプレス・トーク方式のセンサまたはスイッチを形成し、前記プレス・トーク方式のセンサまたはスイッチは加速度計および空気圧スイッチの少なくとも１つを形成することと．
前記プレス・トーク方式のセンサまたはスイッチからの信号に応答して通信装置の動作を制御する手段を形成することと、
を含む．装置を製作する方法。
【請求項28】
前記プレス・トーク方式のセンサまたはスイッチを形成することは．
傾きセンサを形成することと．
前記傾きセンサを適応させて、所定の継続時間前記傾きセンサが成る標準化された角度から予め決められた角度より大きく傾いたことに応答して前記通信装置の送信モードを起動させることと、
を含む、請求項２７記載の装置を製作する方法。
【請求項29】
前記プレス・トーク方式のセンサまたはスイッチを形成することは．
可聴信号検出器を形成することと．
前記可聴信号検出器を適応させて、前もってセットされた可聴信号を前記可聴信号検出器が検出したことに応答して前記通信装置の送信モードを起動させることと．
を含む請求項２７記載の装置を製作する方法。
【請求項30】
前記空気圧スイッチを適応させて、前もってセットされた空気圧を前記空気圧スイッチが検出したことに応答して前記通信装置の送信モードを起動させることを更に含む．請求項２７記載の装置を製作する方法。
【請求項31】
ヘッドセットを形成することと．
前記ヘッドセット内に前記プレス・トーク方式のセンサまたはスイッチを取り付けることと．
を更に含む．請求項２７記載の装置を製作する方法．
【請求項32】
或る方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体であって．
加速度計からの予め決められた傾きまたは空気圧の少なくとも１つを検出することと．
前記前もってセットされた可聴信号、予め決められた動き、または空気圧の少なくとも１つがあるかないかを検出したことに応答して通信装置の動作を制御することと．
を含む．或る方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体．
【請求項33】
所定の継続時間傾きセンサが或る標準化された角度から予め決められた角度より大きく傾いたことを検出することを更に含む、請求項３２記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体．
【請求項34】
所定の継続時間前記傾きセンサが前記標準化された角度から前記予め決められた角度よ

FITBIT 1002
Fitbit v. Immersion

り大きく傾いたことを検出したことに応答して前記通信装置の送信モードを起動することを更に含む、請求項３３記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。

【請求項３５】

選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが前記予め決められた角度より大きく傾いたことを検出したことの少なくとも１つに応答して前記通信装置を送信モードに維持することと、

前記選択された時間遅れの後に音声信号を検出したことまたは前記傾きセンサが前記予め決められた角度より大きく傾いたことを検出したことの少なくとも１つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えまたは維持することと、

を更に含む、請求項３３記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。

【請求項３６】

前もってセットされた空気圧より大きな空気圧を検出することを更に含む、請求項３２記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。

【請求項３７】

前記前もってセットされた空気圧より大きな空気圧を検出したことに応答して前記通信装置の送信モードを起動することを更に含む、請求項３６記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。

【請求項３８】

選択された時間遅れの後に音声信号を検出したことまたは前記前もってセットされた空気圧を検出したことの少なくとも１つに応答して前記通信装置を前記送信モードに維持することと、

前記選択された時間遅れの後に音声信号または前記前もってセットされた空気圧の少なくとも１つがないことに応答して前記通信装置を受信モードまたは待機モードの一方に切り替えまたは維持することと、

を更に含む、請求項３７記載の方法を実行するためのコンピュータが実行可能な命令を有するコンピュータが読み取り可能な媒体。

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

PCT/US2004/034135

IPC 7 H04B1/46

IPC 7 H04B

EPO-Internal, WPI Data, PAJ

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 426 733 A (BREHIG ET AL) 17 January 1984 (1984-01-17) the whole document	1-45
X	GB 1 194 089 A (LEONARD RICHARD KAHN) 10 June 1970 (1970-06-10) the whole document	1-45
A	US 5 101 504 A (LENZ ET AL) 31 March 1992 (1992-03-31) the whole document	1-46
A	US 4 187 532 A (MAFFIER, VERNON H) 5 February 1980 (1980-02-05) the whole document	1-45

Date of the actual completion of the international search	Date of mailing of the international search report
25 February 2005	08/03/2005

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
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Authorized officer

Lindhardt, U

FITBIT 1002
Fitbit v. Immersion

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2004/034135

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4426733 A	17-01-1984	DE 3301516 A1	04-08-1983
		GR 2114a01 A	17-08-1983
		JP 58138129 A	16-08-1983
GB 1194899 A	10-06-1970	US 3683130 A	08-08-1972
US 5101504 A	31-03-1992	NONE	
US 4187632 A	05-02-1980	NONE	

Form PCT/ISA/210 (patent family annex) (January 2004)

FITBIT 1002
Fitbit v. Immersion

(81)指定国　　AP(BW,GH,GM,KE,LS,MW,MZ,NA,SD,SL,SZ,TZ,UG,ZM,ZW),EA(AM,AZ,BY,KG,KZ,MD,RU,TJ,TM),EP(AT,BE,BG,CH,CY,CZ,DE,DK,EE,ES,FI,FR,GB,GR,HU,IE,IT,LU,MC,NL,PL,PT,RO,SE,SI,SK,TR),OA(BF,BJ,CF,CG,CI,CM,GA,GN,GQ,GW,ML,MR,NE,SN,TD,TG),AE,AG,AL,AM,AT,AU,AZ,BA,BB,BG,BR,BW,BY,BZ,CA,CH,CN,CO,CR,CU,CZ,DE,DK,DM,DZ,EC,EE,EG,ES,FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KP,KR,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,MN,MW,MX,MZ,NA,NI,NO,NZ,OM,PG,PH,PL,PT,RO,RU,SC,SD,SE,SG,SK,SL,SY,TJ,TM,TN,TR,TT,TZ,UA,UG,US,UZ,VC,VN,YU,ZA,ZM,ZW

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Fターム(参考) 5K011 AA10 DA17 DA19 FA04 JA01 JA02 KA12
5K023 AA07 BB11 DB18 EE03 EE17 FF06
5K027 AA11 BB02 HH03 HH20

FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Amber Johnson
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	16285591
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Amber Johnson
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	11-JUL-2013
Filing Date:	14-JUL-2009
Time Stamp:	11:39:06
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	10149
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

EXHIBIT 1002
Fitbit v. Immersion

1	Miscellaneous Incoming Letter	Transmittal.pdf	39147	no	1
Warnings:					
Information:					
2	Transmittal Letter	Certification.pdf	207614	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	IDS.pdf	64149	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Foreign Reference	JP2007531113.pdf	3522869	no	51
Warnings:					
Information:					
5	Foreign Reference	JP2007531158.pdf	1359555	no	21
Warnings:					
Information:					
6	Foreign Reference	JP2007535273.pdf	1267906	no	22
Warnings:					
Information:					
7	Non Patent Literature	JPOA05282013.pdf	208605	no	4
Warnings:					
Information:					
8	Non Patent Literature	OA06032013.pdf	904470	no	23
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	30189	no	2

FITBIT 1002
Fitbit v. Immersion

Warnings:	
Information:	
Total Files Size (in bytes):	7616704

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	Conf. No.: 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2688
Serial No. 12/502,702	)	
	)	Examiner: **Wong, Kin C.**
Filed: July 14, 2009	)	
	)	

For: Systems and Methods for Transmitting Haptic Messages

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Supplemental Information Disclosure Statement Letter;
2. Form PTO/SB/08a listing Seven (7) Documents;
3. Three (3) Foreign Patent Documents;
4. Two (2) Non Patent Literature Documents; and
5. EFS-Web Payment in the amount of $180 (IDS Fee).

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 20-1430

Respectfully submitted,

Date: 7/10/2013

Michael T. Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing
I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web on July 11, 2013.

Amber C Johnson

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	)	
	)	Conf. No.: 6699
Serial No. 12/502,702	)	
	)	Art Unit: 2688
Filed: July 14, 2009	)	
	)	Examiner: Wong, Kin C.
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	)	
Attorney Ref. IMM351 (51851-378586)	)	

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☒ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:
JP 2007-531158 has an English Language Abstract.
JP 2007-531113 has an English Language Abstract.
JP 2007-535273 has an English Language Abstract.

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

FITBIT 1002
Fitbit v. Immersion

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(c) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☒ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

FITBIT 1002
Fitbit v. Immersion

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☒ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 20-1430.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 20-1430 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 7/10/2013

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):

- ☒ PTO/SB/08
- ☒ Documents
- ☒ Fee
- ☐ Other

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	David Birnbaum
Application No.	:	12/502,702
For	:	**SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**
Filed	:	July 14, 2009
Examiner	:	Kin C. Wong
Art Unit	:	2627
Confirmation No.	:	6699

Mail Stop **Amendment**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT AND RESPONSE TO NON-FINAL OFFICE ACTION

Sir:

The following Amendment and Remarks are submitted in response to the Office Action mailed May 6, 2013.

Listing of the Claims begins on page 2 of this paper.

Remarks begin on page 8 of this paper.

FITBIT 1002
Fitbit v. Immersion

LISTING OF THE CLAIMS

1. (Previously Presented) A method comprising:

receiving at least one sensor signal from at least one sensor of a mobile device, the at least one sensor signal associated with a movement of the mobile device;

determining a message to be displayed in a user interface based at least in part on the at least one sensor signal;

determining a haptic effect based in part on the first sensor signal; and

causing the message to be displayed and the haptic effect to be output.

2. (Original) The method of claim 1, wherein the at least one sensor comprises one or more of: an accelerometer, a gyroscope, a touch-sensitive input device, a camera, or a GPS sensor.

3. (Original) The method of claim 1, wherein the at least one sensor comprises a plurality of sensors.

4. (Original) The method of claim 3, wherein a first sensor of the plurality of sensors comprises an accelerometer and a second sensor of the plurality of sensors comprises a touch-screen.

5. (Original) The method of claim 1, wherein the message comprises predefined characteristics.

FITBIT 1002
Fitbit v. Immersion

6. (Original) The method of claim 5, wherein the predefined characteristics comprise: a shape and a haptic effect.

7. (Original) The method of claim 1, wherein:

the movement of the mobile device comprises a movement approximating the shape of a heart; and

the message is in the form of a heart.

8. (Original) The method of claim 1, wherein:

the movement of the mobile device comprises a movement approximating a hammering motion; and

the message is in the form of a nail.

9. (Original) The method of claim 1, further comprising detecting a user interaction associated with the message.

10. (Original) The method of claim 9, wherein the interaction comprises an input on a touch-sensitive input device of the mobile device.

11. (Original) The method of claim 9, wherein the interaction comprises tilting the mobile device.

12. (Original) The method of claim 9, wherein the interaction comprises an input detected by a microphone of the mobile device.

FITBIT 1002
Fitbit v. Immersion

13. (Original) The method of claim 12, wherein the interaction comprises blowing on the microphone.

14. (Original) The method of claim 9, further comprising transmitting a signal associated with the message to a recipient.

15. (Previously Presented) A method comprising:

receiving a first sensor signal from a first sensor, the first sensor signal associated with a movement of a first mobile device;

receiving a second sensor signal from a touch-sensitive interface of the first mobile device, the second sensor signal associated with a user interaction;

determining a change in a display of the first mobile device based at least in part on the second sensor signal;

transmitting a first data signal to a second mobile device, the first data signal comprising data associated with the user interaction and the movement of the first mobile device; and

determining a haptic effect based at least in part on the first data signal and outputting the haptic effect.

16. (Original) The method of claim 15, wherein the touch-sensitive interface comprises a touch-screen display.

FITBIT 1002
Fitbit v. Immersion

17. (Original) The method of claim 15, wherein the determining a change in the display of the first mobile device and the transmitting a data signal to a second mobile device occur substantially simultaneously.

18. (Original) The method of claim 15, wherein the change in the display of the first mobile device comprises displaying a trail substantially following the location of a point of contact between the user and the device.

19. (Original) The method of claim 15, wherein the movement of the first mobile device comprises a movement substantially approximating a pouring gesture.

20. (Original) The method of claim 19, wherein the change in the display comprises displaying a champagne bottle.

21. (Original) The method of claim 15, further comprising:

receiving a second data signal from the second mobile device;

determining a second change in the display of the first mobile device based at least in part on the second data signal.

22. (Original) The method of claim 21, wherein the second data signal comprises data corresponding to a display of the second mobile device.

FITBIT 1002
Fitbit v. Immersion

23. (Original) The method of claim 21, wherein the change in the display of the first mobile device comprises outputting an image substantially the same as the display of the second mobile device.

24 (Original) The method of claim 21, further comprising:

determining a haptic effect based at least in part on the second data signal; and

transmitting a haptic signal associated with the haptic effect to an actuator configured to output the haptic effect.

25. (Original) The method of claim 24, wherein the haptic effect comprises a haptic effect approximating a champagne cork popping.

26. (Original) The method of claim 24, wherein the haptic effect comprises a haptic effect approximating a collision between a user of the first mobile device and a user of the second mobile device.

27. (Previously Presented) A system comprising:

a processor configured to:

receive a first sensor signal from a first sensor, the first sensor configured to detect a movement of a first mobile device;

receive a second sensor signal from a second sensor, the second sensor configured to detect an interaction with the first mobile device;

receive a first data signal from a network interface, the network interface configured to receive signals transmitted by a second mobile device;

FITBIT 1002
Fitbit v. Immersion

determine a change in a display signal based at least in part on the first data signal and the second sensor signal;

determine a haptic effect based at least in part on the first data signal; and

outputting the haptic effect.

28. (Original) The system of claim 27, wherein the first sensor and the second sensor are each configured to detect one or more of: contact, pressure, acceleration, inclination, inertia, or location.

29. (Original) The system of claim 27, wherein the second sensor comprises a touch-screen.

30. (Original) The system of claim 27, wherein the mobile device further comprises a speaker configured to generate a sound effect coordinated with the haptic effect.

31. (Original) The system of claim 27, wherein the processor is further configured to transmit a second data signal to the network interface, and the network interface is further configured to transmit the second data signal to the second mobile device.

FITBIT 1002
Fitbit v. Immersion

REMARKS

I. General

This paper is filed in response to the Final Office Action mailed on May 6, 2013. The Office Action rejects all pending claims, specifically, the Office Action provisionally rejects claims 1-31 for non-statutory obviousness type double patenting. Further, the Office Action rejects claims 1-9, 11-15, and 17-31 as allegedly anticipated under 35 U.S.C. § 102(b) by U.S. 6,573,883 to Bartlett ("Bartlett"). The Office Action rejects claims 1-31 as anticipated under 35 U.S.C. § 102(e) by U.S. 8,306,576 to Cho ("Cho"). Finally, the Office Action further rejects claims 10, 16, and 29 as allegedly obvious under 35 U.S.C. § 103 in view of Bartlett and Cho.

In light of the remarks herein, Applicants respectfully request reconsideration and allowance of all pending claims.

II. Non-Statutory Double Patenting Rejections – Claims 1-31

The Office Action provisionally rejects claims 1-31 over Application Nos. 12/502,755 and 12/502,647 for non-statutory obviousness type double patenting. The Office Action further indicates that these are "provisional obviousness-type double patenting rejections because the conflicting claims have not in fact been patented." Office Action, p. 3 (emphasis in original).

Applicants respectfully note that this rejection is improper for not making clear: "(A) *The differences between the inventions defined by the conflicting claims* - a claim in the patent compared to a claim in the application; and (B) *The reasons why a person of ordinary skill in the art would conclude that the invention defined in the claim at issue . . .* would have been an obvious variation of the invention defined in a claim in the patent." MPEP § 804 (emphasis added). "The analysis employed in an obviousness-type double patenting determination parallels the guidelines for a 35 U.S.C. 103(a) rejection, the factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are employed when making an obvious-type double patenting analysis."

FITBIT 1002
Fitbit v. Immersion

MPEP § 804.

The Office Action must establish a *prima facie* case that two claims are in fact not patentably distinct. This requires, at a minimum, comparing each limitation of the rejected claim to a limitation recited by another claim. The Office Action simply does not do so here. The Office Action's entire statement with regard to these applications is:

> Claims (1-31) are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims (1-23) of copending Application No. 12/502647 (submitted by applicant in IDS). Although the conflicting claims are not identical, they are not patentably distinct from each other because of variation of wordings (i.e., claims (1, 2, 5 and 10) vs. claims (1-4) of copending 12/502647).[1]

The Examiner has not analyzed any claim limitation recited by the present application in comparison to any limitation recited by the claims of 12/502,755 or 12/502,647. Rather, the Examiner has simply stated that the claims are not patentably distinct. This does not establish a *prima facie* case that the claims are not patentably distinct, and is therefore improper.

Thus, Applicants respectfully request withdrawal of the provisional double patenting rejections. Applicants respectfully request that any further double patenting rejection, provisional or otherwise, comply with the requirements of MPEP § 804, discussed above.

Furthermore, without conceding the accuracy of the rejection, Applicants will consider filing a Terminal Disclaimer once claims 1-31 are otherwise in condition for allowance.

III. 35 U.S.C. § 102 – Claims 1-9, 11-15, and 17-31

The Office Action rejects claims 1-9, 11-15, and 17-31 as allegedly anticipated under 35 U.S.C. § 102 by Bartlett. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." MPEP § 2131, quoting *Verdegaal Bros. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987). Applicants respectfully assert that the Office Action has failed to establish that Bartlett discloses each and every limitation of claims 1-9, 11-15, and 17-

[1] Office Action, p. 3.

FITBIT 1002
Fitbit v. Immersion

31.

Applicants note that, as previously argued, Bartlett does not disclose or suggest a processor configured to "determine a haptic effect based at least in part on the first data signal and outputting the haptic effect." In the response to Arguments section, the Office Action states that "regarding to Bartlett: applicant asserted that Bartlett fails to disclose the touch sensing; and thus, further asserted that Bartlett fails to have the haptic effect. Applicant is directed to figure 5 of Bartlett and the associated descriptions for details." Office Action, p. 8.

Applicants respectfully note that Bartlett figure 5 does not disclose "determine a haptic effect based at least in part on the first data signal and outputting the haptic effect." Rather, Figure 5 discloses receiving gesture and position commands from a user. *See e.g.* Bartlett Col. 6:19-26. This may disclose taking in data from a user based on the user's movements or movements of the mobile device. But this does not disclose or suggest determining a haptic effect, and then outputting that haptic effect to the user.

Furthermore, Applicants respectfully note that in the rejection of this limitation the Office Action cites Bartlett col. 6:27-36. Applicants respectfully note that this passage of Bartlett discloses:

> The display device 700 is used to observe images that are stored in a database. Scrolling position commands are used to scroll from image to image displayed on a display screen 710 until an image of interest is found. A gesture command then activates the displayed image for more detailed viewing. Additional gesture commands serve to "zoom" in to observe the selected image in greater detail or to zoom out to observe a greater portion of the image or the entire image. Position commands, again, serve to scroll the image across the display screen 710.[2]

Applicants respectfully note that this does not disclose or suggest a haptic effect. Rather, it discloses a visual effect (e.g., images) and scrolling to view this visual effect.

Furthermore, Applicants respectfully note with regard to "outputting the haptic effect" the Office Action merely states "(as illustrated in figures 5 and 6 of Bartlett and see associated descriptions for details)." Office Action, p. 4. Applicants respectfully note that neither Figures 5 nor 6 disclose outputting a haptic effect. Rather, these Figures are related to detecting gestural commands (e.g., the user moving the device), but in no way

[2] Bartlett col. 6:27-36.

FITBIT 1002
Fitbit v. Immersion

relate to outputting a haptic effect.

Finally, Applicants respectfully note that the rejection of claims 1-9, 11-15 and 17-26 is improper. With regard to these claims, the Office Action states only that "[r]egarding claims 1-9, 11-15 and 17-26: method claims (1-9, 11-15 and 17-26) are considered met when the apparatus of Bartlett is been implemented." Office Action, p. 5. Applicants respectfully note that this is an improper omnibus rejection under MPEP § 707.07(d). Applicants respectfully request that any future rejection be fully and clearly stated in order to give Applicants the opportunity to fully respond to the rejection.

Accordingly, Applicants respectfully request withdrawal of the 35 U.S.C. § 102 rejection of claim 27. Applicants further request withdrawal of the 35 U.S.C. § 102 rejections of claims 28-31, which depend from and further limit claim 27, and are thus allowable for at least the same reasons as claim 27.

Applicants respectfully request withdrawal of the 35 U.S.C. § 102 rejection of claim 1, which recites similar limitations to those discussed above with regard to claim 27. Accordingly, Applicants respectfully assert claim 1 is allowable for at least the same reasons as claim 27. Applicants further request withdrawal of the 35 U.S.C. § 102 rejections of claims 2-9 and 11-14, which depend from and further limit claim 1, and are thus allowable for at least the same reasons as claim 1.

Applicants respectfully request withdrawal of the 35 U.S.C. § 102 rejection of claim 15, which recites similar limitations to those discussed above with regard to claim 27. Accordingly, Applicants respectfully assert claim 15 is allowable for at least the same reasons as claim 27. Applicants further request withdrawal of the 35 U.S.C. § 102 rejections of claims 17-26, which depend from and further limit claim 15, and are thus allowable for at least the same reasons as claim 15.

IV. 35 U.S.C. § 102 – Claims 1-31

The Office Action rejects claims 1-31 as allegedly anticipated under 35 U.S.C. § 102 by Cho. Applicants respectfully assert that Cho is not prior art, and therefore respectfully request withdrawal of all rejections based on Cho.

Applicants respectfully note that Cho has a U.S. filing date of May 27, 2009. Applicants respectfully note that this Application claims priority to six provisional patent

FITBIT 1002
Fitbit v. Immersion

applications,[3] ***all of which were filed before the May 27, 2009 filing date of Cho.***

Applicants further note that Cho claims priority to two Foreign Filed Applications, which were filed in Korea on June 27, 2008 and August 21, 2008. However, Applicants respectfully note that Cho cannot claim priority to these two Korean Applications for prior art purposes. The Examiner relies on Cho under 35 U.S.C. § 102(e), however this section requires in relevant part:

> (e) the invention was described in . . . (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the ***treaty defined in section 351(a)*** shall have the effects for the purposes of this subsection of an application filed in the United States ***only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.***[4]

Applicants respectfully note that neither of these two Applications is filed under the treaty defined in section 351(a), i.e., neither is a PCT Application.[5] And further, Applicants respectfully note that neither of these two Korean Applications was published in the English language under Article 21(2) prior to the U.S. filing date of Cho.[6]

Accordingly, Applicants respectfully assert that Cho is not prior art to the present Application, and respectfully request withdrawal of this rejection.

V. 35 U.S.C. § 103 – Claims 10, 16, and 29

The Office Action rejects claims 10, 16, and 29 as allegedly obvious in view of Bartlett and Cho. As discussed above, Cho is not prior art to this Application.

---

[3] U.S. Provisional Patent Application No. 61/080,978, entitled "Systems and Methods for Physics-Based Tactile Messaging" filed July 15, 2008; U.S. Provisional Patent Application No. 61/080,981, entitled "Systems and Methods for Mapping Message Contents to Virtual Physical Properties for Vibrotactile Messaging" filed July 15, 2008; U.S. Provisional Patent Application No. 61/080,985, entitled "Systems and Methods for Shifting Sensor Haptic Feedback Function Between Passive and Active Modes" filed July 15, 2008; U.S. Provisional Patent Application No. 61/080,987, entitled "Systems and Methods for Gesture Indication of Message Recipients" filed July 15, 2008; U.S. Provisional Patent Application No. 61/148,312, entitled "Systems and Methods for Pseudo-Telepresence in a Shared Space" filed January 29, 2009; and U.S. Provisional Patent Application No. 61/181,280, entitled "Systems and methods for Transmitting Haptic Messages" filed May 26, 2009.

[4] 35 U.S.C. §102(e) (emphasis added).

[5] 35 U.S.C. 351(a) ("The term "treaty" means the Patent Cooperation Treaty done at Washington, on June 19, 1970.")

[6] http://www.kipo.go.kr/kpo/user.tdf?a=user.english.html.HtmlApp&c=3010&catmenu=ek03_02_01#a1 Indicating that Korean Applications publish 18 months after the first priority date.

FITBIT 1002
Fitbit v. Immersion

Accordingly, Applicants respectfully request withdrawal of this rejection.

CONCLUSION

Applicants respectfully assert that in view of the amendments and remarks above, all pending claims are allowable and Applicants respectfully request the allowance of all claims.

Should the Examiner have any comments, questions, or suggestions of a nature necessary to expedite the prosecution of the application, or to place the case in condition for allowance, the Examiner is courteously requested to telephone the undersigned at the number listed below.

Respectfully submitted,

Date: 8/5/2013

Michael Morlock
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FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	16495619
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
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Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	05-AUG-2013
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Time Stamp:	09:16:47
Application Type:	Utility under 35 USC 111(a)

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	Transmittal378586.pdf	48794	no	2
Warnings:					
Information:					

FITBIT 1002
Fitbit v. Immersion

2	Amendment Copy Claims/Response to Suggested Claims	Response378586.pdf	522098 11178e619fe851a7ae4e2a18c336d49de06e2b1a	no	13

Warnings:	
Information:	
Total Files Size (in bytes):	570882

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	)	
	)	Conf No.: 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2688
Serial No. 12/502,702	)	
	)	Examiner: **Wong, Kin C.**
Filed: July 14, 2009	)	
	)	

For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Commissioner:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Transmittal; and
2. Amendment and Response to Non-Final Office Action.

Shown below are the fees for the presentation of the amended claims:

	Claims Remaining	Highest # Previously Paid For	Extra	Rate	Fee
TOTAL	31	31	0	$ 80	$ 0
Ind. Cls.	3	3	0	$420	$ 0
Multiple Dependent Claim Added.....				NO	
				TOTAL	$ 0

The Commissioner is hereby authorized to charge any additional fees required by this action, or credit any overpayment, to Deposit Account Number 20-1430.

Respectfully submitted.

Date: 8/5/2013

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Certificate of Electronic Filing
I hereby certify that this correspondence is being electronically filed with the United States Patent Office via EFS-Web on August 5, 2013.

Laura J. Smith

PTO/SB/06 (09-11)
Approved for use through 1/31/2013. OMB 0651-0032
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE
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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875	Application or Docket Number 12/502,702	Filing Date 07/14/2009	☐ To be Mailed

ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

	(Column 1)	(Column 2)		
FOR	NUMBER FILED	NUMBER EXTRA	RATE ($)	FEE ($)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	x $ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	x $ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

		(Column 1)		(Column 2)	(Column 3)		
AMENDMENT	08/05/2013	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	* 31	Minus	** 31	= 0	x $80 =	0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0	x $420 =	0
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADDL FEE	0

		(Column 1)		(Column 2)	(Column 3)		
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE ($)	ADDITIONAL FEE ($)
	Total (37 CFR 1.16(i))	*	Minus	**	=	x $ =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x $ =	
	☐ Application Size Fee (37 CFR 1.16(s))						
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))						
						TOTAL ADDL FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/VIKKI GRAY/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2688
Examiner Name	Wong, Kin C
Attorney Docket Number	IMM351 (51851/378536)

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number: Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1.	US-2006/0279476	12-14-2006	Obata	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	2	WO 2005/112287 A1	11-24-2005	Sony Ericsson Mobile Communications AB		X
						X
						X

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[7]
	3.	Japanese Patent Office, Notice for Reasons of Rejection, Japanese Patent Application No. 2011-510649, dated May 28, 2013.	

Examiner Signature		Date Considered	

FITBIT 1002
Fitbit v. Immersion

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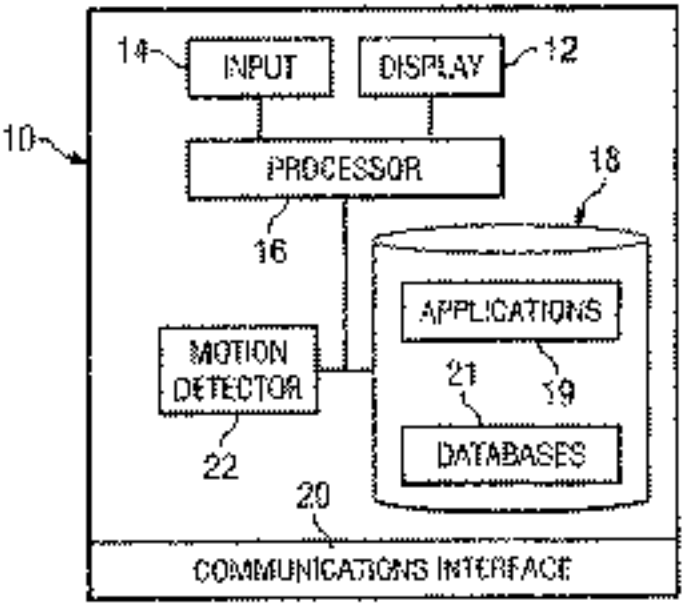
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(Continued on next page)

(54) Title: DISTINGUISHING TAP AND TRANSLATION MOTION COMPONENTS IN HANDHELD DEVICES



(57) Abstract: A mobile handheld device includes a first accelerometer operable to detect acceleration along a first axis and a second accelerometer operable to detect acceleration along a second axis. The second axis is perpendicular to the first axis. The device includes a tilt detector component operable to detect motion having a component normal to at least one of the first axis and the second axis and a display operable to present a current image. The device includes a motion tracking module operable to track motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detector component. The device also includes a controller operable to generate the current image and to modify the current image in response to the motion of the device.

WO 2005/103863 A2

FITBIT 1002
Fitbit v. Immersion

PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

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Declarations under Rule 4.17:

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii)) for all designations*

— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii)) for all designations*

Published:

— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

FITBIT 1002
Fitbit v. Immersion

DISTINGUISHING TILT AND TRANSLATION MOTION COMPONENTS IN HANDHELD DEVICES

TECHNICAL FIELD

The present invention relates generally to portable devices and, more particularly, to portable devices with a motion interface.

BACKGROUND

The use of computing devices, such as cellular phones and personal digital assistants (PDAs) has grown rapidly. Such devices provide many different functions to users through different types of interfaces, such as keypads and displays. Some computing devices utilize motion as an interface by detecting tilt of the device by a user. Some implementations of a motion interface involve tethering a computing device with fishing lines or carrying large magnetic tracking units that require large amounts of power.

SUMMARY

In accordance with the present invention, a handheld device with motion a motion interface is provided.

In accordance with a particular embodiment, a motion controlled handheld device includes a first accelerometer operable to detect acceleration along a first axis and a second accelerometer operable to detect acceleration along a second axis. The second axis is perpendicular to the first axis. The device includes a tilt detection component operable to detect rotation having a component around at least one of the first axis and the second axis and a display operable to present a current image. The device includes a motion tracking module operable to track motion of the device in

FITBIT 1002
Fitbit v. Immersion

three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component. The device also includes a controller operable to generate the current image and to modify the current image in response to the motion of the device.

The display may comprise a viewable surface, and the first axis and the second axis may be substantially parallel to the viewable surface. The tilt detection component may comprise a third accelerometer operable to detect acceleration along a third axis, where the third axis is perpendicular to the first axis and perpendicular to the second axis. The motion tracking module may be further operable to distinguish translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer. The tilt detection component may comprise a third accelerometer operable to detect acceleration along a third axis, where the third axis is perpendicular to the first axis and perpendicular to the second axis. The tilt detection component may also comprise a camera operable to generate a video stream and a video analysis module operable to detect a direction of motion based on the video stream.

In accordance with another embodiment, a method for controlling a handheld device comprises detecting acceleration along a first axis using a first accelerometer and detecting acceleration along a second axis using a second accelerometer. The second axis is perpendicular to the first axis. The method also includes detecting rotation having a component around at least one of the first axis and the second axis using a tilt detection component and tracking motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component. The method includes displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

Technical advantages of particular embodiments of the present invention include a handheld device with motion detection components capable of distinguishing between tilt and translation of the device and a plane of translation. Accordingly, the device can recognize a larger number of motions to serve as input thus increasing the device's functionality. In some embodiments, a number of

FITBIT 1002
Fitbit v. Immersion

different types of motion detection components may be combined and utilized thus allowing a manufacturer to design the device using the most suitable components depending on the functionalities desired for the device.

Other technical advantages will be readily apparent to one skilled in the art from the following figures, descriptions and claims. Moreover, while specific advantages have been enumerated above, various embodiments may include all, some or none of the enumerated advantages.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of particular embodiments of the invention and their advantages, reference is now made to the following descriptions, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 illustrates a handheld device with motion interface capability, in accordance with a particular embodiment;

FIGURE 2 illustrates a motion detector of the handheld device of FIGURE 1, in accordance with a particular embodiment;

FIGURE 3 illustrates the use of motion detector components of the handheld device of FIGURE 1, in accordance with a particular embodiment;

FIGURE 4 illustrates an example handheld device with motion detection capability, in accordance with a particular embodiment;

FIGURE 5 illustrates an example of selection and amplification of a dominant motion of a handheld device, in accordance with a particular embodiment;

FIGURE 6 is a flowchart illustrating preferred motion selection, in accordance with a particular embodiment;

FIGURE 7 is a flowchart illustrating the setting of a zero-point for a handheld device, in accordance with a particular embodiment;

FIGURE 8 illustrates an example of scrubbing functionality with a handheld device for virtual desktop navigation, in accordance with a particular embodiment;

FIGURE 9 is a flowchart illustrating the scrubbing process of FIGURE 8, in accordance with a particular embodiment;

FIGURE 10A illustrates an example of menu navigation using gesture input, in accordance with a particular embodiment;

FITBIT 1002
Fitbit v. Immersion

FIGURE 10B illustrates example gestures which may be used to perform various functions at a handheld device, in accordance with a particular embodiment;

FIGURE 11 illustrates an example of map navigation using motion input, in accordance with a particular embodiment;

FIGURE 12A illustrates a form of motion input cursor navigation, in accordance with a particular embodiment;

FIGURE 12B illustrates another form of motion input cursor navigation, in accordance with a particular embodiment;

FIGURE 13 is a flowchart illustrating a process for utilizing feedback in response to motion input, in accordance with a particular embodiment;

FIGURE 14 illustrates an example system utilizing spatial signatures with a handheld device, in accordance with a particular embodiment;

FIGURE 15 illustrates an example system in which motion input of a handheld device controls multiple other devices, in accordance with a particular embodiment;

FIGURE 16 is a flowchart illustrating an environmental modeling process of a handheld device, in accordance with a particular embodiment;

FIGURE 17 illustrates example gestures which may be mapped to different functions of a handheld device, in accordance with a particular embodiment;

FIGURE 18 is a flowchart illustrating the utilization of a preexisting symbol gesture, in accordance with a particular embodiment;

FIGURE 19 is a flowchart illustrating the use of context-based gesture mapping, in accordance with a particular embodiment;

FIGURE 20 is a flowchart illustrating the use of user-based gesture mapping, in accordance with a particular embodiment;

FIGURE 21 is a flowchart illustrating the assignment process for user-created gestures, in accordance with a particular embodiment;

FIGURE 22 illustrates these gestures input using a handheld device with varying levels of precision, in accordance with a particular embodiment; and

FIGURE 23 is a flowchart illustrating a gesture recognition process utilizing a number of features, in accordance with a particular embodiment.

FITBIT 1002
Fitbit v. Immersion

DETAILED DESCRIPTION

FIGURE 1 illustrates a handheld device 10 with motion interface capability, in accordance with a particular embodiment of the present invention. Handheld device 10 can recognize movement of the device and can perform various functions corresponding to such movement. Thus, movement of the device operates as a form of input for the device. Such movement input may directly alter what is being displayed on a device display or may perform other functions. Handheld device 10 may comprise a mobile phone, personal digital assistant (PDA), still camera, video camera, pocket calculator, portable radio or other music or video player, digital thermometer, game device, portable electronic device, watch or any other device capable of being held or worn by a user. As indicated in the examples listed above, handheld device 10 may include wearable portable devices such as watches as well. A watch may include any computing device worn around a user's wrist.

Handheld device 10 includes a display 12, input 14, processor 16, memory 18, communications interface 20 and motion detector 22. Display 12 presents visual output of the device and may comprise a liquid crystal display (LCD), a light emitting diode (LED) or any other type of display for communicating output to a user. Input 14 provides an interface for a user to communicate input to the device. Input 14 may comprise a keyboard, keypad, track wheel, knob, touchpad, stencil or any other component through which a user may communicate an input to device 10. In particular embodiments, display 12 and input 14 may be combined into the same component, such as a touchscreen.

Processor 16 may be a microprocessor, controller or any other suitable computing device or resource. Processor 16 is adapted to execute various types of computer instructions in various computer languages for implementing functions available within system handheld device 10. Processor 16 may include any suitable controllers for controlling the management and operation of handheld device 10.

Memory 18 may be any form of volatile or nonvolatile memory including, without limitation, magnetic media, optical media, random access memory (RAM), read only memory (ROM), removable media or any other suitable local or remote memory component. Memory 18 includes components, logic modules or software executable by processor 16. Memory 18 may include various applications 19 with

FITBIT 1002
Fitbit v. Immersion

user interfaces utilizing motion input, such as mapping, calendar and file management applications, as further discussed below. Memory 18 may also include various databases, such as gesture databases and function or gesture mapping databases, as further discussed below. Components of memory 18 may be combined and/or divided for processing according to particular needs or desires within the scope of the present invention. Communications interface 20 supports wireless or wireline communication of data and information with other devices, such as other handheld devices, or components.

Motion detector 22 tracks movement of handheld device 10 which may be used as a form of input to perform certain functions. Such input movement may result from a user moving the device in a desired fashion to perform desired tasks, as further discussed below.

It should be understood that handheld device 10 in accordance with particular embodiments may include any suitable processing and/or memory modules for performing the functions as described herein, such as a control module, a motion tracking module, a video analysis module, a motion response module, a display control module and a signature detection module.

In particular embodiments, input movement may be in the form of translation and/or gestures. Translation-based input focuses on a beginning point and endpoint of a motion and differences between such beginning points and endpoints. Gesture-based input focuses on an actual path traveled by the device and is a holistic view of a set of points traversed. As an example, when navigating a map using translation-based input, motion in the form of an "O" may change the display during the movement but may ultimately yield no change between the information displayed prior to the movement and the information displayed at the end of the movement since the device presumably will be in the same point as it started when the motion ends. However, in a gesture input mode the device will recognize that it has traveled in the form of an "O" because in gesture-based input the device focuses on the path traveled during the motion or movement between a beginning point and an endpoint of the gesture (e.g., even though the beginning and endpoints may be the same). This gesture "O" movement may be mapped to particular functions such that when the device recognizes it has traveled along a path to constitute an "O" gesture, it may

FITBIT 1002
Fitbit v. Immersion

perform the functions, as further elaborated upon below. In particular embodiments, movement of the device intended as a gesture may be recognized as by the device as a gesture by matching a series, sequence or pattern of accelerations of the movement to those defining gestures of a gesture database.

Handheld devices in accordance with other embodiments may not include some of the components of the device illustrated in FIGURE 1. For example, some embodiments may include a handheld device 10 without an input 14 separate from a motion detector such that motion of the device provides the sole or primary input for the device. It should be noted that handheld devices in accordance with other embodiments may include additional components not specifically illustrated with respect to device 10.

FIGURE 2 illustrates motion detector 22 of FIGURE 1, in accordance with a particular embodiment of the present invention. In this embodiment, motion detector 22 includes accelerometers 24a, 24b and 24c; cameras 26a, 26b and 26c; gyros 28a, 28b and 28c; rangefinders 30a, 30b and 30c; and a processor 32.

Accelerometers 24a, 24b and 24c detect movement of the device by detecting acceleration along a respective sensing axis. A particular movement of the device may comprise a series, sequence or pattern of accelerations detected by the accelerometers. When the handheld device is tilted along a sensing axis of a particular accelerometer, the gravitational acceleration along the sensing axis changes. This change in gravitational acceleration is detected by the accelerometer and reflects the tilt of the device. Similarly, translation of the handheld device, or movement of the device without rotation or tilt also produces a change in acceleration along a sensing axis which is also detected by the accelerometers.

In the illustrated embodiment, accelerometer 24a comprises an x-axis accelerometer that detects movement of the device along an x-axis, accelerometer 24b comprises a y-axis accelerometer that detects movement of the device along a y-axis and accelerometer 24c comprises a z-axis accelerometer that detects movement of the device along a z-axis. In combination, accelerometers 24a, 24b and 24c are able to detect rotation and translation of device 10. As indicated above, rotation and/or translation of device 10 may serve as an input from a user to operate the device.

FITBIT 1002
Fitbit v. Immersion

The use of three accelerometers for motion detection provides certain advantages. For example, if only two accelerometers were used, the motion detector may not be able to disambiguate translation of the handheld device from tilt in the plane of translation. However, using a third, z-axis accelerometer (an accelerometer with a sensing axis at least approximately perpendicular to the sensing axes of the other two accelerometers) enables many cases of tilt to be disambiguated from many cases of translation.

It should be understood that some unique movements may exist that may not be discernible from each other by accelerometers 24a, 24b and 24c. For example, movement comprising a certain rotation and a certain translation may appear to accelerometers 24a, 24b and 24c as the same movement as a different movement that comprises a different particular rotation and a different particular translation. If a motion detector 22 merely included three accelerometers to detect movement (without any additional components to ensure greater accuracy), some unique, indiscernible movements may be mapped to the same function or may not be mapped to a function to avoid confusion.

As indicated above, motion detector 22 also includes cameras 26a, 26b and 26c, which may comprise charge coupled device (CCD) cameras or other optical sensors. Cameras 26a, 26b and 26c provide another way to detect movement of the handheld device (both tilt and translation). If only one camera were installed on a device for movement detection, tilt of the device may be indistinguishable from translation (without using other motion detection components, such as accelerometers). However, by using at least two cameras, tilt and translation may be distinguished from each other. For example, if two cameras were installed on handheld device 10 (one on the top of the device and one on the bottom of the device), each camera would see the world moving to the right when the device was translated to the left. If the device is lying horizontally and is rotated by lifting its left edge while lowering its right edge, the camera on the bottom will perceive the world as moving to the right while the camera on the top will perceive the world as moving to the left. Thus, when a device is translated, cameras on opposite surfaces will see the world move in the same direction (left in the example given). When a device is rotated, cameras on opposite surfaces will see the world move in opposite directions.

FITBIT 1002
Fitbit v. Immersion

This deductive process can be reversed. If both cameras see the world moving in the same direction, then the motion detector knows that the device is being translated. If both cameras see the world moving in opposite directions, then the motion detector knows that the device is being rotated.

When the device is rotated, the magnitude of the movement of the world to the cameras is directly related to the magnitude of the rotation of the device. Thus, the amount of the rotation can accurately be determined based on such movement of the world to the cameras. However, when the device is translated, the magnitude of the translation is related to both the magnitude of the movement of the world to the cameras and to the distance to the objects in the field of view of the cameras. Therefore, to accurately determine amount of translation using cameras alone, some form of information concerning the distance to objects in the camera fields of view must be obtained. However, in some embodiments cameras with rangefinding capability may be used.

It should be understood that even without distance information, optical information can be of significant value when correlated against the information from accelerometers or other sensors. For example, optical camera input may be used to inform the device that no significant motion is taking place. This could provide a solution to problems of drift which may be inherent in using acceleration data to determine absolute position information for certain device functions.

As discussed above, distance information may be useful to determine amount of translation when cameras are being used to detect movement. In the illustrated embodiment, such distance information is provided by rangefinders 30a, 30b and 30c. Rangefinders 30a, 30b and 30c may comprise ultrasound rangefinders, laser rangefinders or any other suitable distance measuring component. Other components may also be used to determine distance information. For example, cameras with rangefinding capability may be used, and multiple cameras may be utilized on the same side of the device to function as a range-finder using stereopsis. Determined distance information allows for accurate and explicit computation of the portion of any apparent translation that is due to translation and the portion that is due to rotation.

FITBIT 1002
Fitbit v. Immersion

As indicated above, motion detector 22 additionally includes gyros 28a, 28b and 28c. Gyros 28a, 28b and 28c are used in combination with the other components of motion detector 22 to provide increased accuracy in detecting movement of device 10.

Processor 32 processes data from accelerometers 24, cameras 26, gyros 28 and rangefinders 30 to produce an output indicative of the motion of device 10. Processor 32 may comprise a microprocessor, controller or any other suitable computing device or resource, such as a video analysis module for receiving a video stream from each camera. In some embodiments, the processing described herein with respect to processor 32 of motion detector 22 may be performed by processor 16 of handheld device 10 or any other suitable processor, including processors located remote to the device.

As discussed above, motion detector 22 includes three accelerometers, three cameras, three gyros and three rangefinders. Motion detectors in accordance with other embodiments may include fewer or different components than motion detector 22. For example, some embodiments may include a motion detector with three accelerometers and no cameras, gyros or rangefinders; two or three accelerometers and one or more gyros; two or three accelerometers and one or more cameras; or two or three accelerometers and one or more rangefinders. In addition, the location of the motion detection components on the device may vary on different embodiments. For example, some embodiments may include cameras on different surfaces of a device while other embodiments may include two cameras on the same surface (e.g., to add rangefinding functionality).

Altering the type, number and location of components of motion detector 22 may affect the ability of motion detector to detect or accurately measure various types of movement. As indicated above, the type and number of components of motion detectors may vary in different embodiments in order to fulfill particular needs. Fewer or less accurate components may be used in particular embodiments when it is desired to sacrifice accuracy to reduce manufacturing cost of a handheld device with motion detection capabilities. For example, some handheld devices may only need to detect that the device has been translated and may not need to detect exact amount of such translation to perform desired functions of the device. Such handheld devices

FITBIT 1002
Fitbit v. Immersion

may thus include a motion detector with cameras and without any sort of rangefinder or other component providing distance information. In particular embodiments, components described above, such as cameras and rangefinders, may also be used for other purposes by the device than those described above relating to motion detection functionality.

FIGURE 3 is a diagram illustrating the use of the motion detector components of handheld device 10 of FIGURE 1. Raw data from motion detection components is processed at processor 32. Such raw data includes x-axis accelerometer raw data 23a, y-axis accelerometer raw data 23b and z-axis accelerometer raw data 23c from accelerometers 24a, 24b and 24c, respectfully; camera raw data 25a, camera raw data 25b and camera raw data 25c from cameras 26a, 26b and 26c, respectfully; gyro raw data 27a, gyro raw data 27b and gyro raw data 27c from gyros 28a, 28b and 28c; and rangefinder raw data 29a, rangefinder raw data 29b and rangefinder 29c from rangefinders 30a, 30b and 30c, respectively. If the handheld device includes more, fewer or different motion detection components as may be the case in some embodiments, the raw data may correspond to the components included.

The raw data is processed at processor 32 to produce motion detector output 34 identifying movement of device 10. In the illustrated embodiment, motion detector output 34 comprises translation along x, y and z axes and rotation with respect to the x, y and z axes. The motion detector output is communicated to a processor 16 of the handheld device which identifies the operation, function or task the device should perform (i.e., device behavior 36) based on the device motion. The performance of certain operations, functions or tasks based on particular movements is further discussed below.

FIGURE 4 is an isometric illustration of an example handheld device 31 with motion detection capability, in accordance with particular embodiments. Handheld device 31 includes an x-axis accelerometer 33, a y-axis accelerometer 35 and a camera 37 oriented towards the z-axis. X-axis 38, y-axis 39 and z-axis 40 are also illustrated with respect to device 31 for reference. Handheld device 31 may detect movement, including tilt and translation in various directions, using accelerometers 33 and 35 and camera 37. Handheld device 31 may also include other components, such as components illustrated and described above with respect to handheld device 10,

FITBIT 1002
Fitbit v. Immersion

such as display 12, input 14, processor 16, memory 18 and communications interface 20. As indicated above, particular embodiments may include handheld devices having various types of motion detection components (including accelerometers, gyros, cameras, rangefinders or other suitable components) in any combination and positioned or oriented in any suitable manner upon the devices.

In particular embodiments, a user interface function may utilize input motion along one axis of motion at a time. For example, a device application may allow a user to scroll through a list displayed on the handheld device by moving the device along a particular axis (e.g., in one direction or in two opposite directions). It may be very difficult for a user to constrain the motion of the device to that particular axis as desired. In other words, some user generated device rotation or movement along another axis may be difficult to avoid. To counter this problem, the device may include preferred motion selection including the selection and amplification of a dominant motion and the minimization of movement in other directions or axes.

FIGURE 5 illustrates an example of selection and amplification of a dominant motion and minimization of movement in another direction as discussed above. In the illustrated example, actual motion 41 represents movement of a handheld device. Actual motion 41 comprises movement 42 along one axis 44 and movement 46 along another axis 48 perpendicular to axis 44. Since the amount of movement 42 is greater than the amount of movement 46, the handheld device may select movement 42 as the dominant motion. The handheld device may then amplify this dominant motion and minimize movement 46 (the other motion) such that actual motion 41 is treated by the device as represented motion 50. The amount or size of amplification of the dominant motion may vary in various embodiments according to particular factors, such as the particular application being run on the device at the time. Moreover, amplification of a dominant motion may also be based on magnitude of acceleration, speed of motion, ratio of a motion in one direction (e.g., movement 42) to motion in another direction (e.g., movement 46), size of underlying desktop being navigated or user preferences. In some embodiments, a handheld device may implement preferred motion selection only when certain motion characteristics occur. For example, in some cases the handheld device may select and amplify a dominant motion if motion in one axis is

FITBIT 1002
Fitbit v. Immersion

more than two times greater than any other motion. The other, smaller motion may then be minimized.

The selection and amplification of the dominant motion and minimization of other motion may further expand a user's ability to take advantage of motion user interfaces and may also allow the handheld device, or applications running on the device, to filter out undesired, user-induced noise. With this capability, the user may be able to, for example, move the device left to pick a list to examine, then scroll that list by moving up and down. Motion along inappropriate axes may be ignored or substantially reduced by the device.

In particular embodiments, the selection and amplification of a dominant motion and minimization of other motion may also be applied to rotational motion of the device. Dominant motion around an axis may be selected and amplified in the same manner as motion along an axis as described above with respect to translational motion. Moreover, rotation around another axis (that is not dominant rotation) may be minimized.

FIGURE 6 illustrates a preferred motion selection flowchart 60, in accordance with a particular embodiment of the present invention. In flowchart 60, raw data corresponding to movement of a handheld device is received. In the illustrated embodiment, the movement raw data includes x-acceleration data 62a, y-acceleration data 62b and z-acceleration data 62c that is processed at step 64 to yield an output indicating movement of the device. Other embodiments may include other types of movement raw data, such as optical or camera data, gyro data and/or rangefinder data. After the processing of the raw acceleration data 62, a dominant axis of motion is selected at step 66. If the selected dominant axis of motion is the x-axis, then the movement along the x-axis is augmented at step 68a. If the selected dominant axis of motion is the y-axis, then the movement along the y-axis is augmented at step 68b. If the selected dominant axis of motion is the z-axis, then the movement along the z-axis is augmented at step 68c. The amount of augmentation of movement in the dominant axis of motion may vary in different embodiments according to the application being utilized or other characteristics. In some embodiments, user preferences 69 may be utilized to determine type or amount of movement augmentation. Movement along axes other than the dominant axis of motion may be minimized as discussed above,

FITBIT 1002
Fitbit v. Immersion

such that such movement is ignored by a particular application in use. At step 70, the augmented movement is processed to yield device behavior 72. This processing step may include accessing an application being used to determine the particular device behavior to perform based on the augmented movement. Augmented movement may yield any of a number of types of device behavior according to the application in use, a particular user or otherwise.

For particular user interfaces utilizing motion input, there may be value in having the position of a virtual display, or the information displayed at display 12 of handheld device 10, linked to the position of the device. For example, in particular embodiments using translation-based input such as for navigating a map displayed at the device, the position of the handheld device may directly determine the portion of the map displayed at display 12. However, if device position information is kept in absolute terms (e.g., as with global positioning satellite (GPS) based systems) the utility for many tasks such as map or menu navigation may be impaired. Thus, it is beneficial in certain circumstances to define a "zero point," or an origin in a local context, that may be used to determine the behavior of the device. For example, if a zero point is defined when the device is at a point A, then motion between point A and a point B may be used as input. Particularly useful applications of setting a zero point may include external behaviors such as moving the virtual display or locating applications in the space around a user's body. Setting a zero point also addresses internal behaviors such as instructing the device to ignore the gravitational acceleration at the current orientation to allow the device to act only on additional, and presumably user generated, accelerations.

Handheld devices according to particular embodiments may include application user interfaces that utilize motion input only at certain times. At other times, for example, the motion of the device may not be utilized as input, and it may be useful to disengage or "turn off" motion sensitivity or the motion detection capability of the device. Disengagement of motion sensitivity may comprise, for example, deactivation of motion detector 22 of device 10 or other component, such as a motion response module of the device. Particular embodiments thus allow for the selective engagement and disengagement of the motion sensitivity of the device.

FITBIT 1002
Fitbit v. Immersion

As an example, a motion response module which modifies display 12 based on motion detected at motion detector 22, may have a mode of operation in which it awaits a trigger for switching to another mode of operation in which motion sensitivity is enabled. When motion sensitivity is not enabled, any motion of the device may be disregarded. The trigger may also set a zero-point for the device. When the zero-point is set, the motion response module may measure a baseline orientation of the device based on measurement from motion detection components. The baseline orientation may comprise the position of the device (determined from information from motion detector components) when the trigger is received. Future movement of the device will be compared against the baseline orientation to determine the functions to perform or the modifications which should be made at display 12 based on the user's motion of the device.

Particular embodiments provide for any number of user-initiated actions to act as a single trigger for zero-point selection and selective engagement/disengagement of the motion sensitivity of the device. Such actions may include, for example, the pressing of a key on input 14, moving device 10 in a particular way (e.g., movement corresponding to a particular gesture), and tapping display 12. It should be understood that any user-initiated action may set a zero-point and engage motion sensitivity of the device at the same time.

In some embodiments, a period of inactivity or minimal activity (i.e., relative stillness) may also set a zero-point and engage or disengage motion sensitivity. FIGURE 7 illustrates a flowchart 80 for the passive setting of a zero-point for a handheld device. Change in acceleration with respect to an x-axis is detected at step 82a, change in acceleration with respect to a y-axis is detected at step 82b and change in acceleration with respect to a z-axis is detected at step 82c. At steps 84a, 84b and 84c, it is determined whether any acceleration change detected is greater than a particular respective threshold. If detected acceleration change along each of the three axes is not greater than a set threshold, then the device may be considered at rest, and at step 86 a zero-point will be set. An at rest position may be determined, for example, from stabilization of the raw data or motion components of components of motion detector 22. However, if detected acceleration change along any of the three axes is greater than a set threshold, then the process returns to acceleration change

FITBIT 1002
Fitbit v. Immersion

detection at steps 82. Thus, this method of passively setting a zero-point may ensure that when the handheld device is at rest, a zero point will be set. Moreover, if a device is in constant motion but not being moved by a user at a particular time (e.g., resting in a train moving at a constant speed), a zero-point will be set since there will be no detected change in acceleration. The use of thresholds to determine whether an acceleration change is high enough so as not to trigger the setting of a zero-point enables a user to hold the device still to passively set the zero-point. Otherwise, this may be difficult since a device with highly sensitive accelerometers may detect acceleration change as a result of very minor unintended, user-initiated movement. It should be understood that similar methods may be used in connection with motion detectors with components other than accelerometers. Thresholds may also be used in such similar methods to account for small, unintended movements that may otherwise prevent setting of a zero point.

Particular embodiments of the present invention include the ability to allow a user to repeatedly selectively engage and disengage the motion sensitivity of the handheld device in order to allow greater movement through a virtual desktop (or information space) using motion input in a limited amount of physical space. This process can be analogized to "scrubbing" with a mouse controlling a cursor, or lifting the mouse off of a surface and replacing the mouse on the surface at a different location to allow greater movement of the cursor. Lifting the mouse breaks the connection between the motion of the mouse and the motion of the cursor. Similarly, a user may be able to engage and disengage the connection between the motion of a handheld device, such as device 10, and the operations, functions or actions based on movement of the device.

FIGURE 8 illustrates an example of the use of scrubbing functionality to navigate across a virtual desktop, or information space, larger than the display of a handheld device. In the illustrated example, a handheld device is used to navigate through virtual desktop 90. Virtual desktop 90 is illustrated as a grid map and may represent any suitable information through which a user may desire to navigate. Information of virtual desktop displayed at the handheld device is represented by box 92. In this embodiment, translation of the handheld device is used to navigate through virtual desktop 90. For example, a user may move the handheld device from right to

FITBIT 1002
Fitbit v. Immersion

left to navigate from right to left through information of virtual desktop 90. It should be understood that while the example illustrated describes moving the device to the right to implement the scrubbing process, it should be understood that handheld devices of particular embodiments may be moved in any suitable manner to implement the scrubbing process.

As indicated above, box 92 represents the information of virtual desktop 90 currently displayed at the device. If a user desired to view information represented at box 94, the user may move the handheld device from left to right. For purposes of this example, imagine that the user moves the device to the right, and the information of virtual desktop 90 contained in box 94 is displayed at the device. Also imagine that the user's arm is now outstretched to the user's right such that the user must walk or otherwise move further right in order to view at the display of the device information of virtual desktop 90 that is to the right of box 94. If this were the case, and the user could not, or did not desire to, walk or otherwise move further to the right so that the device would be moved farther to the right, then the user could selectively disengage the motion sensitivity of the handheld device, move the device back to the left, selectively reengage the motion sensitivity of the device and move the device back to the right to display information to the right of box 94. In this manner, the user could display information of virtual desktop 90 contained in box 96, and this process could be repeated to display information contained in box 98, which is further to the right of box 96.

The selective disengagement and reengagement of the motion sensitivity of the device in order to allow greater movement within a virtual desktop in a limited amount of physical space may be enabled in any of a variety of ways, such as by a key on an input of the device, moving the device according to a particular gesture or movement (e.g., an arc movement) or tapping the device display. Any other user-initiated action may be used to disengage and reengage motion sensitivity for this purpose. Particular embodiments may allow multiple actions to disengage and reengage motion sensitivity of the device. Moreover, a user action that disengages motion sensitivity of the device may be different from a user action that reengages motion sensitivity. This scrubbing process may be performed in any suitable application, such as map navigation, menu navigation and scrolling through a list.

FITBIT 1002
Fitbit v. Immersion

FIGURE 9 is a flowchart illustrating the steps of the scrubbing process described above with respect to FIGURE 8, in accordance with a particular embodiment. The flowchart begins at step 100, where the handheld device is moved to the right to go from displaying information of box 92 of virtual display 90 to information of box 94. As indicated above, the user may desire to display information further to the right of box 94 but may have run out of physical space to move the device further to the right. Thus, the user disengages the motion sensitivity of the device at step 102. Any suitable user action may perform such disengagement, such as the pressing of a button on the device or moving the device according to a particular gesture. At step 104, the user moves the device to the left so that the user will have more physical space through which the user may move the device to the right when motion sensitivity is reengaged

At step 106, the user reengages motion sensitivity of the device. Again, such reengagement may be performed by any suitable user action, and such user action may be different from the user action performed to disengage motion sensitivity in step 102. Since motion sensitivity has been reengaged, the user moves the device to the right at step 108 in order to change the information being displayed at the device from the information of box 94 to the information of box 96. At step 110, it is determined whether further movement of the device to the right is needed. If further movement is needed (e.g., to display the information of virtual display 90 in box 98), then the process returns to step 102 where motion sensitivity of the device is again disengaged. If no further movement is needed, then the process ends. As indicated above, this scrubbing process may be utilized in any suitable application of the device that supports motion input, and the device may be moved in any suitable manner in order to implement this functionality.

As indicated above, a particular movement of the device (e.g., a particular gesture) may be utilized in the scrubbing process to signal to the device not to change the information presented on the display during such movement. This allows the user to return the device to a position from which the user may move the device to further change the information presented on the display. For example, the device may be at a base reference position from which movement of the device changes the information displayed. A particular predetermined movement (e.g., an arc movement) may be

FITBIT 1002
Fitbit v. Immersion

used which may signal to the device not to change the information displayed based on motion until the movement is completed. Once the predetermined movement is completed, the base reference position may be reset such that future movement of the device from the base reference position further changes the information displayed. The base reference position may identify a baseline orientation of the device represented by baseline components of the motion data received by the motion detection components of the device. In particular embodiments, gestures may be received, as determined by movement from the base reference position, to perform particular commands which change the information displayed at the device.

As discussed with respect to various embodiments described above, handheld devices in accordance with particular embodiments may utilize multiples types or modes of input to operate the device. Such input modes include motion input modes, such as a translation input mode and a gesture input mode. While multiple input modes may sometimes be used in combination with each other, in some cases the handheld device may be set to recognize a certain mode type at one time. In some situations, the handheld device may be set to function based on multiple types of non-motion input and only one type of motion input (e.g., translation or gesture) at a particular time.

To facilitate this flexibility of the handheld device in recognizing multiple input modes, in particular embodiments a certain trigger may be used to switch between input modes. For example, a user may press a particular key or may move the device in a certain manner (e.g., a particular gesture) to switch input modes. In some cases where an application of the device recognizes and functions based upon multiple types of motion input, a particular key may be pressed or a particular gesture may be formed using the device to switch between a translation motion input mode and a gesture motion input mode. The trigger may also comprise the mere switch from one application to another or the switch from one displayed image to another. In some situations, the trigger may switch between a non-motion input mode and a motion input mode. Any particular user-action may be implemented to act as a trigger to switch between different input modes, such as between different motion input modes. In some embodiments, a voice command or physical action upon the device (e.g., a device or screen tap) may be utilized to switch input modes.

FITBIT 1002
Fitbit v. Immersion

In particular embodiments, a user action that reengages motion sensitivity of a device may also contain other information that might otherwise affect device behavior. For example, if a user makes one motion to reengage translation sensitivity, it may render the device more sensitive to motion than if the user makes a different motion to reengage motion sensitivity. A reengaging motion may comprise a gesture that indicates the user's identity or context, thereby engaging a variety of operational settings, such as user preferences.

As indicated above, particular embodiments include the ability to receive motion input to control various functions, tasks and operations of a handheld device and may be used to alter information displayed at the device in the process. In some cases, such motion input may be in the form of gestures, as opposed to mere translation-based input. Gesture input may be used to navigate through a multidimensional menu or grid in some applications. For example, as discussed above with respect to the scrubbing process, a display of a handheld device may be smaller than the amount of information (e.g., menu options, map information) that can be presented on the display. This may lead to a menu structure that is narrow and deep. In many cases, broad, shallow menu structures may be preferred over a narrow, deep menu structure because a user is not required to remember as much information concerning where functionalities are located.

FIGURE 10A illustrates an example of menu navigation using gesture input, in accordance with a particular embodiment. In the illustrated embodiment, a handheld device is used to navigate through virtual desktop 120. Virtual desktop 120 includes a menu tree with menu categories 122 for selection. Each menu category 122 may include respective sub-categories for selection. In some embodiments, menu categories 122 may comprise categories of functions, while sub-categories of each menu selection may include the actual functions under each such category. In other embodiments, menu categories may comprise nouns (e.g., "folder," "document," "picture"), while sub-categories comprise verbs (e.g., "move," "paste," "cut"). If the handheld device comprised a cellular phone, menu categories 122 may include "calls," "phone book," "messages," "planner," "sounds," "setup" or other items. Each menu category 122 may include functions which may be accessed once a menu category 122 is selected. While two menu levels are illustrated in FIGURE 10A, it

FITBIT 1002
Fitbit v. Immersion

should be understood that a multidimensional desktop or display of information for motion interface navigation may include any number of selections (e.g., menus) utilizing any number of levels.

In the illustrated example, menu category 122e has been selected, and sub-categories 124 of menu category 122e are displayed as available for selection. Boxes 126 and 128 represent information displayed at the handheld device for the user. As illustrated, virtual desktop 120 includes more information, or menus, which can be displayed at the device at one time. A user may move the device according to particular gestures to navigate across or through the virtual desktop. Gestures may also be used to navigate through different menu levels and to make menu selections. As an example, a user may move device 10 in the form of a clockwise circle 130 to navigate a predetermined amount to the right across virtual desktop 120 (e.g., moving from information of box 126 to information of box 128). A particular menu category 122 may be selected by an away gesture 132, or a downward gesture (e.g., to select menu category 122e), and thus display sub-categories 124 for selection. Similarly, to move to the left across virtual desktop 120, a user may move device 10 in the form of a counterclockwise circle 134. In some cases, navigation may be accomplished through four gestures: a forward gesture, a backward gesture, a left gesture and a right gesture. In some embodiments, gestures comprising motion vectors in perpendicular directions may be used for navigation.

In particular embodiments, gestures may be used that are mirror images of other used gestures to execute opposite functions from those accomplished by the other gestures. For example, a motion toward a user might zoom in while an opposite motion, a motion away from the user, may zoom out. Using mirror image or reciprocal gestures mapped to opposite functions may make a motion user interface for a device easier to learn and to use.

In some cases, the menu item at the center of the display may be highlighted for selection, while in other cases a particular gesture may indicate which menu selection of a plurality of displayed selections a user desires to select. It should be understood that the menus or other information through which a user may navigate using gestures may be presented at the handheld device in any number of ways. In some embodiments, only one level of information (i.e., one menu level) may be

FITBIT 1002
Fitbit v. Immersion

displayed at once, while sub-levels or higher levels are not displayed until they are available for selection.

FIGURE 10B illustrates example gestures which may be utilized to perform various functions, such as functions enabling a user to navigate through a virtual desktop. The illustrated example gestures include an "up" gesture 133 to navigate in an upward direction through the desktop, a "down" gesture 135 to navigate down, a "left" gesture 136 to navigate left, a "right" gesture 137 to navigate right, an "in" gesture 138 to navigate in a direction towards the user and an "out" gesture 139 to navigate away from the user. It should be understood that these are mere example gestures and commands for particular embodiments, and other embodiments may include different gestures or similar gestures mapped to different commands for navigating through a desktop or performing other functions with a handheld device.

FIGURE 11 illustrates another example of map navigation using motion input, in accordance with a particular embodiment of the present invention. FIGURE 11 includes a virtual desktop 140 representing an information grid divided into sixteen portions, each referenced by a respective letter (A, B, C . . . P). Portions of virtual desktop 140 are identified using reference letters only for purposes of describing particular embodiments, and portions of virtual desktops in accordance with other embodiments may or may not be identified in a device application by a reference character or otherwise. Virtual desktop 140 includes more information that can be displayed at a particular handheld device at one time. Virtual desktop 140 may represent any suitable information through which a user may desire to navigate using a handheld device, such as a street map. A user may desire to navigate across virtual desktop 140 to display different portions of information on the handheld device display and may also desire to zoom in (and out of) virtual desktop 140 (i.e., change the granularity of the information displayed) to more clearly view certain portions of the information of virtual desktop 140.

In the illustrated example, box 142 represents information currently displayed at handheld device 10. Box 142 includes portions A, B, E and F of virtual desktop 140. In particular embodiments, if a user desires to change the information of desktop 140 displayed at the device to, for example, information of boxes C, D, G and H, then the user can use motion input to move box 142 representing the display of the device

FITBIT 1002
Fitbit v. Immersion

to the right the necessary amount (two portions to the right in the illustrated example). Such motion input may comprise translation input (moving the handheld device 10 to the right an applicable amount to change the information displayed) or a gesture input (moving the handheld device 10 according to a particular gesture mapped to this function). As an example, one gesture may be mapped to moving the display one portion to the right, while another gesture may be mapped to moving the display two portions to the right. Thus, using translation input or gesture input, the user may navigate across desktop 140.

The handheld device 10 may also allow the user to zoom in on certain information displayed for a clearer view of such information, for example, through translation input or gesture input. As an example using gesture input, if the information displayed at the device included four of the sixteen portions (e.g., box 142 displaying portions A, D, E and F), then a user may use one of four gestures, each mapped to zoom in on a particular portion, to zoom in on one of the four displayed portions. If the user moved the handheld device according to the gesture mapped to zoom in on portion B, then the device may display information represented by box 144 (portions B1, B2, B3, B4, B5, B6, B7, B8 and B9) collectively forming the information of portion B of virtual desktop 140 in an enlarged view. Thus, the information of portion B may be more largely and clearly displayed. When viewing the information of box 144 on the device, the user may zoom out or zoom in again on a particular portion currently displayed using appropriately mapped gestures. If the user moved the handheld device according to a gesture mapped as zooming in on portion B2 (this could be the same gesture as that used to zoom in on portion B when information of box 142 was displayed), then the device may display information of box 146 (portions B2a, B2b, B2c, B2d, B2e, B2f, B2g, B2h and B2i). The user may also be able to navigate across the virtual desktop when zoomed in on a particular portion. For example, when zoomed in on portion B (viewing information of box 144), the user may use translation or gesture input to move across the virtual desktop to view enlarged views of portions other than portion B. As an example, when viewing information of box 144 the user may make a gesture that moves the information displayed to the right such that the entire display shows only information of portion C of virtual desktop 140 (i.e., zoomed in on portion C showing portions C1,

FITBIT 1002
Fitbit v. Immersion

C2, C3, C4, C5, C6, C7, C8 and C9). It should be understood that a user may navigate through the information of virtual desktop 140 (both navigating across and zooming in and out) in any suitable manner using motion input.

As indicated above, any suitable gestures may be used to both navigate across a virtual desktop (or across a particular level) and to navigate between or through different levels or dimensions of a multidimensional desktop. Moreover, in some embodiments motion, such as gestures, may be used to navigate across the multidimensional desktop, and non-motion actions may be used to select or navigate between dimensions. Such non-motion actions may include the pressing of a key in a device input. Thus, a combination of motion and non-motion actions may be used for multidimensional virtual desktop or menu navigation in particular embodiments.

Particular embodiments may allow gesture-based navigation through any suitable application, such as a multidimensional grid, menu, calendar or other hierarchical application. For example, in a calendar application certain gestures may be used to navigate within one level, such as months, while other gestures may be used to navigate between levels, such as between years, months, days, hours and events. Moreover, different applications implemented in the handheld device that use such gesture navigation may use different gestures. Thus, the particular navigation gestures may change according to the particular application in use. In some embodiments, translation-based interfaces may be used to navigation through multidimensional information of a virtual desktop, as opposed to merely using gesture-based movements. For example, movement along x and y-axes may be used to travel within a level of a hierarchy, while movement along a z-axis may be used to travel between levels of the hierarchy.

Another example might involve using a telephone directory with institutions, letters of the alphabet, names, contact details (e.g., office, cellular and home phone numbers, email) and action to initiate contact all along different levels of a hierarchy. In this example, the hierarchy may contain information (nouns) and actions (verbs). One could map this example onto only two axes with, for example, a y-axis being used to select within a level of hierarchy and an x-axis being used to move between levels. A z-axis could be used to confirm the actions and help prevent inadvertent execution of actions.

FITBIT 1002
Fitbit v. Immersion

In some cases, the number of levels traversed may depend on the magnitude of the motion, particular in translation-based navigation. Moving the device a small amount may navigate one level at a time, while moving the device a large amount may navigate multiple levels at a time. The greater the magnitude of motion, the more levels may be navigated at once. As applied to gesture-based motion inputs, different gestures may be used to navigate different numbers of levels in the hierarchy at once. These gestures may be different magnitudes of the same motion or entirely different motions.

The use of motion interface navigation through a multidimensional desktop or information display increases may allow menus to be flattened since a user may more easily navigate across a particular menu or dimension of a virtual desktop too large to fit on a device's display. As a result of the menu flattening, the user may be required to memorize less information thus increasing functionality and capability of the device for the user.

As discussed above, handheld devices in particular embodiments allow a user to navigate across a virtual desktop using motion input. In some cases, a user may utilize a cursor to navigate across information displayed at the handheld device. For example, certain information may be displayed at the device, and the user may utilize motion input to move the cursor around the device display and to select particular items displayed to perform certain functions. In some cases, motion input may be utilized to move a cursor, while a non-motion action (such as pressing a button) may be used to select an item currently indicated by the cursor. It should be understood that both gesture and translation motion input may be utilized in various embodiments of cursor navigation.

In particular embodiments, information displayed may be fixed with respect to the device, and the cursor may remain fixed in space such that movement of the device is used to navigate the cursor across the information. FIGURE 12A illustrates an example utilizing this form of motion input cursor navigation. Display 147 represents a display of a handheld device. In order to describe this cursor navigation example, display has been divided into a grid to show information being displayed. The grid includes portions A-P. Display 147 includes a cursor 148 between portions C, D, G and H. As stated above, in this embodiment the information displayed

FITBIT 1002
Fitbit v. Immersion

remains fixed with respect to the device when the device is moved, and the cursor remains fixed in space. However, the cursor's position with respect to the information displayed changes according to motion input. When the device is translated to the right, according to right movement 149, the cursor is translated according to a motion opposite to the translation of the device.

Display 150 represents a possible display after the device is moved according to right movement 149, with cursor 148 now between portions A, B, E and F. It should be understood that since this example involves translation-based input, the magnitude of the movement of the device (e.g., to the right in this example) may directly affect the magnitude of the movement of the cursor with respect to the information displayed. Display 152 represents another display after the handheld device has been moved according to up movement 151, with cursor 148 now between portions I, J, M and N. As evident, the cursor will have moved down with respect to information displayed since it remains fixed in space. Display 154 represents another display after the handheld device has been moved according to left movement 153, with cursor 148 now between portions K, L, O and P. As evidence, the cursor will have moved to the right with respect to information displayed. Thus, in this form of cursor navigation, motion of the device changes the position of the cursor on the information. In this manner for example, the handheld device may be moved instead of using a stylus to point to certain portions of information displayed.

At any point in the cursor navigation process, a user may utilize any form of input (e.g., gesture, key press, etc.) to select or otherwise perform a function according to the information currently indicated at the cursor. For example, with respect to display 152, a user may use a particular gesture or press a button to zoom in, select or perform some other function based on information between portions I, J, M and N currently indicated by cursor 148.

As described above with respect to FIGURE 12A, particular embodiments may translate the cursor in a motion opposite from the motion of the device to move the cursor across the information displayed. In one example of implementation, input motion of the device may be divided into motion along each of three axes, two of which are parallel to the device display (e.g., an x-axis and a y-axis). While motion of the device in the x-axis and y-axis plane changes information displayed at the device

FITBIT 1002
Fitbit v. Immersion

based on such motion, the cursor may be moved at the same time according to a translation vector that is opposite to the sum of movement in the x-axis direction and the y-axis direction to substantially maintain the position of the cursor in space. In some cases, when the cursor would move past a display edge off of the display according to the translation vector, the vector may be reduced in order to keep the cursor within the display. Such reduction may include reducing one or more components of the translation vector to maintain the cursor within a certain distance from the display edge.

It should be understood that the division of information displayed into portions A-P is done only for illustrating and describing the embodiments described above, and information displayed at handheld devices of particular embodiments may not include such a division or other type of reference information.

FIGURE 12B illustrates another form of motion input cursor navigation, in accordance with a particular embodiment. In this example, the cursor remains in a fixed position with respect to the display while motion input is used to navigate across a virtual desktop larger than the device display. FIGURE 12B includes virtual desktop 158 which comprises information through which a user may navigate using motion input at a handheld device, such as a street map. Virtual desktop 158 includes more information that can be displayed at a particular handheld device at one time. In order to describe this cursor navigation example, virtual desktop 158 has been divided into a grid to differentiate between information presented at the desktop. The grid includes 6 rows (A-F) and 7 columns (1-7). Portions of the grid may be identified herein for this example using their row letter and column number (e.g., portion B7 or D2). It should be understood that the division of virtual desktop 158 into portions referenced by row and column number is done only for illustrating and describing the embodiments described above, and the virtual desktops of particular embodiments may not include such a division or other type of reference information.

Box 160 represents information of virtual desktop 158 currently displayed at a handheld device. Display 161 represents the display of a handheld device showing information of box 160. Display 161 also includes a cursor 159 positioned at the intersection of portions B2, B3, C2 and C3. As indicated above, as a user utilizes motion input to move around the virtual desktop (i.e., to change the information

FITBIT 1002
Fitbit v. Immersion

displayed at the device), the cursor remains in a fixed position with respect to the display. However, the cursor's position changes with respect to the information of the virtual desktop displayed at the handheld device. For example, a user may utilize motion input to change the information displayed at the device to that represented at box 162. The information displayed at the device changes (to portions B5, B6, C5 and C6); and cursor 159 will remain fixed at the device display (e.g., in this case at the center of the display) such that its position changes with respect to the information of virtual desktop 158, as illustrated at display 163. If the user desired to use motion input to change the information displayed at the device to that represented at box 164, the information displayed at the device changes to portions E3, E4, F3 and F4, as illustrated at display 165. Cursor 159 is positioned between these illustrated portions in the center of the display since its position relative to the display remains fixed in this embodiment.

Thus, according to the form of cursor navigation illustrated with respect to FIGURE 12B, the cursor will remain at a position fixed with respect to the device display, while its position with respect to the information of a virtual desktop changes. As discussed above with respect to the embodiment described and illustrated with respect to FIGURE 12A, at any point in the navigation process, a user may utilize any form of input (e.g., gesture, key press, etc.) to select or otherwise perform a function according to the information currently indicated at the cursor. For example, with respect to display 163, a user may use a particular gesture or press a button to zoom in, select or perform some other function based on information between portions B5, B6, C5 and C6 currently indicated by cursor 159.

It should be understood that any particular input, such as a gesture or key press, may be used to switch cursor navigation modes at the device. For example, a user may switch between the translation-controlled cursor mode of FIGURE 12A and the fixed cursor mode of FIGURE 12B.

As discussed above, particular embodiments allow a user to move handheld device 10 according to a gesture to perform particular functions or operations. In some cases however, a user may not move the device according to the particular gesture intended, and the device may, as a result, not be able to recognize the movement as the intended gesture. In order to indicate that a particular movement of

FITBIT 1002
Fitbit v. Immersion

the device by a user is recognized as a particular gesture, handheld devices in some embodiments provide feedback to notify the user that the movement was in fact recognized as a gesture.

This feedback may comprise an audio format, such as speech, a beep, a tone or music, a visual format, such as an indication on the device display, a vibratory format or any other suitable feedback format. Audio feedback may be provided through a user interface speaker or headphone jack of device 10, and vibratory feedback may be provided through a user interface vibration generation module of device 10. Audio, visual and vibratory feedback may be varied to provide capability for multiple feedback indicators. As an example, vibratory feedback may be varied in duration, frequency and amplitude, singly or in different combinations over time. The richness and complexity of the feedback may be expanded by using feedback of different types in combination with one another, such as by using vibratory feedback in combination with audio feedback. In some cases, the feedback may be gesture-specific, such that one or more recognized gestures have their own respective feedback. For example, when a certain gesture is recognized the device may beep in a particular tone or a particular number of times, while when one or more other gestures are recognized the beep tones or number of beeps may change. The use of audio feedback may be especially valuable for gestures that do not have an immediately visible on-screen manifestation or function, such as calling a certain number with a cellular phone. Different types of feedback may also be context or application specific in some embodiments. Different contexts might include device state, such as what application is in focus or use, battery level, and available memory, as well as states defined by the user, such as quiet or silent mode. For example, a handheld device may utilize vibratory feedback in response to gesture input while in silent mode when audio feedback would otherwise be used. This feedback process may also be utilized by a handheld motion input device of a computer or other component.

Similar to the feedback relating to gesture recognition described above, handheld devices in particular embodiments may also provide feedback for the user in the event that a particular user movement was not recognized as a gesture when the device is in a gesture input mode. For example, if a motion appears intended to be a gesture, but cannot be assigned to a particular gesture that is known to the device, it

FITBIT 1002
Fitbit v. Immersion

may play a sound indicating failure. This notifies the user that the user must make another attempt at moving the device according to the intended gesture for the device to perform the operation or function desired. The feedback notifying the user that a movement was not recognized may also comprise an audio, visual, vibratory or other suitable format and may be a different feedback than that communicated when a particular movement is recognized by the device as a particular gesture. In order to determine whether a user's intent was to input a gesture, handheld device 10 may look at certain characteristics of the movement that imply that the motion was intended to be a gesture. Such characteristics may include, for example, the amplitude of the motion, the time course of the above-threshold motion and the number and spacing of accelerations. If a particular gesture is unrecognized by the device, a system of gestural feedback may be used to determine the gesture intended. For example, audio feedback may indicate possibilities determined by the handheld device, and the user may utilize gestures to navigate an auditory menu to select the intended gesture.

In particular embodiments, a system of audio or vibratory feedback may be used such that a user could operate handheld device 10 without having to resort to viewing display 12. For example, handheld devices in some embodiments may provide audio, visual or vibratory feedback to a user navigating a menu or other information of a virtual desktop. In effect, this device feedback combined with the motion input of a user could act as a type of "conversation" between the user and the device. As indicated above, multiple types and complexities of feedback may be utilized. The feedback process could be particularly advantageous in environments where it may be inconvenient, unsafe or impractical to look at the device display (e.g., while driving or while in a dark environment).

It should be understood that feedback, such as audio, visual and vibratory feedback, may also be used in some embodiments in connection with translation motion input. For example, a feedback indicator may be given when a user reached a limit or edge of a virtual desktop using translation input.

FIGURE 13 is a flowchart 170 illustrating a process for utilizing feedback in response to motion input, in accordance with a particular embodiment. At step 172 of the process raw motion data is received at handheld device 10. As described above, the raw motion data may be received by any combination of accelerometers, gyros,

FITBIT 1002
Fitbit v. Immersion

cameras, rangefinders or any other suitable motion detection components. At step 174, the raw motion data is processed to produce a motion detector output indicative of the motion of the device. Such processing may include various filtering techniques and fusion of data from multiple detection components.

At step 176, the device state may be checked, because in some embodiments the feedback for a particular motion depends on the state of the device when the motion is received. As indicated above, example device states may include the particular application in focus or use, battery level, available memory and a particular mode, such as a silent mode. At step 178, the motion detector output is analyzed with respect to the device state. At step 180, it is determined whether the motion indicated by the motion detector output is meaningful or otherwise recognizable given the particular device state. For example, a particular gesture may perform a certain function in one application (e.g., a calendar application) while the gesture serves no function in another application. If the gesture is recognizable or meaningful give the state of the handheld device, then at step 182 feedback is provided. As indicated above, in particular embodiments feedback may be in an audio, visual or vibratory format. In some cases the feedback may merely be an indication that the device recognizes the gesture given the state of the device. In other cases, the feedback may be a further query for additional input, for example if the user was utilizing a particular application of the device that provided for a series of inputs to perform one or more functions. At step 184, the device behaves according to the motion input and device state, and the process may return to step 172 where additional raw motion data is received.

If it is determined at step 180 that the motion indicated by the motion detector output is not meaningful or recognizable given the particular device state, then the process proceeds to step 186. At step 186, it is determined whether the motion is above a particular threshold. This determination may be made to determine whether particular motion input was, for example, intended to be a gesture. As indicated above, threshold characteristics for this determination may include the amplitude of the motion input, the time course of the motion input and the number and spacing of accelerations of the motion. If it is determined that the motion input was not above a particular threshold, then the process may return to step 172 where additional raw

FITBIT 1002
Fitbit v. Immersion

motion data is received. If, however, the motion input was above a threshold such that a gesture may have been intended but was not recognized or meaningful given the device state, feedback is provided at step 188. The feedback may include audio, visual and/or vibratory feedback and may indicate that the gesture was not recognizable or meaningful. In particular embodiments, the feedback may also provide a query regarding the intended gesture or may otherwise provide the user with a number of potentially intended gestures from which the user may select the particular gesture intended by the motion. It should be understood that particular embodiments may not include some of the steps described (e.g., some embodiments may not include the threshold determination of step 186), while other embodiments may include additional steps or the same steps in a different order. As suggested above, particular embodiments may utilize motion input feedback (e.g., including feedback "conversations") in any of a number of applications and ways and the type and complexity of feedback systems may vary greatly in different embodiments.

As indicated above, handheld devices according to particular embodiments may receive gesture motion input to control any number of functions of any number of applications running at the device. Some applications that utilize gesture involve may comprise mobile commerce (mCommerce) applications in which a mobile device, such as handheld device 10, is used to conduct various transactions, such as commercial or consumer purchases. Many mCommerce applications utilize some form of authentication to authenticate a user, such as personal identification numbers (PINs), credit card information and/or possession of the mobile device. However, many forms of authentication can be "leaked." They can be shared intentionally or inadvertently. Another form of authentication is a user's written signature, which does not suffer from such leaking problems since forgery is typically difficult to accomplish and may be easy to detect. Particular embodiments may utilize motion input to receive a user's signature as a form of authentication in mCommerce or other transactions through the handheld device.

A written signature may be considered a two dimensional record of a gesture. When utilizing a handheld device with motion input, a user's signature may be in three dimensions and may thus comprise a "spatial signature." Moreover, when combined with other forms of input received at the device, a user's signature can take

FITBIT 1002
Fitbit v. Immersion

on any number of dimensions (e.g., four, five or even more dimensions). For example, a three-dimensional gesture "written" in space using the device and detected at motion detector 22 may be combined with key-presses or other inputs to increase the number of dimensions of the signature.

These spatial signatures can be tracked, recorded, and analyzed by motion detectors 22 of handheld devices. They can be recorded with varying degrees of precision with varying numbers of motion detector components to serve as an effective form of authentication. A user's spatial signature may take comprise a three-dimensional form based on the user's traditional two-dimensional written signature or may comprise any other suitable gesture which the user records at the handheld device as his or her signature.

In some embodiments, the process for recognizing a spatial signature may involve pattern recognition and learning algorithms. The process may analyze relative timings of key accelerations associated with the signature. These may correspond to starts and stops of motions, curves in motions and other motion characteristics. In some cases, some hash of a data set of a points of a signature motion may be stored, and subsequent signatures may be compared against the hash for recognition. This may further verify if the signature was genuine by determining whether it was unique. For example, in particular embodiments, a signature may be detected (e.g., by a signature detection module of device 10) by comparing a particular movement of the device with respect to an initial or reference position. Such comparison may be made by comparing a sequence of accelerations of the movement with a predetermined sequence of accelerations of a stored spatial signature. This determination may be made regardless of the scale of the user's input motion signature.

In some embodiments, the device can detect whether motion of the device matches the signature by determining whether positions of the device in motion relative to an initial position match the spatial signature.

FIGURE 14 illustrates an example system 200 utilizing spatial signatures as authentication for mCommerce transactions. System 200 includes handheld device 10, mCommerce application 202, authenticator 204 and communication network 206. mCommerce application 202 may comprise any suitable application for transacting

FITBIT 1002
Fitbit v. Immersion

business with a handheld device of a user. Such transactions may include consumer purchases, such as products or services of a business or other user from a website, online bill paying, account management or any other commercial transaction. Authenticator 204 authenticates, or verifies, a spatial signature input by the user at handheld device 10 to complete an mCommerce transaction. Authenticator 204 may store one or more spatial signatures of one or more users for authentication in an mCommerce transaction. In some embodiments, authenticator may be located within handheld device 10, within mCommerce application 202 or at any other suitable location. Communication network 206 is capable of transmitting information or data between components of system 200 and may include one or more wide area networks (WANs), public switched telephone networks (PSTNs), local area networks (LANs), the Internet and/or global distributed networks such as intranets, extranets or other form of wireless or wireline communication networks. Communication network 206 may include any suitable combination of routers, hubs, switches, gateways or other hardware, software or embedded logic implementing any number of communication protocols that allow for the exchange of information or data in system 200.

In operation, when a user utilizes handheld device 10 to conduct a transaction with mCommerce application 202, the user may utilize motion input to communicate an authentication signature, for example by moving the device according to the user's three-dimensional signature. As an example, a user might use their cellular phone at a point-of purchase (e.g., store) instead of a credit card. Instead of signing a paper document that then needs to be shipped and processed, the user could simply move device 10 according to the user's spatial signature. As indicated above, the user's signature may include more than three dimensions in some embodiments. The signature may have been previously recorded by the user using handheld device 10 or another mobile device, and the recorded signature may be stored at handheld device 10, mCommerce application 202, authenticator 204 or other suitable location such as a signature storage database for signatures of multiple mCommerce users.

The motion of handheld device 10 may be processed at the device, and motion output indicative of the motion may be transmitted to mCommerce application 202. mCommerce application 202 may communicate the motion output to authenticator 204 for verification that the motion input received at device 10 was in fact the

FITBIT 1002
Fitbit v. Immersion

signature of the user attempting to transact mCommerce. If authenticator 204 verifies the user's signature, then mCommerce application may complete the transaction with the user. As indicated above, authenticator 204 may be located within handheld device 10 or at mCommerce application 202 in particular embodiments and may access signatures for verification stored at device 10, mCommerce application 202 or any other suitable location.

Authentication may also be used by handheld devices in a non-mCommerce application, for example when electronic security is desired to perform functions such as sending private or secure data using the device. A user desiring to transmit data or other information using handheld device 10 may use their spatial signature in the encryption process. Spatial signatures may be used in any of a variety of ways to secure data for communication through a network and may be utilized in connection with public/private key encryption systems. For example, in some embodiments handheld device 10 may authenticate a user's signature received through motion input and then use its own private key to encrypt data for transmission. In other cases, data may be communicated to handheld device 10 such that an intended recipient must input their spatial signature to receive the decrypted data. In some embodiments, data may be communicated to a computer wirelessly connected to handheld device 10, and the intended recipient must use handheld device 10 as a way to communicate the user's signature to the computer for data decryption. Moreover, in particular embodiments, a user's spatial signature itself may represent an encryption key such that motion of the device generates the encryption key instead of the signature motion merely being used for authentication. In some cases a device may recognize a combination of accelerations as a signature by converting the signature into the equivalent of a private key. The handheld device may then use the private key as part of an authentication process for a transaction.

In particular embodiments, a spatial signature may be used to manage physical access to a building or event. For example, the signature input by a user at a device may be checked against a list of people allowed to enter as IDs are checked at "will call" for an event.

In particular embodiments, a user may utilize motion input for handheld device 10 to control other devices, such as audio/video equipment, home appliances

FITBIT 1002
Fitbit v. Immersion

and devices, computing devices or any other device capable of being controlled by a handheld device. Devices may be controlled by handheld device 10 through communications interface 20 of device 10 utilizing any of a number of wireless or wireline protocols, including cellular, Bluetooth and 802.11 protocols. In some embodiments, device 10 may receive motion input to control, through wireless or wireline communication, other devices through a network. Thus, devices controlled through motion input of device 10 may be at any location with respect to device 10, such as in the same room or across a country. Moreover, control of the other device may be implemented through any number of intermediate devices (e.g., through a network).

As an example, if handheld 10 device were a Bluetooth-enabled cellular phone, then particular gestures or other motion of the cellular phone may wirelessly communicate commands to control another device, such as a laptop across a room to drive a PowerPoint presentation. Other devices which may be controlled through motion input of handheld device 10 may include televisions, radios, stereo equipment, satellite receivers, cable boxes, DVD players, digital video recorders, lights, air conditioners, heaters, thermostats, security systems, kitchen appliances (e.g., ovens, refrigerators, freezers, microwaves, coffee makers, bread makers, toasters), PDAs, desktop and laptop PCs, computer peripheral equipment, projectors, radio controlled cars, boats and planes and any other device. As another example, a commuter may shake their cellular phone in a certain manner to tell their heater at home to turn on before the commuter arrives at home. In some embodiments, a handheld device may receive and process raw motion data to determine commands or intended functions for communication to other devices. In other embodiments, a motion detector of a handheld device may output raw data received from its motion detection components for communication to one or more devices controlled by device 10 through the motion of device 10. As a result, different devices controlled by device 10 may treat the same raw motion data of device 10 differently. For example, a particular gesture of device 10 may perform different functions of different devices controlled by device 10.

FIGURE 18 illustrates an example system 220 in which handheld device 10 controls multiple other devices through motion input of device 10. System 220 includes handheld device 10, laptop 222 and remote device 224 connected, through

FITBIT 1002
Fitbit v. Immersion

wireless or wireline links to handheld device 10 through communication network 226. Handheld device 10 receives raw motion data of a particular motion of the device through motion detection components, such as accelerometers, cameras, rangefinders and/or gyros. The raw motion data is processed at the handheld device. Particular databases, such as gesture and gesture mapping databases, may be accessed to determine a matching gesture and intended function based on motion tracked by a control module of the device. The intended function may be for another device to be controlled by handheld device 10, such as laptop 222 or remote device 224. Thus, the motion input is the interface for the underlying operational signal communicated from device 10 to the controlled device. In other embodiments, the raw motion data or other data merely indicating a particular motion input for device 10 may be directly sent to laptop 222 and/or remote device 224 without determining a function at device 10. In these embodiments, laptop 222 and/or remote device 224 may themselves process the raw motion data received from handheld device 10 to determine one or more intended functions or operations they should perform based on the raw motion data. In some embodiments, a user of device 10 may indicate to device 10 through motion or otherwise the other devices that handheld device 10 should communicate raw motion data or intended functions of such other devices, as applicable. While two devices controlled by handheld device 10 are illustrated, it should be understood that particular embodiments may include any number of devices of varying types to be controlled by handheld device 10 through motion input as discussed above.

As indicated above, particular embodiments include the ability to control other devices, such as other local or remote devices, through motion input of handheld device 10. In some embodiments a user of handheld device 10 selects the other device that a particular motion input of device 10 is intended to control. For example, a user may use input 14 of handheld device 10 (e.g., by pressing a button or moving a trackwheel) to select a local or remote device to control before moving device 10 according to a particular motion mapped to a function or operation desired for the other device. In particular embodiments however, a user may move handheld device 10 according to a particular gesture in order to select the other device (e.g., other local or remote device) to be controlled at the time through motion input of device 10.

FITBIT 1002
Fitbit v. Immersion

Thus, particular embodiments provide gesture motion selection of other devices to be controlled by handheld device 10.

Handheld device 10 may include a device selection module operable to detect a device selection gesture which indicates that a user desires to control a particular device. Each controllable device may include its own gesture command maps which correlate gestures to be input using device 10 and commands of the controllable device. A control module of the handheld device may select a particular command map corresponding to the controllable device selected for control. In some embodiments, device 10 may include a device locator operable to detect, for each of a plurality of remote devices, a direction from the handheld device to each remote device. In this case, the user may move handheld device 10 in the direction of a particular remote device the user desires to control in order to select that remote device for control.

While motion input for device 10 may be used for such control of the other devices, other types of input (e.g., utilizing input 14) may also be used to control other local or remote devices selected for control by gesture input. In some embodiments different gestures may be each mapped to control a different device. In other embodiments, device 10 may display possible other devices for control and particular gesture(s) to utilize to indicate a user's selection as to which other device the user desires to presently control through device 10. Handheld devices according to the present invention may utilize any particular manner of gesture selection of one or more local or remote devices to be controlled by the handheld devices.

As discussed above, particular embodiments include handheld devices 10 capable of detecting motion of the device through a motion detector 22 to modify the behavior of the device in some way according to the motion detected. Handheld devices 10 in some embodiments are capable of modeling their particular environment and subsequently modifying their behavior based on such environment. One distinction between modeling an environment of a handheld device and detecting a particular motion of the device is that in the former case there may be reasoning involved and in the latter case there may be no such reasoning. As an example, if a handheld device changes its behavior when moved according to a particular gesture, that may be considered sensing or detecting a particular motion and reacting based on

FITBIT 1002
Fitbit v. Immersion

the motion detected. If, on the other hand, the handheld device determines that it is sitting face down on a table and reacts accordingly, that may be considered modeling its environment. As another example, if a handheld device moves to the left and changes its behavior based on such movement, that may be considered detecting motion and reacting. If the handheld device finds itself in free fall and powers-down so as to survive an impending collision with the ground, that may be considered modeling its environment. A further distinction may be that environmental modeling may not require an immediate response to a user input, while detecting an event, such as a particular motion, generally does require such an immediate response. Modeling an environment may thus involve sensing or detecting a pattern of motion (or lack thereof), matching it to a predefined set of environmental conditions and modifying the behavior of the device based on the modeled environment. The behavior implemented based on the environment modeled may also change based on a particular application in use or in focus. In some cases, the device may change its sensitivity to particular motions based on the environment modeled.

As an example, a handheld device may recognize, through accelerometers or other motion detection components, that it is at rest on an approximately horizontal surface. Such recognition may result from a determination that the device is not moving, or still, with a static 1g of acceleration orthogonal to a surface. The device may be able to differentiate resting on a table from resting in a user's hand, for example, because a user's hand typically will not be able to hold the device perfectly still. The device may, as a result, behave in a certain manner according to the recognition that it is at rest on an approximately horizontal surface. For example, if handheld device 10 recognized that it was lying at rest on a table, it may power off after lying in such position for a certain amount of time. As another example, a cellular phone in a vibrate mode may vibrate more gently if it recognizes it is on a table upon receipt of a call or upon any other event that may trigger vibration of the phone. In some embodiments, the device may recognize its orientation while lying on a table such that it may behave in one manner when lying in a "face down" position (e.g., it may power off) while it may behave in a different manner when lying in a non-face down position. If handheld device 10 comprised a cellular phone, it may enter a speaker mode when it is on a call and recognizes that it is placed by a user in a

FITBIT 1002
Fitbit v. Immersion

"face up" position on a table while on the call. If, on the other hand, the cellular phone is on a call and is placed face down on the table, it may enter a mute mode.

As another example, handheld device 10 may recognize through a brief period of approximately 0g that it is in free-fall and then may behave to reduce damage due to impending impact with the ground or another surface. Such behavior may include, for example, powering down chips and/or hard drives, retracting lenses, applying covers or any other device behavior. In particular embodiments, non-hand-held devices or devices that do not otherwise detect motion for input may also be able to model their environment and to behave based on the environment modeled. As an additional example, acceleration patterns may be detected to recognize that a handheld device 10 is in a moving environment (e.g., being held by a user in a car or on a train) and may adjust various sensitivities, threshold and/or other characteristics to enable better performance of the device in that environment.

In other embodiments, handheld device 10 may comprise a digital camera. Through its motion detection components, the camera may determine whether it is on a tripod or is being held by a user when a picture is taken. The camera may set a shutter speed for the picture based on that determination (e.g., slow shutter speed if on a tripod or fast shutter speed if being held by a user).

If handheld device 10 comprised a device that utilized a cradle for syncing up with another device, such as a PC, then device 10 may recognize that it is in the cradle based on its stillness (or supported state) and its particular orientation. The device may then operate or function according to its state of being in the cradle (e.g., it may then sync up with its associated PC).

FIGURE 16 is a flowchart 230 illustrating an environmental modeling process, in accordance with a particular embodiment. At step 232, raw motion data is received at handheld device 10. As described above, the raw motion data may be received by any combination of accelerometers, gyros, cameras, rangefinders or any other suitable motion detection components. At step 234, the raw motion data is processed to produce a motion detector output from which motion and orientation of the device is determined at step 236. Boxes 237 represent example motions and orientations of the device, such as rotating around the z-axis in box 237a, translating along the x-axis in box 237b, oriented at particular angles α, β, ρ in box 237c and still

FITBIT 1002
Fitbit v. Immersion

in box 237n. These are mere example motions and orientations of the device, and any number of motions may be utilized that are determined at step 236. In some embodiments, the determined orientations may comprise an orientation of the device with respect to gravity.

At step 238, handheld device 10 determines its environment based on the motion and orientation determined at step 236. Boxes 239 represent example environments of the device, such as face down on a table in box 239a, falling in box 239b, on a train in box 239c and held in hand at box 239n. Any number of environments may be determined based on motions and orientations determined at step 236. In particular embodiments, the environmental determination may also be based on a history of the device, such as a motion/orientation history. For example, when implementing a speaker mode function of a cellular phone, the device may detect a quite period when horizontal in the middle of a call after a short jarring is detected (e.g., the short jarring caused by a user placing the phone face up on a table). The phone can detect that it was jarred so that stillness and a perpendicular position relative to gravity may take on a different meaning than had the jarring not occurred. Thus, the determination of the environment may be based on the motion and orientation of the device and its history. The history may comprise a previous motion/orientation of the device or any other information relating to a device's history.

At step 240, the determined environment is mapped to a particular behavior. The mapped behavior may depend on any number of factors in addition to the determined environment, such as desired characteristics of the particular user using the device at the time or the particular application in use or focus at the time. For example, the behavior according to a particular modeled environment may include engaging a mute function of the handheld device in box 241a, powering down chips of the device to survive an impact in box 241b and increasing a motion activation threshold of the device in box 241n. The mute behavior indicated in box 241a may be implemented when a cell phone's environment comprises laying face down on a table while on a call. The powering down chips behavior in box 241b may be implemented when the environment of handheld device 10 comprises a free fall of the device. The increasing a motion activation threshold behavior of box 241n may be implemented

FITBIT 1002
Fitbit v. Immersion

when a handheld device's environment comprises being in a car or train where bumpiness may require a greater movement threshold for a user's motion input to register as an intended input. Particular embodiments may include any number of behaviors mapped to one or more modeled environments. At step 242, the handheld device behaves according to the behavior to which its environment is mapped at step 240.

As indicated above, users may move handheld devices according to particular gestures to cause the devices to perform desired functions, operations or tasks. In particular embodiments, gestures used as motion input for the device may comprise pre-existing symbols, such as letters of the alphabet, picture symbols or any other alphanumeric character or pictographic symbol or representation. For example, gestures used as motion input may mimic upper and lower case members of an alphabet in any language, Arabic and Roman numerals and shorthand symbols. Preexisting gestures may be used for handheld input devices for other local and remote devices as well. Using preexisting gestures for handheld device input may facilitate the learning process for users with respect to gesture motion interfaces.

FIGURE 17 illustrates example gestures which may be mapped to particular functions. For example, if handheld device 10 comprised a cellular phone, a user may move device 10 in the form of heart 250 to call the user's girlfriend, boyfriend or spouse or house 252 to call the user's home. As another example, if handheld device 10 were a PDA or other device running an application managing files or data, moving the device in the form of C-gesture 254 may be a command for copying data, O-gesture 256 may be a command for opening a file, D-gesture 258 may be a command for deleting data and X-gesture 260 may be an exit command for a file or application. The logical connection between gestures and their intended functions or operations (e.g., "O" for opening a file) further facilitates user interaction and learning.

Any number of pre-existing symbols may be used as gestures for motion input as commands for performing any number of functions, operations or tasks of a handheld device. Many preexisting gestures typically exist in two dimensions. Handheld device 10 may recognize such gestures. In some cases, for example, handheld device 10 may disable receipt of a particular dimension so that any movement in a third dimension when a user is attempting to input a two-dimensional

FITBIT 1002
Fitbit v. Immersion

gesture is not received or detected in order to facilitate recognition of the two-dimensional gesture. In some embodiments, handheld device 10 may receive three-dimensional gestures that may be based on preexisting two-dimensional gestures. Receiving and detecting three-dimensional gestures increases the capabilities of the device by, for example, increasing the number and types of gestures which may be used as motion input.

FIGURE 13 is a flowchart 270 illustrating the utilization of a preexisting symbol gesture, the letter "O," as motion input. As illustrated in step 272, a user moves handheld device 10 in the form of the letter "O." At step 274, handheld device 10 receives raw motion data of the "O" movement from motion detection components and process such raw motion data at step 276 to determine the actual motion of the device. At step 278, handheld device 10 accesses a gesture database 280 which may include a plurality of gestures recognizable by the device to map the motion to the gesture "O." The plurality of gestures of the gesture database may each be defined by a series of accelerations of a movement. The actual motion of the device may be matched to a series of accelerations of one of the gestures of the gesture database. At step 282, handheld device 10 maps the gesture "O" to a particular function by accessing a function database 284 (or a gesture mapping database) which may include a plurality of functions that may be performed by one or more applications running on the device. In particular embodiments, the gesture and function databases may be composed in memory 18 of the device. The particular function mapped to the gesture "O" may depend on a particular application in focus or being used by the user at the time. For example, in some applications "O" be comprise a command to open a file, while in other applications it may comprise a command to call a certain number. In some cases, one gesture may be mapped to the same function for all applications of the device. At step 286, the device behaves according to the mapped function, such as opening a file.

As indicated above, gestures used as motion input for handheld device 10 may have different meanings (e.g., functions, operations, tasks) based on a particular context, such as a particular application in use or in focus, a particular device state with respect to an application or otherwise, a particular modeled environment or any combination of these or any other context. For example, a particular gesture may be

FITBIT 1002
Fitbit v. Immersion

mapped as a command to scroll a page up when running a web browser at the device, while the gesture may be mapped as a command to examine a different date when running a calendar program. The ability for particular gestures to be mapped to different commands depending on the context, such as the application in use, increases the functionality of the device.

Handheld devices in some embodiments may be able to utilize simpler motion detection components if gestures are mapped to different commands depending on the context. As an example, a handheld device may include particular motion detection components such that the handheld device may only be able to recognize and distinguish between twenty different gestures. If each gesture is mapped to a different function for each of four different applications, then the ability to only recognize twenty unique gestures still provides eighty different functions on the device (twenty for each application). If each gesture were mapped to its own function, no matter what application was in focus, then the overall capability of the device would be reduced, and some gestures would likely not be used in some applications. The ability to use less complex components that are able to recognize and distinguish between fewer gestures as a result of mapping gestures to a plurality of functions depending on the context can lead to reduced costs in the components utilized in the device and can also simplify the task of physically learning gestures required to control the device. As indicated above, gestures may be mapped to different functions, operations or tasks depending on the application in use, device state, modeled environment or other context. In some cases, gestures may be mapped to different functions depending on the state of a particular application. For example, in the case of a word processing program, some gestures may have some functions when in one state of the program (e.g., a menu state) while the same gestures may have different functions when in another state of the word processing program (e.g., a document editing state). In this case, a command map associated with the gesture function mappings may include gesture mappings for each such state.

FIGURE 19 is a flowchart 290 illustrating the use of context-based gesture mapping, in accordance with a particular embodiments. In the illustrated embodiment, a gesture has different functions assigned based on the application in focus. At step 292, handheld device 10 receives raw motion data of a particular

FITBIT 1002
Fitbit v. Immersion

gesture movement and process such raw motion data at step 294 to determine the actual motion of the device. At step 296, handheld device 10 maps the motion to a gesture, for example, by accessing a gesture database. At step 298, handheld device 10 determines which application is in focus. For example, if the device were capable of running four different applications, then it would determine which of the four was in focus or was being used at the time. The device then performs the function mapped to the gesture according to the application in focus. The identification of such function may be accomplished in some embodiments by accessing a function database which may also be referred to as a gesture mapping database since it correlates gestures of a gesture database to functions. In the illustrated embodiment, if Application 1 is in focus, then the device performs Function 1 at step 300a; if Application 2 is in focus, then the device performs Function 2 at step 300b; if Application 3 is in focus, then the device performs Function 3 at step 300c; and if Application 4 is in focus, then the device performs Function 4 at step 300d.

As a further example of context-based gesture mapping, a handheld device with phone and PDA capabilities may run four applications: a phone application, a calendar application, a file management application and an e-mail application. A gesture input mimicking the letter "S" may have different functions depending on the application in focus. For example, if the phone application is in focus, then receiving the gesture input "S" may be a command for calling a particular number designated to the "S" gesture. If the calendar application is in focus, then receiving the gesture input "S" may be a command for scrolling to the month of September in the calendar. If the file management application is in focus, then receiving the gesture input "S" may be a command for saving a file. If the e-mail application is in focus, then receiving the gesture input "S" may be a command for sending an e-mail. Particular embodiments contemplate great flexibility in the ability to map gestures to different functions depending on the context.

As discussed above, gestures may have different functions depending on a particular context at the time. In particular embodiments, handheld devices may be customizable to allow users to assign device functions to pre-defined gestures. The functions may be context-based such that some gestures may have different functions depending on an application in use, a device state or a modeled environment.

FITBIT 1002
Fitbit v. Immersion

Handheld devices in some embodiments may allow different users of the same device to assign different functions to the same gesture, and such functions may also be context-based as discussed above.

For example, a handheld device 10 may be utilized by a number of different users at different times. Each user may assign different functions for the same gestures. When the handheld device receives a gesture input, it must thus know which user is using the device at the time to determine which function the user intends the device to perform. The device may determine the user in any of a variety of ways. In some embodiments, users may log into the device prior to use by using a username and password or otherwise. In other embodiments, the handheld device may be able to identify the user based on the manner in which the user moves the device for motion input, such as the way the user forms a gesture using the device. As indicated above, each user may also assign commands to gestures based on context, such as based on the application in focus at the device. The ability for the handheld device to map functions to gestures based on particular users further increases the device's capabilities and flexibility, particularly if the device is able to recognize and distinguish only a particular number of gestures.

FIGURE 20 is a flowchart 310 illustrating the use of user-based gesture mapping, in accordance with a particular embodiment. In the illustrated embodiment, a gesture has different functions assigned based on the user using the device. At step 312, handheld device 10 receives raw motion data of a particular gesture movement and process such raw motion data at step 314 to determine the actual motion of the device. At step 316, handheld device 10 maps the motion to a gesture, for example, by accessing a gesture database. At step 318, handheld device 10 determines which user is using the device. Such determination may be made, for example, through a log in system in which users log into the device prior to use. Handheld device 10 may determine the current user through other suitable methods as well. At steps 320, the device performs the functions assigned to the gesture input based on the user using the device. In the illustrated embodiment describing the process with four possible users, if User 1 is using the device, then the device performs Function 1 at step 320a; if User 2 is using the device, then the device performs Function 2 at step 320b; if User 3 is

FITBIT 1002
Fitbit v. Immersion

using the device, then the device performs Function 3 at step 320c; and if User 4 is using the device, then the device performs Function 4 at step 320d.

As indicated above, in some embodiments, gestures may be assigned different functions based on both users using the device and a context. In this situation, the illustrated flowchart 310 described above may have an additional step to determine the context at the time (e.g., step 298 of flowchart 290 determining the application in focus). The particular function desired for performance by a certain gesture thus depends on both the user using the device at the time and the context, such as the particular application in focus at the time.

As previously discussed, some embodiments include handheld devices with the ability to receive preexisting symbols as gestures for motion input. Some of those embodiments as well as other embodiments may include the ability for user's to create their own gestures for mapping to functions and/or keys. The gestures may comprise any user-created symbol or other motion that the user desires to utilize as motion input for one or more particular functions, operations or tasks that the device is able to perform. Users may be able to create motions with some personal significance so they may more easily remember the motion's command or intended function.

FIGURE 23 is a flowchart 330 illustrating the assignment process for user-created gestures, in accordance with a particular embodiments. At step 332, an indication is received from a user for gesture creation. The indication may be received in any of a variety of ways using any suitable input format (e.g., keys, trackwheel, motion, etc.). The user may move the device according to the user-created gesture such that raw motion data for the user-created gesture is received at the handheld device at step 334. The raw motion data may comprise a sequence of accelerations of a movement after stabilization of the device from a base reference position until an indication is received to stop recording the reference positions. Indications to start and stop recording a user-created gesture may include motion or non-motion indications (e.g., key presses and key releases). The raw motion data is processed at step 336. At step 338, the motion is stored as a gesture, for example, at a gesture database. In particular embodiments, the indication for gesture creation may be received after the user moves the device according to the user-created gesture. For example, the user may move the device according to a user-created gesture that is

FITBIT 1002
Fitbit v. Immersion

currently unrecognizable by the device. The device may query the user to determine if the user desires to store the unrecognized gesture for a particular function. The user may respond in the affirmative so that the user may utilize the gesture as motion input in the future.

At step 340, function mapping information for the gesture is received from the user. The function mapping information may comprise functions, operations or tasks of the device that the user desires the user-created gesture to command. In particular embodiments, such function mapping information may comprise a series of functions (e.g., a macro) that one gesture may command. The user may assign different functions for a gesture according to an application in focus. In some cases, a user may desire to map different gestures to different keys or keystrokes of the device. One examples of mapping a series of functions to a gesture may include mapping a long string of characters to a gesture (e.g., telephone numbers including pauses, where appropriate). At step 342, the function mapping information is stored, for example, at a function database or gesture mapping database.

As indicated above, it may be difficult for a user to move handheld device 10 in the same precise manner for one or more gestures each time those gestures are used as input. Particular embodiments thus allow for varying levels of precision in gesture input. Precision describes how accurately a gesture must be executed in order to constitute a match to a gesture recognized by the device, such as a gesture included in a gesture database accessed by the device. The closer a user generated motion must match a gesture in a gesture database, the harder it will be to successfully execute such gesture motion. As discussed above, in particular embodiments movements may be matched to gestures of a gesture database by matching a detected series of accelerations of the movements to those of the gestures of the gesture database.

As the precision of gestures required for recognition increases, one may have more gestures (of the same level of complexity) that can be distinctly recognized. As an example, if the precision required was zero, then the device could only recognize a single gesture but it would recognize it easily because anything the user did would be recognized as that gesture. If, however, the precision required was infinite then it would be virtually impossible for a user to form a gesture that was recognized by the device, but the device could support an infinite number of gestures with only

FITBIT 1002
Fitbit v. Immersion

infinitesimal differences between them. One area in which the precision requirement is especially applicable is in the area of spatial signatures. With spatial signatures, the level of precision correlates well with the level of security.

In particular embodiments, the precision required by handheld device 10 for gesture input may be varied. Different levels of precision may be required for different users, different regions of the "gesture space" (e.g., similar gestures may need more precise execution for recognition while gestures that are very unique may not need as much precision in execution), different individual gestures, such as signatures, and different functions mapped to certain gestures (e.g., more critical functions may require greater precision for their respective gesture inputs to be recognized). Moreover, in some embodiments users may be able to set the level(s) of precision required for some or all gestures or gestures of one or more gesture spaces. As an example, a user may set the precision required for spatial signatures higher than for other gestures for the user thus increasing security for spatial signature input.

As indicated above, in particular embodiments gestures may be recognized by detecting a series of accelerations of the device as the device is moved along a path by a user according to an intended gesture. Recognition occurs when the series of accelerations is matched by the device to a gesture of a gesture database.

In some embodiments, each gesture recognizable by handheld device 10, or each gesture of a gesture database, includes a matrix of three-dimensional points. In addition, a user movement intended as a gesture input includes a matrix of three-dimensional points. Handheld device 10 may compare the matrix of the movement with the matrices of each recognizable gesture (or each gesture in the gesture database) to determine the intended gesture. If a user moves the device such that the movement's matrix correlates to each point of an intended gesture's matrix, then the user may be deemed to have input the intended gesture with perfect precision. As the precision required for gesture input is reduced, then the greater the allowable differences between a user gesture movement and an intended gesture of a gesture database for gesture recognition.

FIGURE 22 illustrates three gestures input using a handheld device with varying levels of precision. In the illustrated embodiment, the intended gesture comprises an "O." Gesture movement 350 is input as a perfect "O," or with 100%

FITBIT 1002
Fitbit v. Immersion

precision for the intended gesture. Gesture movement 352 is input with less than 100% precision as it does not form a perfect "O." Gesture movement 354 is input with less precision than gesture movement 352. The precision requirement for the input of gesture "O" may be set at handheld device to accept varying levels of precision. For example, the precision level may be set such that only gesture movement 350 is recognized as gesture "O," gesture movements 350 and 352 are both recognized as gesture "O" or gesture movements 350, 352 and 354 are all recognized as gesture "O." As indicated above, the higher the precision requirement, then the more space available for additional recognizable gestures. For example, if the precision level for handheld device 10 were set such that only gesture movement 350 was recognized as gesture "O," then gesture movements 352 and 354 may be recognized as other, distinct gestures.

In particular embodiments, handheld devices may alter gestures recognized for performing particular functions based on a user's personal precision. In this manner, a handheld device may have dynamic learning capability of gesture mappings. For example, if a particular gesture of a gesture database is mapped to a particular function, and a user's repeated attempts to input the gesture lack precision in a consistent manner; then the handheld device may alter the gesture in the gesture database to match the consistent gesture movement of the user such that the user's consistent gesture motion input will be mapped to the particular function.

As an example, if a particular gesture comprises a square motion and a user's motion intended for the gesture comprises more of a triangular motion on a consistent basis (e.g., on multiple consecutive times), then the handheld device may be able to recognize this consistent difference in an intended gesture and the actual user motion to change the intended gesture (e.g., a square) in the gesture database mapped to the function intended to the user's actual consistent motion (e.g., triangle). Thus, after such change is made, any time the user inputs the triangle gesture then the function previously mapped to the square gesture will be commanded. The device may determine the gesture intended in any of a variety of ways, such as through two-way communication with the user through any form of input. In particular embodiments, this dynamic learning of users' input characteristics may be applied on a user-specific

FITBIT 1002
Fitbit v. Immersion

basis. For example, in the example described above another user may still input the square gesture using the same handheld device to command the same function.

As indicated above, as the precision of user motion with respect to intended gestures increases, then the number of gestures available for mapping to functions increases. In some embodiments, handheld devices may recognize that a user's precision increases over time and the devices may, as a result, increase the gestures available for use. Increasing gestures available for input may also increase the functions capable of being commanded through gesture input.

As an example, a user's personal precision for inputting gestures may be such that the user is only able to input a certain number of gestures that will be recognized by the handheld device. However, over time, the user's personal precision may increase. This increase may be recognized by the handheld device and, as a result, the device may enable additional gestures that the user may use as gesture input. In some embodiments, the enabling of additional gestures may occur when the user's precision increases over a particular precision threshold, or a certain precision level. Since the user's precision has increased, the handheld device will be able to recognize when the user attempts to input these additional gestures. As indicated above, providing additional gestures for input by a user may also increase the number of functions that the user is able to command through gesture input, since each gesture may be mapped to command a different function.

Handheld devices in particular embodiments may also allow users to set and vary noise thresholds of the device. Noise thresholds are the magnitude of motion of the device that must be detected in order to be considered intended motion input (e.g. an intended gesture) of the user. For example, if noise thresholds are set low, then minimal motion of the device may be considered by the device as motion input. However, if noise thresholds are set high, then greater movement of the device would be required before the motion is considered intended input from the user. If, for example, a user is travelling in a car on a bumpy road, the user may desired to set the noise threshold higher so that when the device moves as a result of bumps in the road then such movement may not be considered by the device to be intended motion input.

FITBIT 1002
Fitbit v. Immersion

In particular embodiments, noise thresholds may automatically change in the device based on a modeled environment. For example, if a device determines that the environment comprises traveling in a car, then the device may automatically increase the noise threshold so that minimal movements resulting from the car will not register as user-intended motion.

FIGURE 22 is a flowchart 370 illustrating a gesture recognition process utilizing a number of features described herein, in accordance with a particular embodiment. At step 372, raw motion data of a particular gesture movement is received. The raw motion data is processed at step 374 where the actual motion of the device is determined. Such processing may include various filtering techniques and fusion of data from multiple detection or sensing components. At step 376, the actual motion is mapped to a gesture. Mapping the actual motion to a gesture may include accessing a user settings database 378, which may include user data 379 comprising, for example, user precision and noise characteristics or thresholds, user-created gestures and any other user-specific data or information including user identities 381. User-specific information may be important, for example, because different users of the handheld device may have different settings and motion input characteristics. For example, an older user may have less precision than a younger user when inputting gestures such that the older person may have fewer gestures available. Moreover, a more experienced user may have more device functionality available through gesture input.

User settings database 378 may also include environmental model information 380 which may factor in determining the gesture applicable at the time. As discussed above, through environmental modeling, the device can internally represent its environment and the effect that environment is likely to have on gesture recognition. For example, if the user is on a train, then the device may automatically raise the noise threshold level. The device may also reduce the precision required, depending upon how crowded the gesture space is near the gesture under consideration. Mapping the actual motion to a gesture may also include accessing gesture database 382.

At step 384, the gesture is mapped to a function for the device. This step may include accessing a function mapping database 386 which may include correlation

FITBIT 1002
Fitbit v. Immersion

between gestures and functions. Different users may have different mappings of gestures to functions and different user-created functions. Thus, function mapping database 386 may also include user-specific mapping instructions or characteristics, user-created functions (e.g., macros and/or phone numbers) and any other function information which may be applicable to mapping a particular gesture to one or more functions. In some embodiments, gestures may be mapped to individual keystrokes. User identities 381 may also be accessed in this step. In addition, device context information 388 may also be accessed and utilized in mapping the gesture, which may include environmental model information 389, application in focus information 390 and device state information 391, such as time and date information, location information, battery condition and mode information (e.g., silent mode). At steps 392, the device performs the appropriately-mapped one or more function(s), such as Function 1 at step 392a, Function 2 at step 392b or Function 3 at step 392c.

As discussed above, in particular embodiments handheld device 10 may comprise a cellular phone with many of the capabilities described herein. For example, cellular phones with motion input capabilities may use motion input to flatten menus as discussed above. The cellular phone may detect device states and environments, such as free fall or the cellular phone being face down or face up to map to behaviors such as mute, speaker phone and power-off. Other detection of device states may include detecting that the phone is being held to disengage mute or speakerphone states. The cellular phone may utilize gestures to control dialing (e.g., through gestural speed dial) or to lock/unlock a keypad of the device. For example, the device may be moved in a clockwise circle to dial home, a counterclockwise circle to dial work and in the shape of a heart to dial a significant other. Users may also be able to program the cellular phone to customized gestural mappings.

In particular embodiments handheld device 10 may comprise a digital camera utilizing motion input for at least some of the functions described herein. For example, digital cameras with motion input capabilities may use motion input to flatten menus as discussed above. Motion may also be used to allow a user to zoom in (and back out) on still photos or video to examine it more closely for smoother and more intuitive functionality. Motion may be used to zoom in and out of a number of thumbnails of photographs or video clips so that it is easy to select one or more to

FITBIT 1002
Fitbit v. Immersion

review. Virtual desktops may be used to review many thumbnails of many digital photos or video clips or to review many digital photos or video clips by translating the camera or using gestural input. Gestures and simple motions may be used alone or in combination with other interface mechanisms to modify various settings on digital still and video cameras, such as flash settings, type of focus and light sensing mode. Moreover, free fall may be detected to induce the camera to protect itself in some way from damage in an impending collision. Such protection may include dropping power from some or all parts of the camera, closing the lens cover and retracting the lens.

In particular embodiments handheld device 10 may comprise a digital watch utilizing motion input for at least some of the functions described herein. For example, digital watches with motion input capabilities may use motion input to flatten menus as discussed above. In some embodiments, the tapping of the watch or particular gestures may be used to silence the watch. Other functions may also be accessed through taps, rotations, translations and other more complex gestures. These functions may include changing time zones, setting the watch (e.g., setting the time and other adjustable settings), changing modes (e.g., timers, alarms, stopwatch), activating the backlight, using a stopwatch (e.g., starting, stopping and splitting the stopwatch) and starting and stopping other timers.

In some embodiments, motion detection may be separate from a display. For example, a display may be worn on glasses or contacts, and other parts of the handheld device may be dispersed across a user's body such that the display may not be part of the same physically component as the motion input device or component.

As discussed above, particular figures illustrate various methods, flowcharts and processes which may be performed in particular embodiments. It should be understood that steps may be performed in any order, and steps from a particular method, flowchart or process may be combined with other methods, flowcharts or processes or other steps from the same method, flowchart or process in various embodiments without departing from the scope of the invention.

Although the present invention has been described in detail with reference to particular embodiments, it should be understood that various other changes, substitutions, and alterations may be made hereto without departing from the spirit and scope of the present invention. For example, although the present invention has

FITBIT 1002
Fitbit v. Immersion

been described with reference to a number of elements included within handheld device 10, these elements may be combined, rearranged or positioned in order to accommodate particular architectures or needs. In addition, any of these elements may be provided as separate external elements to each other where appropriate. The present invention contemplates great flexibility in the arrangement of these elements as well as their internal components.

Numerous other changes, substitutions, variations, alterations and modifications may be ascertained by those skilled in the art and it is intended that the present invention encompass all such changes, substitutions, variations, alterations and modifications as falling within the spirit and scope of the appended claims.

FITBIT 1002
Fitbit v. Immersion

WHAT IS CLAIMED IS:

1. A motion controlled handheld device comprising:

a first accelerometer operable to detect acceleration along a first axis;

a second accelerometer operable to detect acceleration along a second axis, the second axis perpendicular to the first axis;

a tilt detection component operable to detect rotation having a component around at least one of the first axis and the second axis;

a display operable to present a current image;

a motion tracking module operable to track motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component; and

a controller operable to generate the current image and to modify the current image in response to the motion of the device.

2. The motion controlled handheld device of Claim 1, wherein:

the display comprises a viewable surface; and

the first axis and the second axis are substantially parallel to the viewable surface.

3. The motion controlled handheld device of Claim 1, wherein:

the tilt detection component comprises a third accelerometer operable to detect acceleration along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis; and wherein:

the motion tracking module is further operable to distinguish translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer.

FITBIT 1002
Fitbit v. Immersion

4. The motion controlled handheld device of Claim 1, wherein the tilt detection component comprises:

a third accelerometer operable to detect acceleration along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

a camera operable to generate a video stream; and

a video analysis module operable to detect a direction of motion based on the video stream.

5. The motion controlled handheld device of Claim 4, wherein the tilt detection component further comprises:

a range finder operable to determine distance information including a distance between the device and an object in the video stream; and wherein:

the video analysis module is further operable to determine a magnitude of translation of the device using the distance.

6. The motion controlled handheld device of Claim 1, wherein the tilt detection component comprises:

a first camera operable to generate a first video stream, the first camera aligned to focus in a first direction along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

a second camera operable to generate a second video stream, the second camera aligned to focus in a second direction along the third axis, the second direction opposite the first direction; and

a video analysis module operable to detect a direction of motion of the device based on the first video stream and the second video stream.

7. The motion controlled handheld device of Claim 6, wherein the tilt detection component further comprises a third accelerometer operable to detect acceleration along the third axis.

FITBIT 1002
Fitbit v. Immersion

8. The motion controlled handheld device of Claim 6, wherein the video analysis module is further operable to:

detect first edges of objects in the first video stream;

detect second edges of objects in the second video stream;

identify movement of the first edges and the second edges;

determine a differential between the movement of the first edges and the movement of the second edges; and

determine tilt components and translation components based on the differential.

9. The motion controlled handheld device of Claim 1, further comprising:

a gesture database comprising a plurality of gestures, each gesture defined by a motion of the device with respect to a first position of the device; and

a gesture mapping database mapping each of the gestures to a corresponding command; and wherein

the controller is further operable to compare the tracked motion of the device against the gestures to determine a received gesture, to identify the corresponding command mapped to the received gesture, and to execute the identified command to modify the current image.

10. The motion controlled handheld device of Claim 1, wherein:

the motion tracking module is further operable to identify translation of the device within a plane formed by the first axis and the second axis based upon motion of the device;

the current image displays a subsection of a larger image; and

the controller is further operable to continuously modify the current image to display another subsection of the larger image based on a resulting position of the device resulting from the translation.

11. The motion controlled handheld device of Claim 1, wherein the motion tracking module is further operable to disregard acceleration detected by the first

FITBIT 1002
Fitbit v. Immersion

accelerometer and acceleration detected by the second accelerometer first register below a noise threshold.

12. A method for controlling a handheld device comprising:

detecting acceleration along a first axis using a first accelerometer;

detecting acceleration along a second axis using a second accelerometer, the second axis perpendicular to the first axis;

detecting rotation having a component around at least one of the first axis and the second axis using a tilt detection component;

tracking motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component; and

displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

13. The method of Claim 12, wherein:

the display comprises a viewable surface; and

the first axis and the second axis are substantially parallel to the viewable surface.

14. The method of Claim 12, further comprising:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

distinguishing translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer.

FITBIT 1002
Fitbit v. Immersion

15. The method of Claim 12, further comprising:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

monitoring a video stream generated by a camera of the device; and

detecting a direction of motion based on the video stream.

16. The method of Claim 15, further comprising:

determining distance information including a distance between the device and an object in the video stream; and

determining a magnitude of translation of the device using the distance.

17. The method of Claim 12, further comprising:

monitoring a first video stream generated by a first camera of the device, the first camera aligned to focus in a first direction along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

monitoring a second video stream generated by a second camera of the device, the second camera aligned to focus in a second direction along the third axis, the second direction opposite the first direction; and

detecting a direction of motion of the device based on the first video stream and the second video stream.

18. The method of Claim 17, further comprising:

detecting first edges of objects in the first video stream;

detecting second edges of objects in the second video stream;

identifying movement of the first edges and the second edges;

determining a differential between the movement of the first edges and the movement of the second edges; and

determining tilt components and translation components based on the differential.

FITBIT 1002
Fitbit v. Immersion

19. The method of Claim 12, further comprising:

comparing the tracked motion of the device against a gesture database, the gesture database comprising a plurality of gestures with each gesture defined by a motion of the device with respect to a first position of the device;

identifying a command mapped to the received gesture; and

executing the identified command to modify the current image.

20. Logic for controlling a handheld device, the logic embodied in a computer readable medium and operable when executed to perform the steps of:

detecting acceleration along a first axis using a first accelerometer;

detecting acceleration along a second axis using a second accelerometer, the second axis perpendicular to the first axis;

detecting rotation having a component around at least one of the first axis and the second axis using a tilt detection component;

tracking motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component; and

displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

21. The logic of Claim 20, further operable when executed to perform the steps of:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

distinguishing translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer.

FITBIT 1002
Fitbit v. Immersion

22. The logic of Claim 20, further operable when executed to perform the steps of:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

monitoring a video stream generated by a camera of the device; and

detecting a direction of motion based on the video stream.

23. The logic of Claim 20, further operable when executed to perform the steps of:

determining distance information including a distance between the device and an object in the video stream; and

determining a magnitude of translation of the device using the distance.

24. The logic of Claim 20, further operable when executed to perform the steps of:

monitoring a first video stream generated by a first camera of the device, the first camera aligned to focus in a first direction along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

monitoring a second video stream generated by a second camera of the device, the second camera aligned to focus in a second direction along the third axis, the second direction opposite the first direction; and

detecting a direction of motion of the device based on the first video stream and the second video stream.

FITBIT 1002
Fitbit v. Immersion

25. The logic of Claim 24, further operable when executed to perform the steps of:

detecting first edges of objects in the first video stream;

detecting second edges of objects in the second video stream;

identifying movement of the first edges and the second edges;

determining a differential between the movement of the first edges and the movement of the second edges; and

determining tilt components and translation components based on the differential

26. The logic of Claim 20, further operable when executed to perform the steps of:

comparing the tracked motion of the device against a gesture database, the gesture database comprising a plurality of gestures with each gesture defined by a motion of the device with respect to a first position of the device;

identifying a command mapped to the received gesture; and

executing the identified command to modify the current image.

27. A motion controlled handheld device comprising:

means for detecting acceleration along a first axis;

means for detecting acceleration along a second axis, the second axis perpendicular to the first axis;

means for detecting rotation having a component around at least one of the first axis and the second axis;

means for tracking motion of the device in three dimensions based upon the acceleration along the first axis, the acceleration along the second axis, and the rotation; and

means for displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

FITBIT 1002
Fitbit v. Immersion

1/11

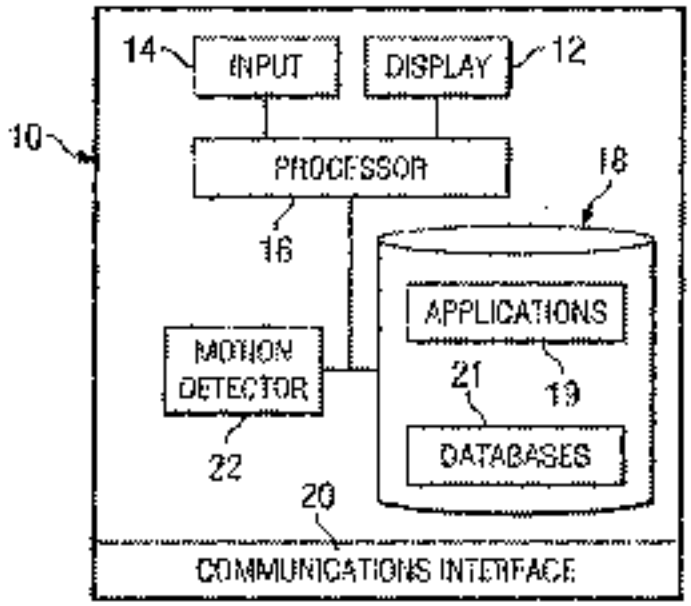


FIG. 1

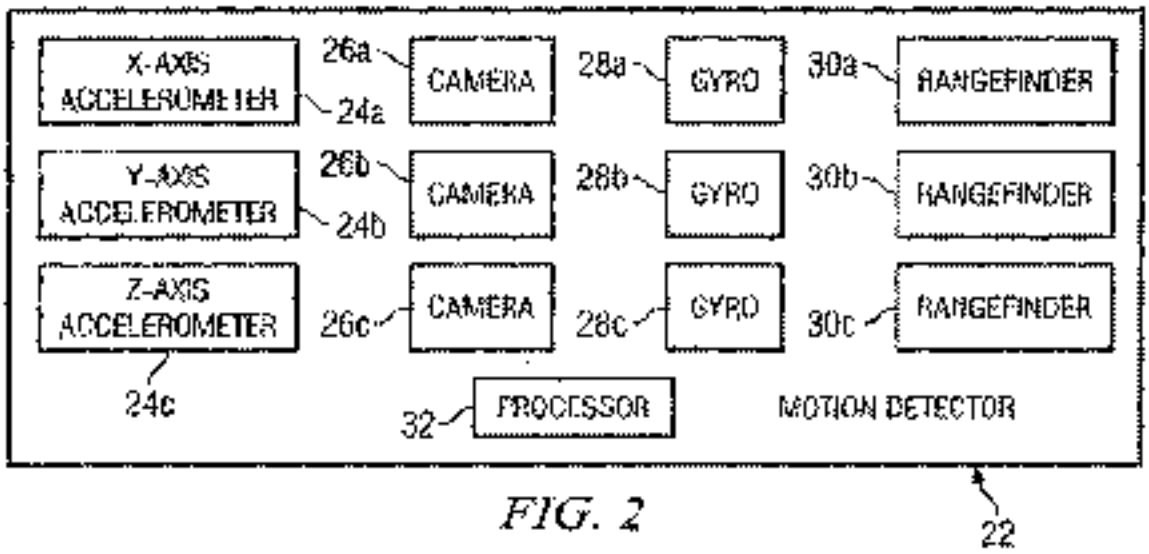


FIG. 2

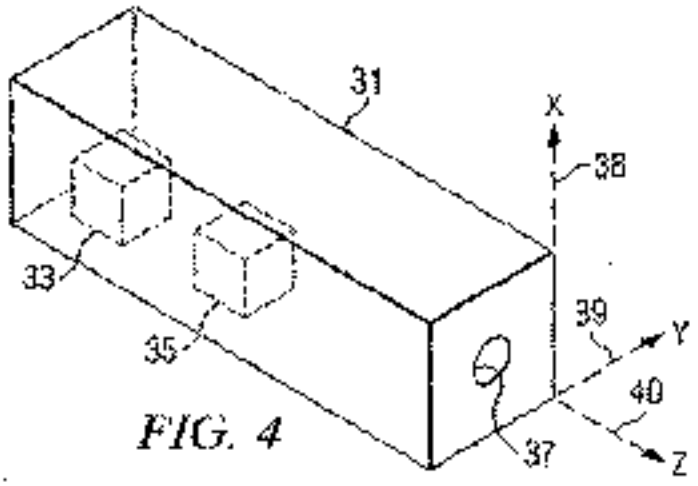


FIG. 4

FITBIT 1002
Fitbit v. Immersion

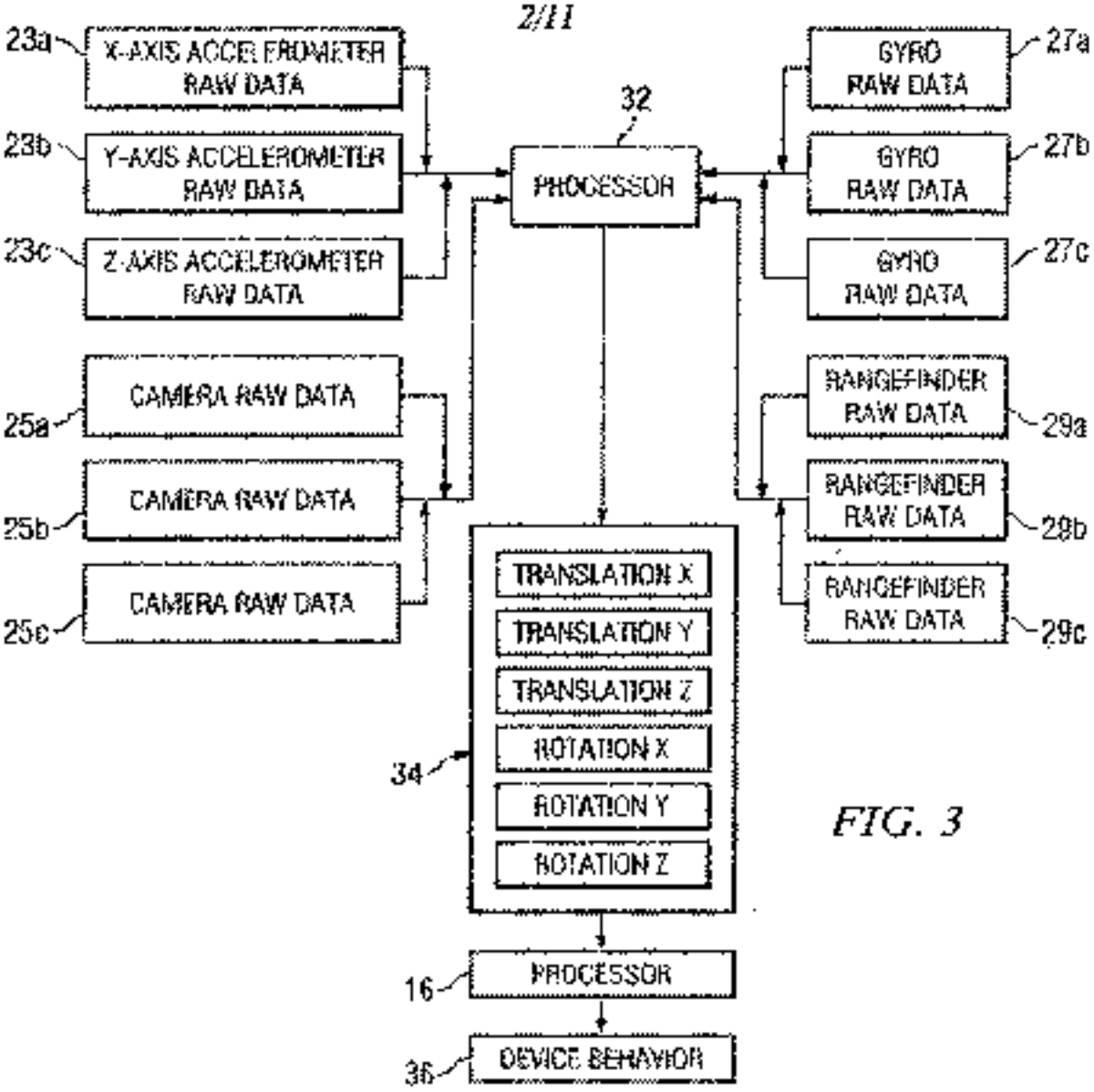


FIG. 3

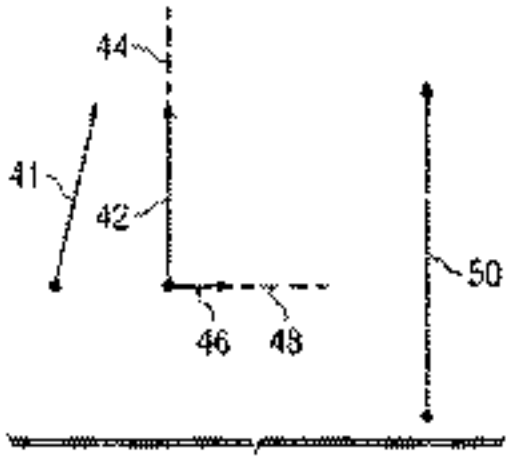


FIG. 5

FITBIT 1002
Fitbit v. Immersion

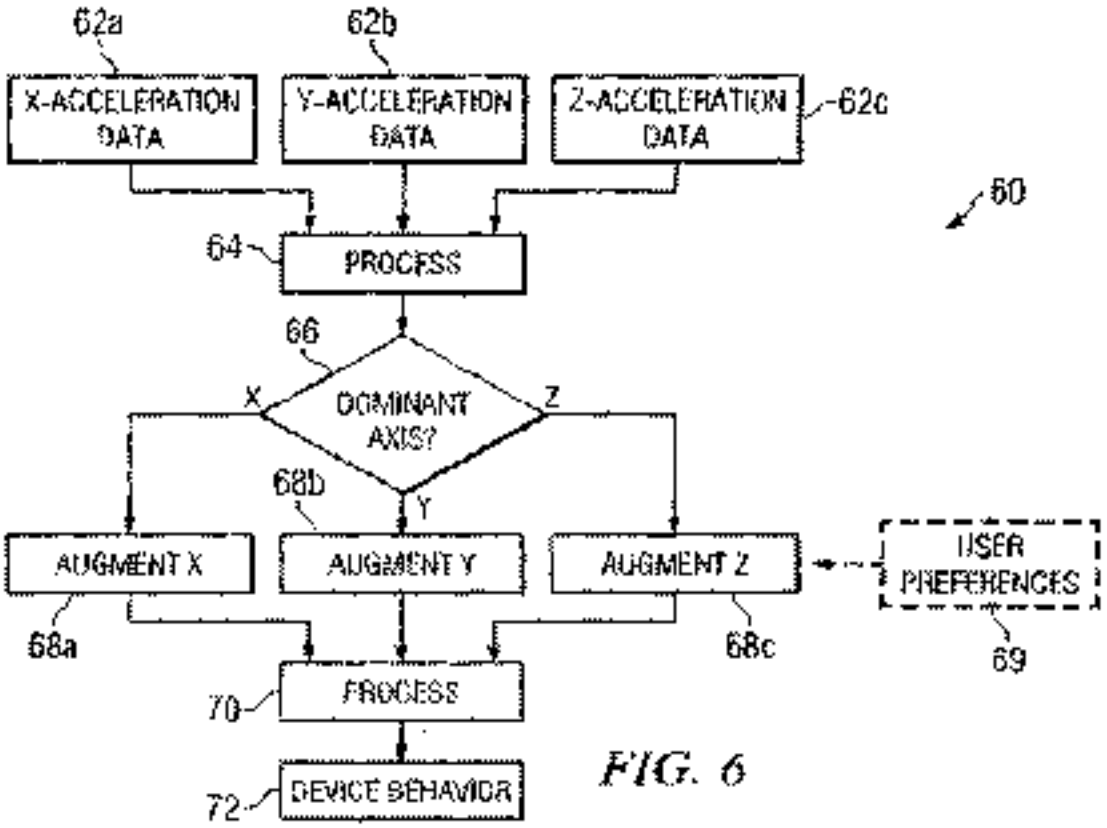


FIG. 6

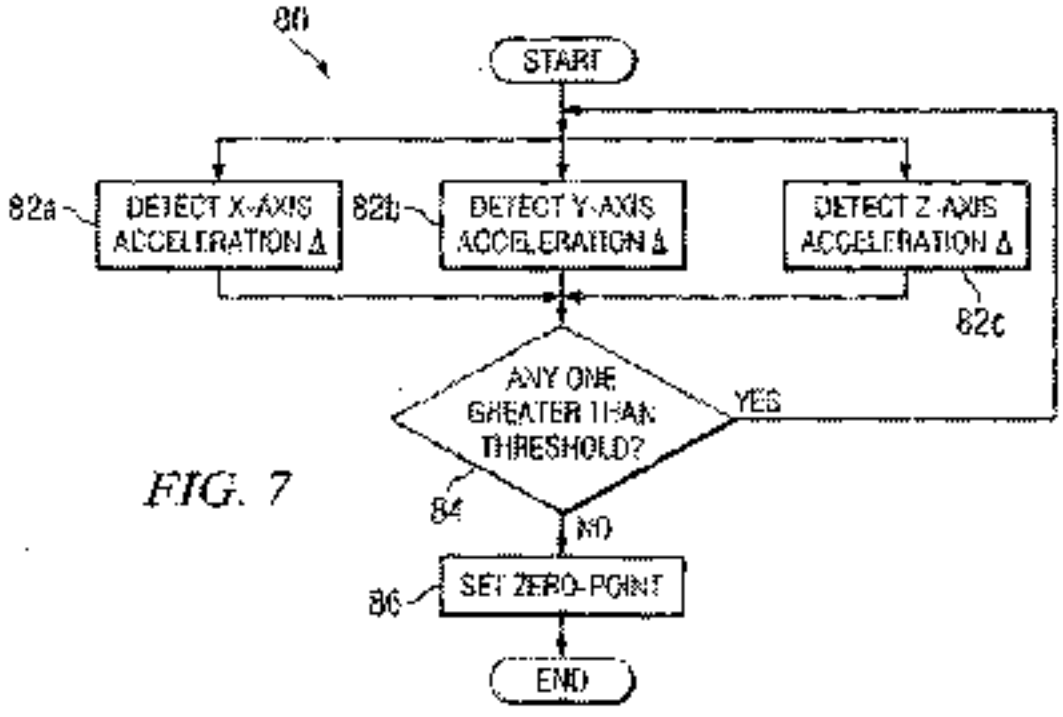


FIG. 7

FITBIT 1002
Fitbit v. Immersion

FIG. 8

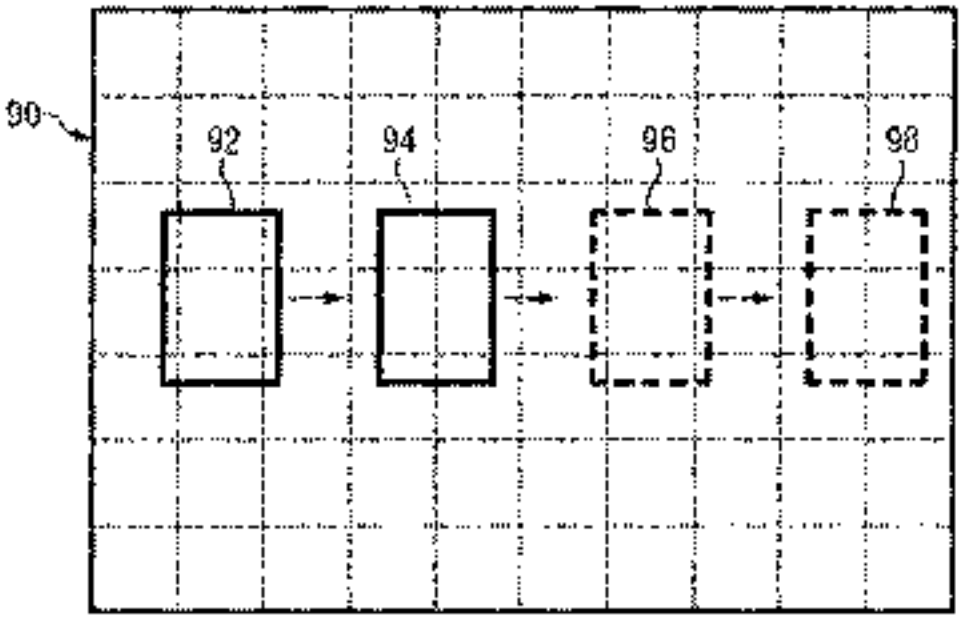
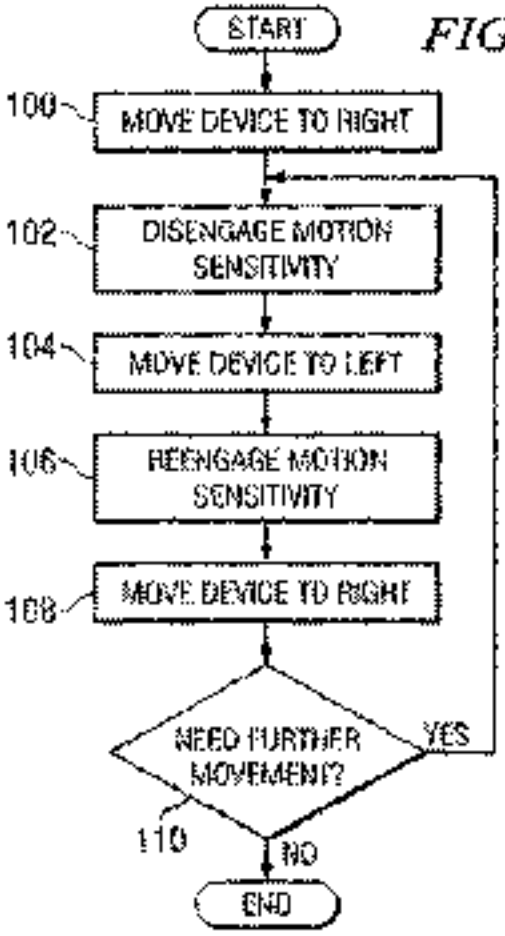


FIG. 9



FITBIT 1002
Fitbit v. Immersion

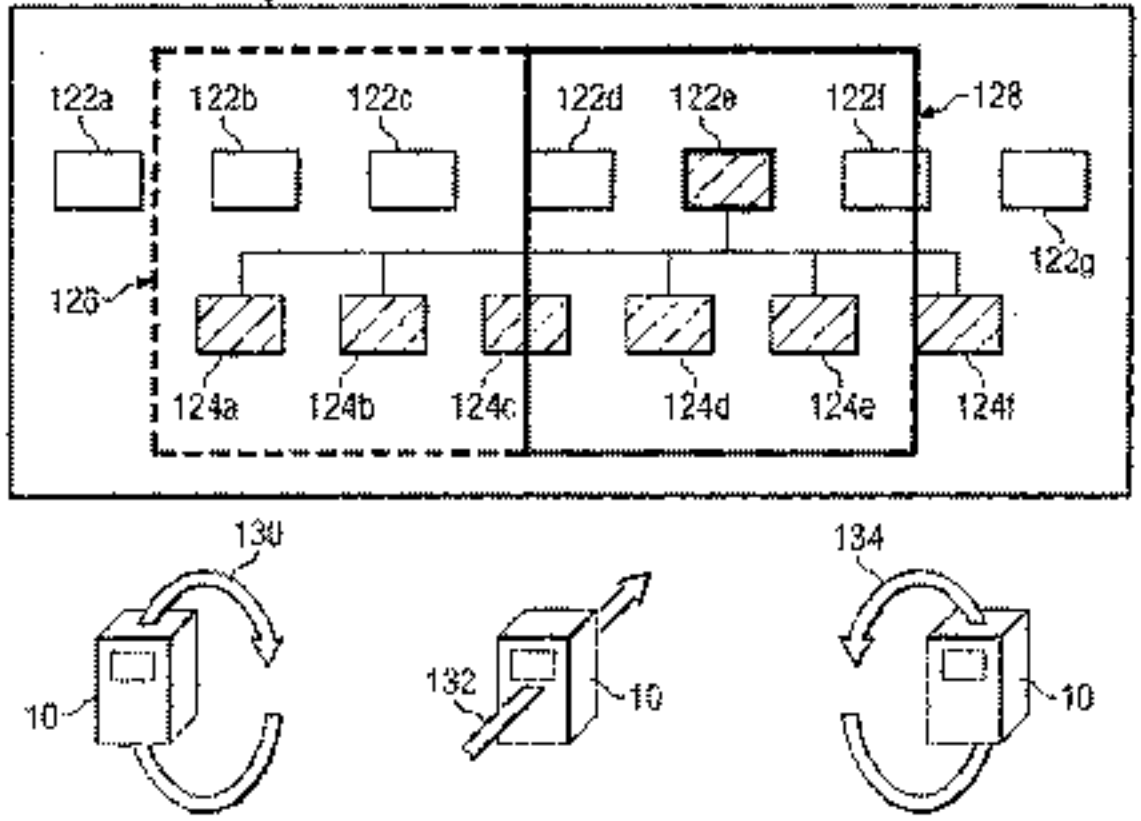


FIG. 10A

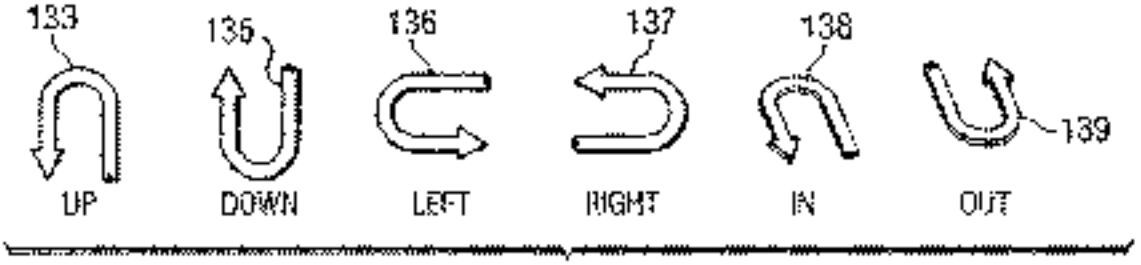


FIG. 10B

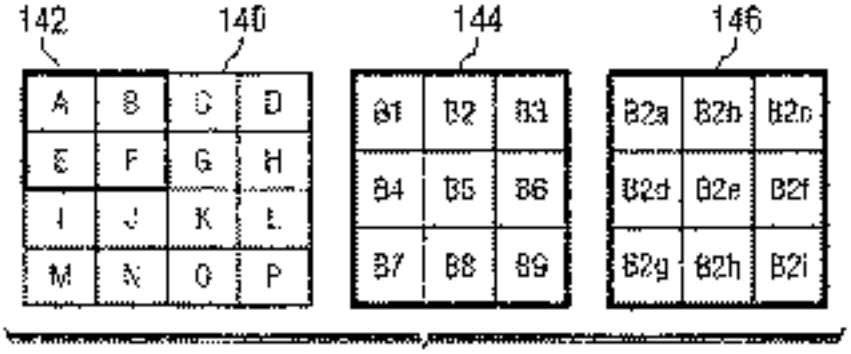


FIG. 11

FITBIT 1002
Fitbit v. Immersion

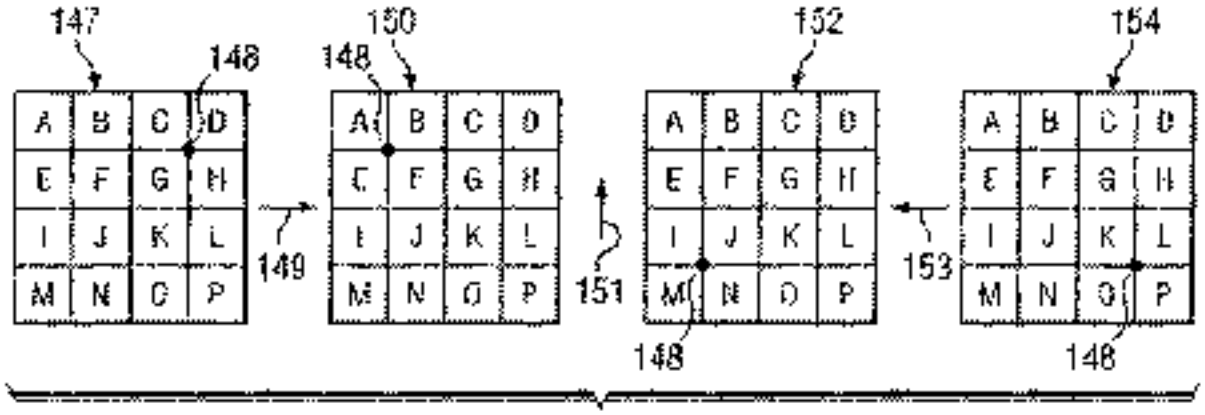


FIG. 12A

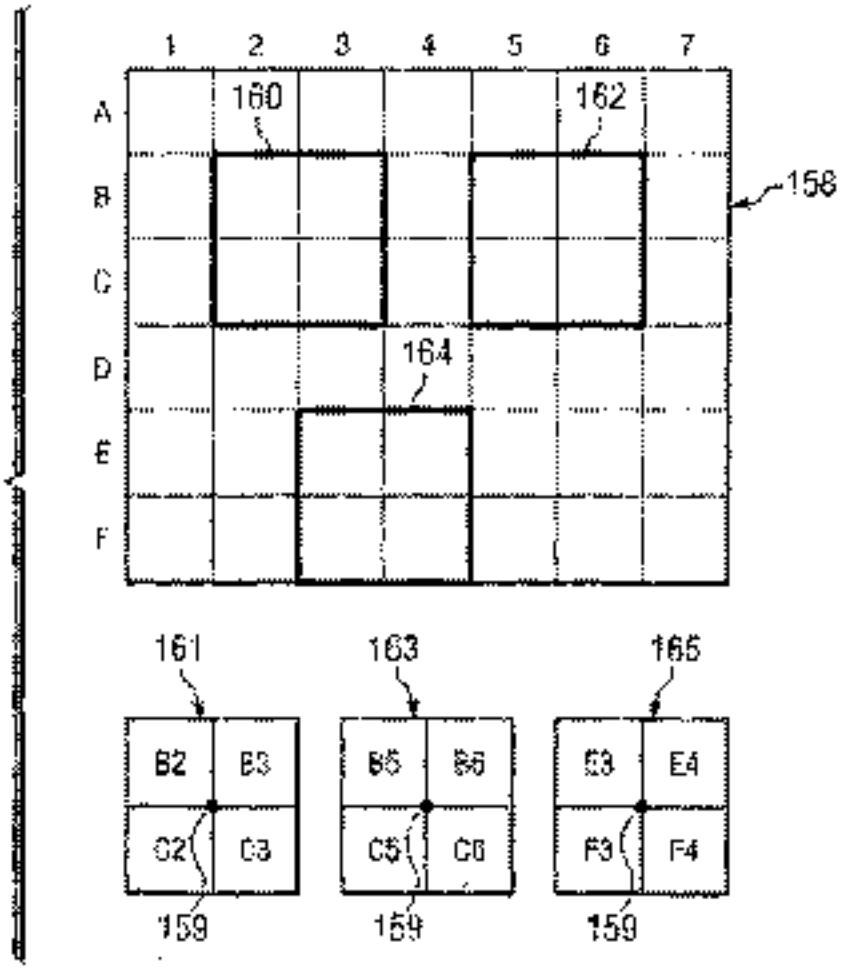


FIG. 12B

FITBIT 1002
Fitbit v. Immersion

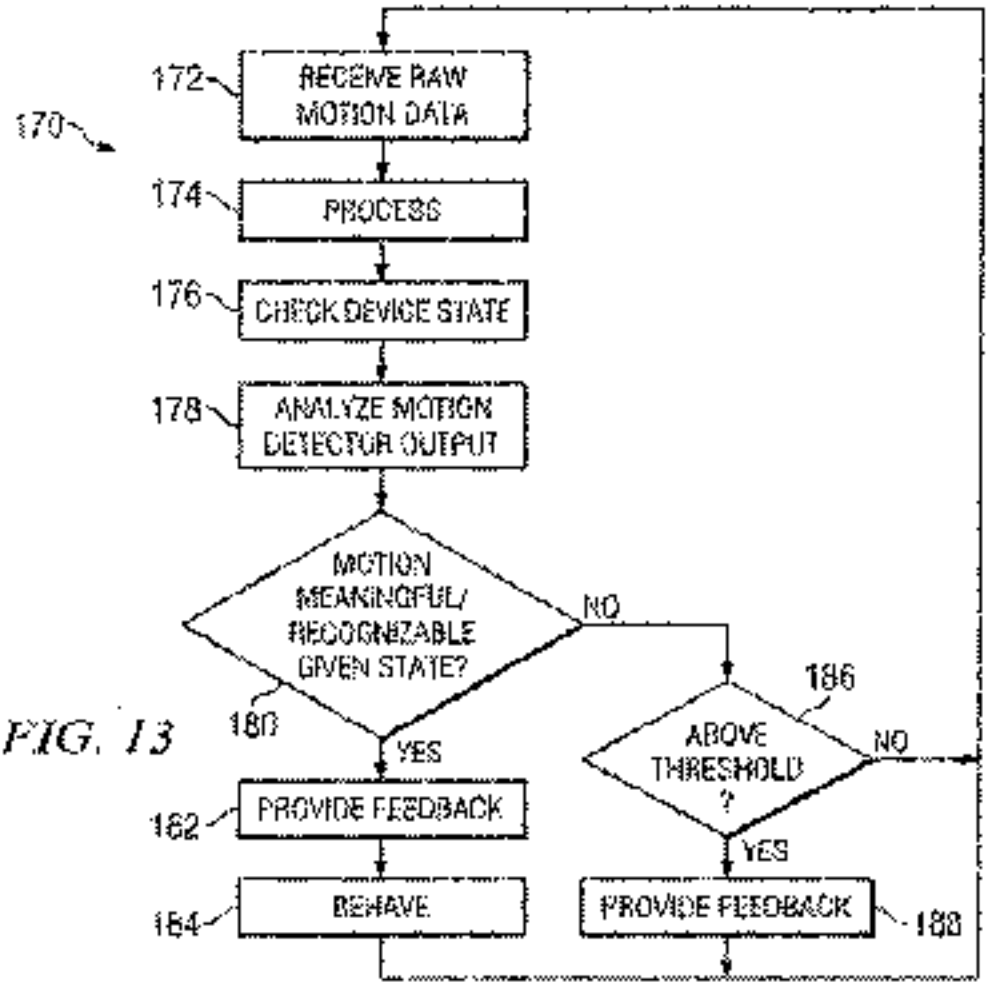


FIG. 13

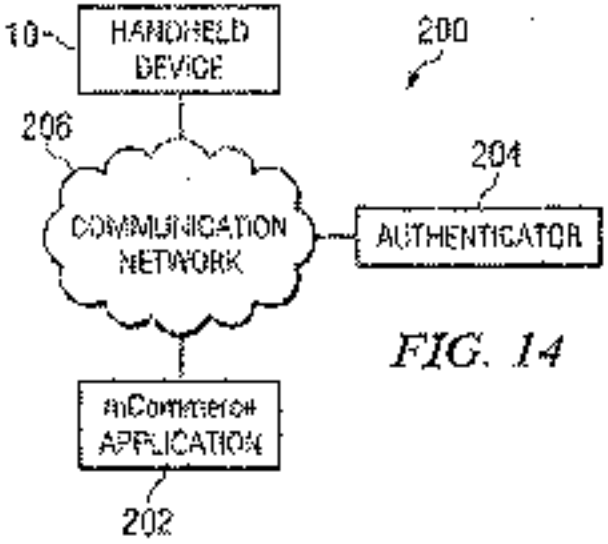


FIG. 14

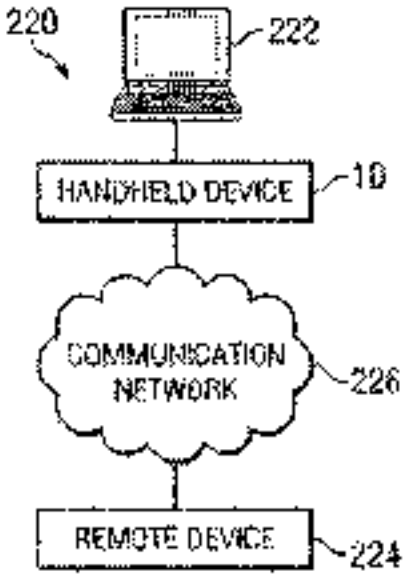


FIG. 15

FITBIT 1002
Fitbit v. Immersion

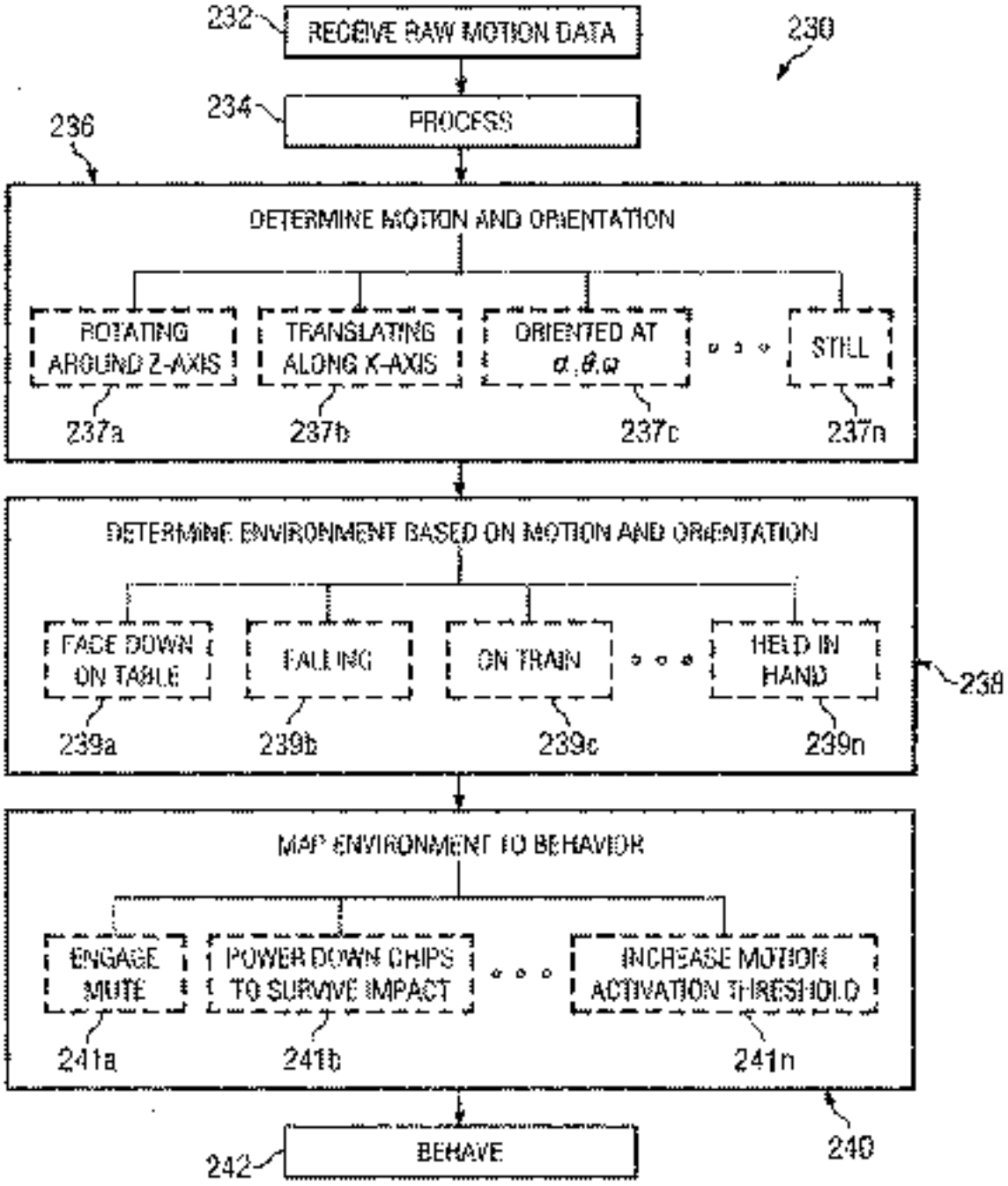


FIG. 16

FITBIT 1002
Fitbit v. Immersion

9/11

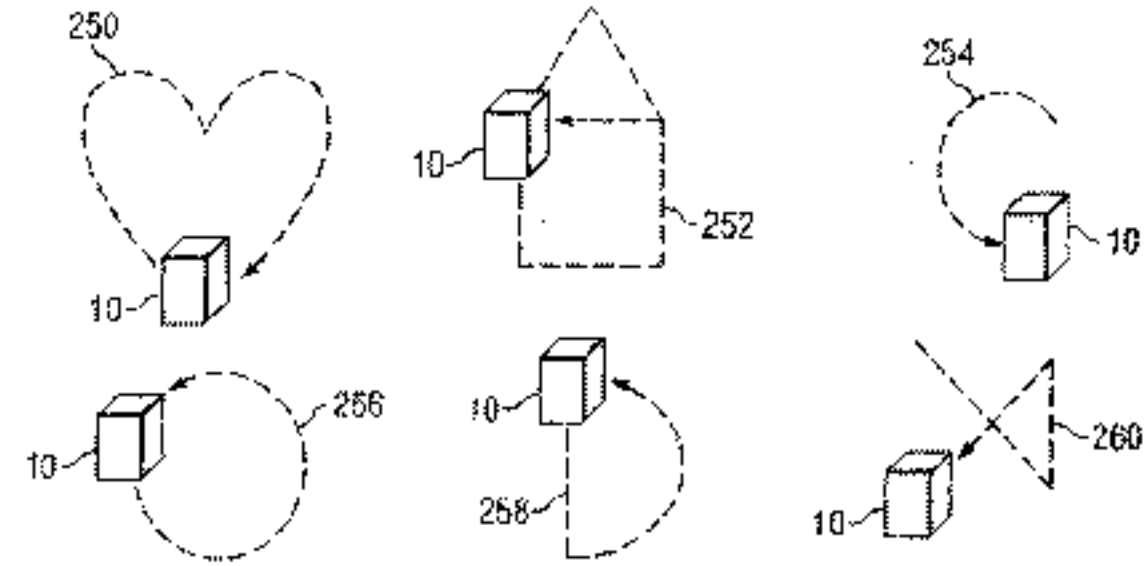


FIG. 17

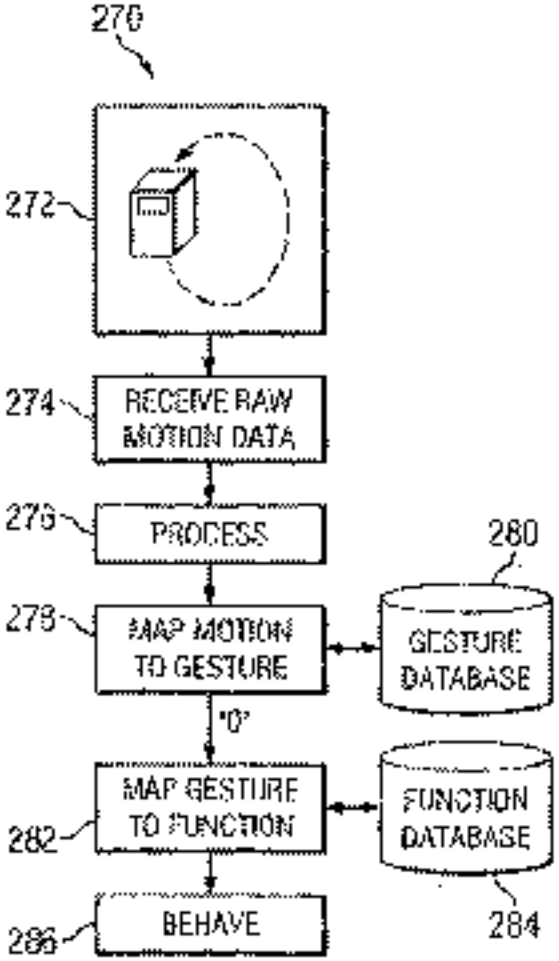


FIG. 18

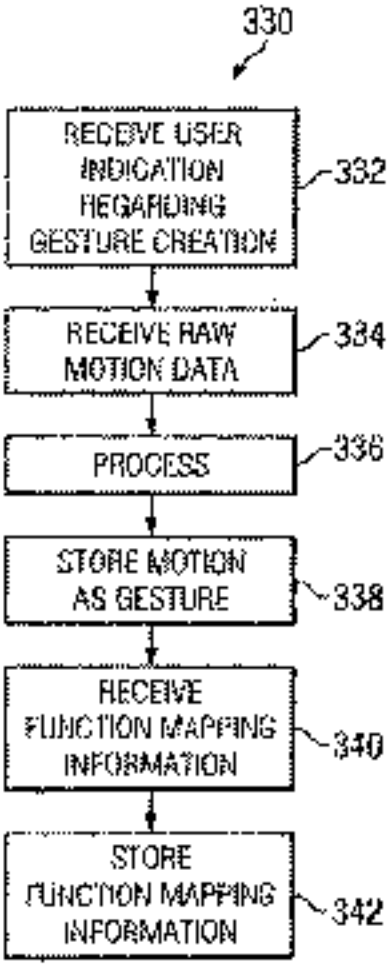


FIG. 21

FITBIT 1002
Fitbit v. Immersion

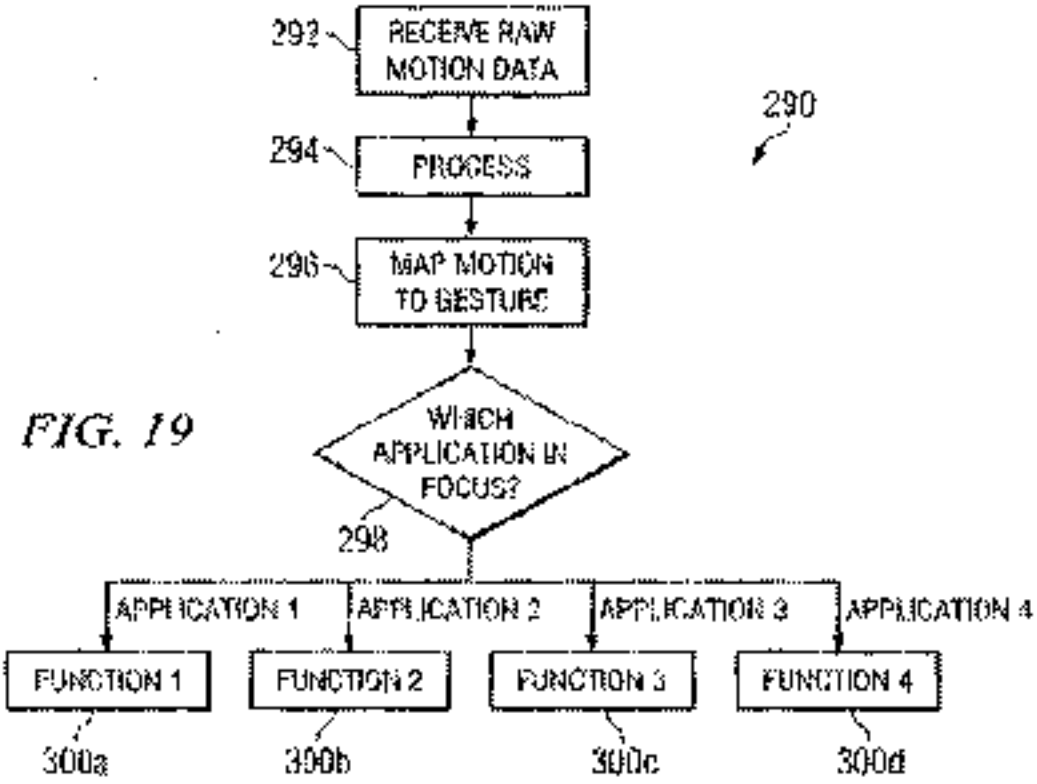


FIG. 19

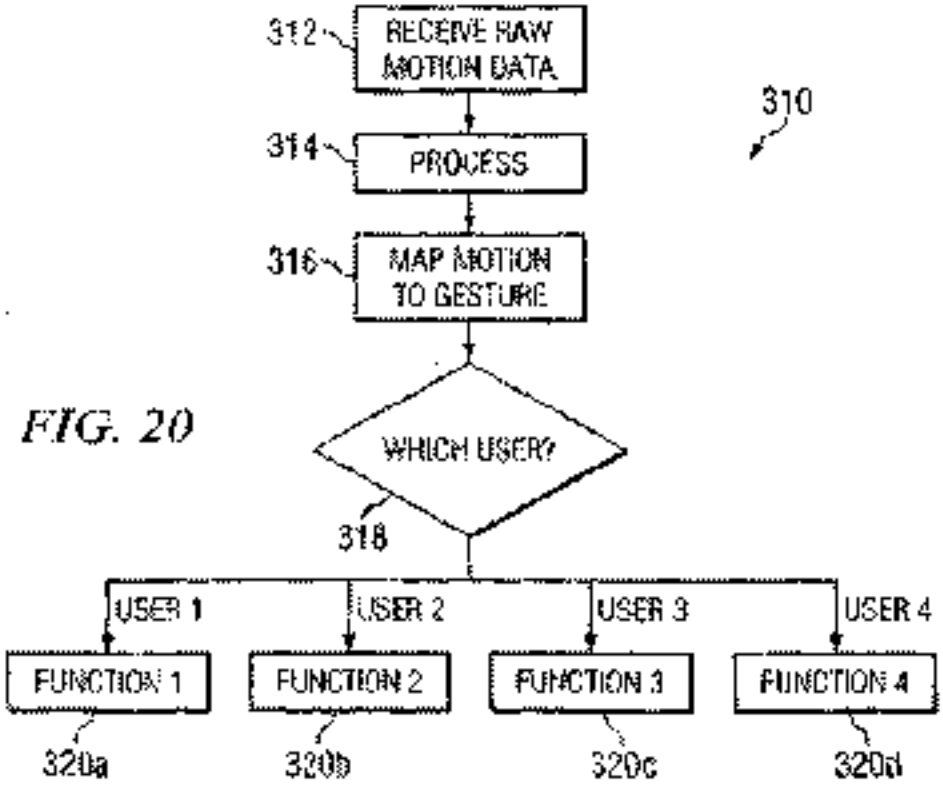


FIG. 20

FITBIT 1002
Fitbit v. Immersion

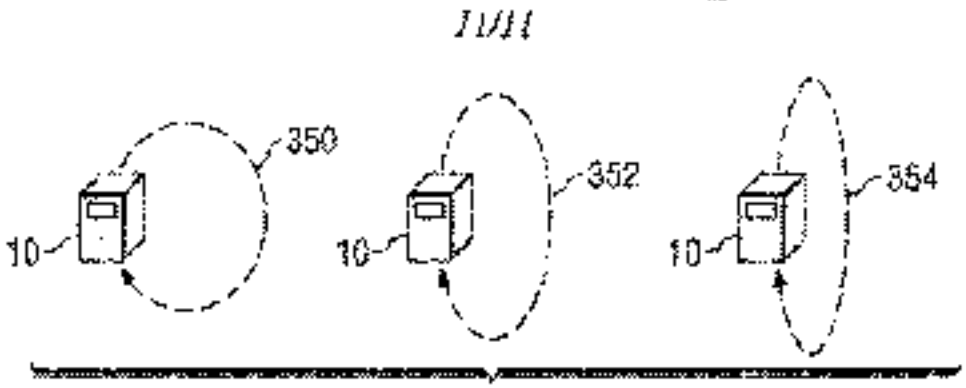


FIG. 22

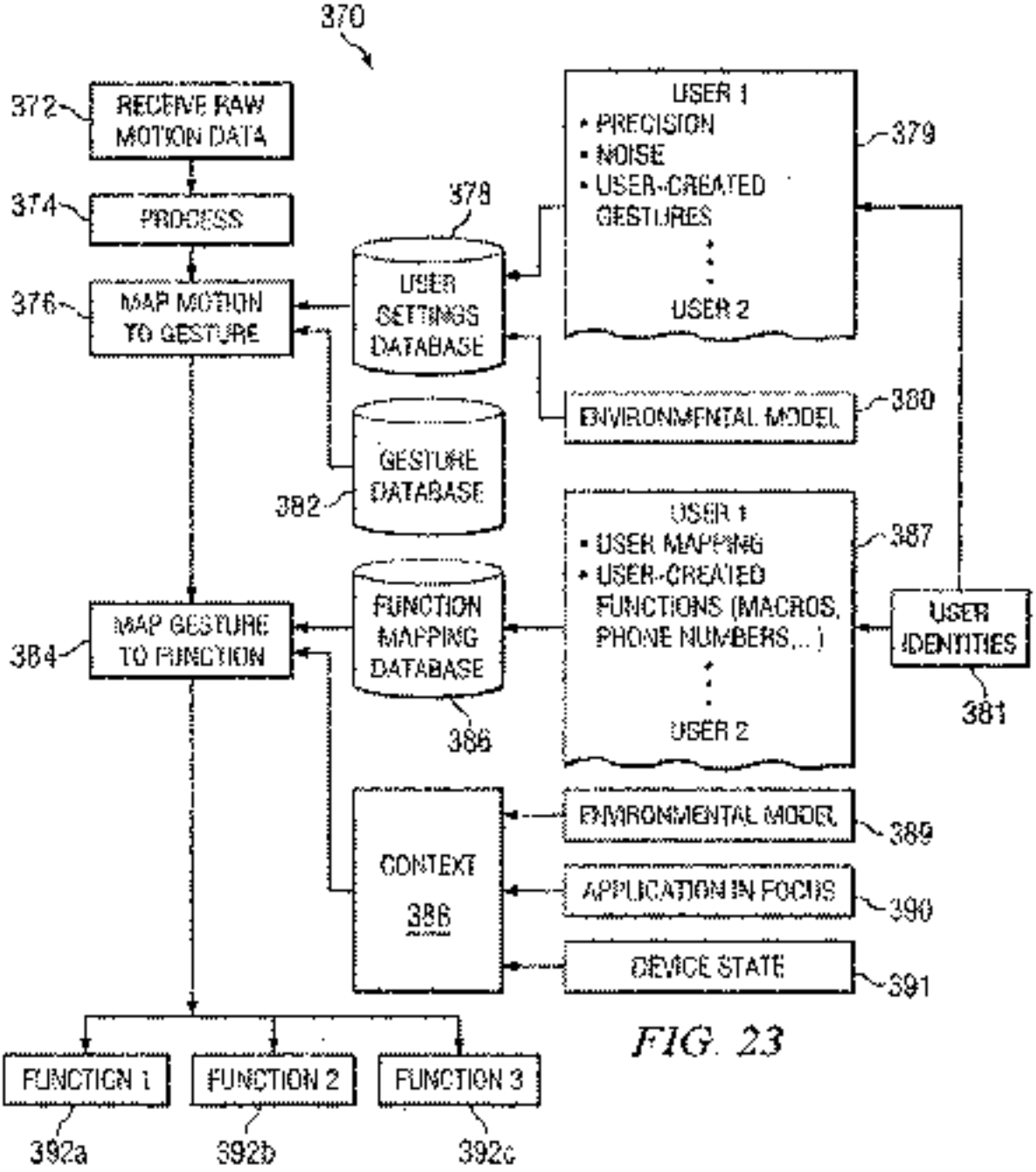


FIG. 23

FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Amber Johnson
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	16612862
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	Systems And Methods For Transmuting Haptic Messages
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Amber Johnson
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	16-AUG-2013
Filing Date:	14-JUL-2009
Time Stamp:	15:19:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	1722
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

EXHIBIT 1002
Fitbit v. Immersion

1	Miscellaneous Incoming Letter	Transmittal.pdf	40349	no	1
Warnings:					
Information:					
2	Transmittal Letter	Certification.pdf	202096	no	5
Warnings:					
Information:					
3	Information Disclosure Statement (IDS) Form (SB08)	08a.pdf	62258	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
4	Non Patent Literature	JPDA05282013.pdf	3799614	no	4
Warnings:					
Information:					
5	Foreign Reference	WO2005103863.pdf	12220586	no	76
Warnings:					
Information:					
6	Fee Worksheet (SB06)	fee-info.pdf	30189	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	16355092		

FITBIT 1002
Fitbit v. Immersion

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
	)	Conf No.. 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2688
Serial No. 12/502,702	)	
	)	Examiner: **Wong, Kin C.**
Filed: July 14, 2009	)	
	)	

For: Systems and Methods for Transmitting Haptic Messages

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Sir:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Supplemental Information Disclosure Statement Letter;
2. Form PTO/SB/08a listing Three (3) Documents;
3. One (1) Foreign Patent Document;
4. One (1) Non Patent Literature Document; and
5. EFS-Web Payment in the amount of $180 (IDS Fee).

The Commissioner is hereby authorized to charge any deficiency to Deposit Account Number 20-1430.

Respectfully submitted,

Date: 8/15/2013

Michael T. Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing
I hereby certify that this correspondence is being electronically filed with The United States Patent Office via EFS-Web on August 15, 2013.

Amber C Johnson

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David M. Birnbaum et al.	)	
	)	Conf. No.: 6699
Serial No. 12/502,702	)	
	)	Art Unit: 2688
Filed: July 14, 2009	)	
	)	Examiner: Wong, Kin C.
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	)	
Attorney Ref. IMM351 (51851-378586)	)	

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☐ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

FITBIT 1002
Fitbit v. Immersion

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(c)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. ☒ No statement; therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

a. ☐ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated

FITBIT 1002
Fitbit v. Immersion

in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☒ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 20-1430.

FITBIT 1002
Fitbit v. Immersion

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 20-1430 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 8/15/2013

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):

- [X] PTO/SB/08
- [X] Documents
- [X] Fee
- [ ] Other

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

56901 7590 09/17/2013
PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
WONG, KIN C	

ART UNIT	PAPER NUMBER
2681	

DATE MAILED: 09/17/2013

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
12/502,702	07/14/2009	David Birnbaum	IMM351 (51851/378586)	6699

TITLE OF INVENTION: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1780	$300	$0	$2080	12/17/2013

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

FITBIT 1002
Fitbit v. Immersion

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

24350 7590 09/17/2013
PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/502,702	07/14/2009	David Birnbaum	IMMRS1.051851/378546	6699

TITLE OF INVENTION: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEES DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1780	$300	$0	$2080	12/17/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
WONG, KIN C	2688	345-173000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.
1 _____
2 _____
3 _____

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fees: (Please first reapply any previously paid issue fee shown above)
- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

FITBIT 1002
Fitbit v. Immersion

5 Change in Entity Status (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

☐ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/502,702	07/14/2009	David Birnbaum	IMM351 (51951/378586)	6609

7590 09/17/2013
PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
WONG, KIN C	

ART UNIT	PAPER NUMBER
2681	

DATE MAILED: 09/17/2013

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 564 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 564 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

FITBIT 1002
Fitbit v. Immersion

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

FITBIT 1002
Fitbit v. Immersion

Notice of Allowability	Application No. 12/502,702	Applicant(s) BIRNBAUM ET AL.	
	Examiner K. Wong	Art Unit 2658	AIA (First Inventor to File) Status No

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address*--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1 ☒ This communication is responsive to 8/5/13.

☐ A declaration(s)/affidavit(s) under 37 CFR 1.130(b) was/were filed on _____.

2 ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____, the restriction requirement and election have been incorporated into this action.

3 ☒ The allowed claim(s) is/are 1-37. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

4 ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

a) ☐ All b) ☐ Some * c) ☐ None of the:

1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____

Applicant has **THREE MONTHS FROM THE "MAILING DATE"** of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in **ABANDONMENT** of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.

☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1 ☐ Notice of References Cited (PTO-892)
2 ☒ Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____
3 ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
4 ☐ Interview Summary (PTO-413), Paper No./Mail Date _____.
5. ☐ Examiner's Amendment/Comment
6. ☐ Examiner's Statement of Reasons for Allowance
7. ☐ Other _____

/K. Wong/
Primary Examiner
Art Unit: 2658

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete If Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2628
Examiner Name	Wong, Kin C.
Attorney Docket Number	IMM351 (51851/378586)

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.*	Document Number: Number - Kind Code[1] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
	1	US-2001/0045941 A1	11-29-2001	Rosenberg et al	
	2	US-2005/0062450 A1	03-10-2005	Shahoian et al.	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[2] - Number[3] - Kind Code[4] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[5]
	3	JP 2007-531158	11-01-2007	Unknown		X
	4	JP 2007-531163	11-01-2007	Unknown		X
	5	JP 2007-535273	11-29-2007	Unknown		X

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[2]
	6.	United States Patent and Trademark Office, Office Action, Application No. 12/697,030, mailed June 3, 2013	
	7.	Notice of Reasons for Rejection, Japanese Application No. 2011-518849, dated May 28, 2013	

Examiner Signature	/K. Wong/	Date Considered	09/06/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.W./

FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David M. Birnbaum
Art Unit	2688
Examiner Name	Wong, Kin C
Attorney Docket Number	IMM351 (51851/378536)

U.S. PATENT DOCUMENTS

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	1.	US-2006/0279476	12-14-2006	Obata	

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[3] - Number[4] - Kind Code[5] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T[6]
	2	WO 2005/112287 A1	11-24-2005	Sony Ericsson Mobile Communications AB		X
						X
						X

NON PATENT LITERATURE DOCUMENTS

Examiner Initials *	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T[7]
	3.	Japanese Patent Office, Notice for Reasons of Rejection, Japanese Patent Application No. 2011-518648, dated May 28, 2013.	

Examiner Signature	/K. Wong/	Date Considered	09/08/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.W./

FITBIT 1002
Fitbit v. Immersion

Issue Classification

Application/Control No.	Applicant(s)/Patent Under Reexamination
12502702	BIRNBAUM ET AL.
Examiner	**Art Unit**
K. WONG	2688

CPC

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CPC Combination Sets

Symbol				Type	Set	Ranking	Version
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NONE (Assistant Examiner)	(Date)	**Total Claims Allowed:** 31	
/K. WONG/ Primary Examiner.Art Unit 2688 (Primary Examiner)	9/16/13 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1 / 3

U.S. Patent and Trademark Office — Part of Paper No. 20130916

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12502702	BIRNBAUM ET AL.
	Examiner	Art Unit
	K. WONG	2688

US ORIGINAL CLASSIFICATION		INTERNATIONAL CLASSIFICATION										
CLASS	SUBCLASS	CLAIMED					NON-CLAIMED					
345	173	G	0	6	F	(continued)						
CROSS REFERENCE(S)												
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)											

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(Primary Examiner)	(Date)	1	1 / 3

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Fitbit v. Immersion

Issue Classification	Application/Control No.	Applicant(s)/Patent Under Reexamination
	12502702	BIRNBAUM ET AL.
	Examiner	Art Unit
	K. WONG	2688

☒ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47

First	Original	First	Original	First	Original	First	Original	First	Original	First	Original	First	Original	First	Original
	1		17												
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	16														

NONE (Assistant Examiner)	(Date)	Total Claims Allowed: 31	
/K. WONG/ Primary Examiner.Art Unit 2688 (Primary Examiner)	9/16/13 (Date)	O.G. Print Claim(s) 1	O.G. Print Figure 1 / 3

U.S. Patent and Trademark Office

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FITBIT 1002
Fitbit v. Immersion

Search Notes	Application/Control No.	Applicant(s)/Patent under Reexamination
	12/502,702	BIRNBAUM ET AL
	Examiner	Art Unit
	K. Wong	2688

SEARCHED			
Class	Subclass	Date	Examiner

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner
See East interference search history report		9/16/2013	KW

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
See East search history report	9/16/2013	KW
Consult w/ W. Young	9/5/2013	KW

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1272	(sensor) and (haptic near3 effect) and (accelerometer or gyroscope or (touch sens$3))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2013/09/16 09:23
L2	256	(sensor) and (haptic near3 effect) and (accelerometer or gyroscope or (touch sens$3)) and (transmit$4 near3 haptic)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2013/09/16 09:23
L3	246	(display or screen) and (sensor) and (haptic near3 effect) and (accelerometer or gyroscope or (touch sens$3)) and (transmit$4 near3 haptic)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2013/09/16 09:25
L4	175	(display or screen) and (sensor) and (haptic near3 effect) and (accelerometer or gyroscope or (touch sens$3)) and (transmit$4 near3 (haptic effect))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2013/09/16 09:25
L5	33	(display or screen) and (sensor) and (haptic near3 effect) and (accelerometer or gyroscope or (touch sens$3)) and (transmit$4 near3 (haptic effect)) and (gesture)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	NEAR	ON	2013/09/16 09:26

EAST Search History (Interference)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L6	33	(display or screen) and (sensor) and (haptic near3 effect) and (accelerometer or gyroscope or (touch sens$3)) and (transmit$4 near3 (haptic effect)) and (gesture)	US-PGPUB; USPAT; UPAD	NEAR	ON	2013/09/16 09:26

9/16/2013 9:27:28 AM

FITBIT 1002
Fitbit v. Immersion

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

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First Named Inventor	David Birnbaum
Art Unit	2688
Examiner Name	Kin C. Wong
Attorney Docket Number	IMM351 (51851/376566)

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US-			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[2] - number[3] - Kind Code[4] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T*
	1	WO 2007057895 A2	07-25-2007	Immersion Corp.		
	2	EP 1728142 A2	12-06-2006	Fujitsu Ltd		
	3	JP 2005-352924	00-00-2005	Sony Corp		
	4	JP 06-100900	04-22-1993	Fujitsu Ltd.		

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T*
	5	Office Action dated October 14, 2013 for corresponding European Patent Application 09790488.4	
	6	Office Action dated October 14, 2013 for corresponding European Patent Application 09790402.3	
	7	Office Action dated October 14, 2013 for corresponding European Patent Application 09790400.9	
	8	Anonymous: "OSGiW 2002 - Interactive Posters", 26 June 2002, pages 1-1, XP55302201, Retrieved from the Internet: URL: http://www.sem.org/pdf/Interact/Posters2002-03-posters.html [retrieved on 2013-10-03]	
	9	Office Action dated October 14, 2013 for corresponding European Patent Application 09790419.9	
	10	Notice of Reasons for Rejection dated August 20, 2013 for corresponding Japanese Patent Application 2011-518852	
	11	Office Action dated October 22, 2013 for corresponding Japanese Patent Application 2011-518849	
	12	Office Action dated October 17, 2013 for corresponding Chinese Patent Application 200980127925.0	

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FITBIT 1002
Fitbit v. Immersion

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(74) Agent: RIEGEL, James, R.; Immersion Corp., 801 Fox Lane, San Jose, CA 95131 (US).

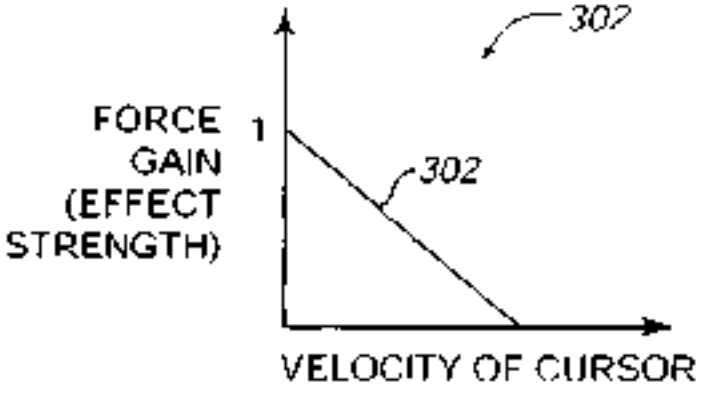
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(54) Title: CONTROLLING HAPTIC FEEDBACK FOR ENHANCING NAVIGATION IN A GRAPHICAL ENVIRONMENT



(57) Abstract: Method and apparatus for controlling haptic feedback to enhance navigation of a cursor or other controlled displayed object in a graphical environment. An interface device is capable of communicating with a computer running an application program and generating a graphical environment. Includes an actuator for outputting a haptic effect to a user of the interface device. A modulator modulates the magnitude of the haptic effect in relation to, in various embodiments, a velocity of the cursor or user manipulatable object, a rate of interaction of the cursor with graphical objects, and/or an amount of time that the cursor engages the graphical object.

WO 02/057885 A2

FITBIT 1002
Fitbit v. Immersion

CONTROLLING HAPTIC FEEDBACK FOR ENHANCING NAVIGATION IN A GRAPHICAL ENVIRONMENT

BACKGROUND OF THE INVENTION

The present invention relates to an interface device that allows a user to interface with a computer, and more particularly to a haptic feedback interface device allowing a user to interface with a graphical environment displayed by a computer.

Computer systems are used extensively to implement many applications, such as word processing, data management, simulations, games, internet browsing, and other tasks. A computer system typically displays a visual environment to a user on a display screen or other visual output device. Users can interact with the displayed environment to perform functions on the computer, e.g., play a game, operate an application program, experience a simulation, use a computer aided design (CAD) system, etc. Such user interaction can be implemented through the use of a human-computer interface device, such as a joystick, mouse, trackball, steering wheel, knob, stylus and tablet, "joypad" button controller, foot pedal, yoke hand grip, or the like, that is connected to the computer system controlling the displayed environment. The computer updates the environment in response to the user's manipulation of a manipulatable object ("manipulandum"), and provides feedback to the user utilizing the display screen.

One visual, graphical environment that is particularly common is a graphical user interface (GUI). Information within GUI's are presented to users visibly and/or audibly. Common GUI's include the Windows® operating system from Microsoft Corporation and the MacOS® operating system from Apple Computer, Inc. These interfaces allows a user to graphically select and manipulate functions of the operating system, of application programs, and of the computer by using an input device, such as a mouse, trackball, joystick, or the like. Other graphical computer environments are similar to GUI's. For example, graphical "pages" for internet or World Wide Web browsers, computer aided design (CAD) systems, etc. also provide graphical presentations to the user. A graphical environment may also comprise a game or simulation environment.

Several types of tasks are typically performed by a user in a graphical environment. A

FITBIT 1002
Fitbit v. Immersion

cursor is often used to select graphical objects or manipulate graphical objects, such as resizing or moving the objects. The user must navigate a cursor through the graphical objects in the environment to perform these tasks and to place the cursor in desired locations to perform other tasks. Thus, it is desirable to provide an interface device and method that will provide improved haptic feedback, for example while navigating a graphical environment.

SUMMARY OF THE INVENTION

The inventions disclosed herein are directed to enhancing the navigation of a cursor or other controlled displayed object within a graphical environment, particularly in relation to other graphical objects displayed in the environment. Some inventions are related to the object interaction of the cursor, while others are related to duration of engagement of the cursor with other graphical objects.

More particularly, one aspect of the present inventions provides an interface device capable of communicating with a computer running an application program and generating a graphical environment. The interface device includes a user manipulatable object capable of controlling the motion of a cursor displayed in the graphical environment and an actuator for outputting a haptic effect to a user of the interface device. A modulator modulates the magnitude of the haptic effect in relation to a selected function. The function can be selected based on a current navigational task of the user, such as selecting one or more graphical objects, positioning a cursor in relation to objects, or dragging, moving, resizing, or otherwise manipulating graphical objects. The function can modulate magnitude based on, for example, a velocity of the cursor, where the magnitude of the haptic effect at a lower cursor velocity is greater than the magnitude of the haptic effect at a higher cursor velocity. Alternatively or additionally, the magnitude can be modulated based on a rate of interaction of the cursor with graphical objects displayed in the graphical environment. The magnitude of the haptic effect at a lower rate of interaction can be made greater than the magnitude of the haptic effect at a higher rate of interaction. In other embodiments, the magnitude can be modulated based on a time of engagement of the cursor with a graphical object. A time function can provide a magnitude inversely proportional to an amount of time that has lapsed since the cursor engaged the target.

FITBIT 1002
Fitbit v. Immersion

The present inventions control haptic output of a haptic feedback device to assist the user in navigating a graphical environment such as a GUI, where haptic feedback is provided when it would be helpful to the user and is reduced at other times. The velocity-based, rate of interaction based, and engagement time methods allow the user to coarsely position the cursor and navigate graphical objects without haptic sensations interfering in selection, positioning, and other navigational tasks.

These and other advantages of the present invention will become apparent to those skilled in the art upon a reading of the following specification of the invention and a study of the several figures of the drawing.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGURE 1 is a block diagram of a haptic feedback system suitable for use with the present invention;

FIGURE 2 is a diagrammatic illustration of a graphical user interface including graphical objects associated with haptic effects;

FIGURE 3 is a diagrammatic illustration of a graphical object having external and internal forces associated therewith;

FIGURES 4a and 4b are diagrammatic illustrations of the use of isometric control over the zooming of a view;

FIGURES 5a, 5b, and 5c are graphs illustrating different embodiments of functions used to provide a strength of haptic effect based on a velocity of the cursor, according to the present inventions; and

FIGURES 6a and 6b are graphs illustrating different embodiments of functions used to provide a strength of haptic effect based on an engagement duration of the cursor with a target.

FITBIT 1002
Fitbit v. Immersion

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The present invention relates to controlling haptic feedback during the navigation of a graphical image in a graphical environment, for example a graphical environment generated by a computer. Although the process is illustrated in the context of navigating a cursor or pointer on a computer display, the present invention can be used while navigating other graphical images or and should not be limited to the examples provided herein.

FIGURE 1 is a block diagram illustrating a version of a system 10 of the present invention comprising a host computer 12 and an interface device 14. The interface device comprises a user object 34 manipulatable by a user 22. As the user object 34 is manipulated, sensors 28 detect the manipulation and the manipulation is communicated to the host computer to, for example, control the positioning of a graphical image, such as a cursor, on a display device 20. In one version, the interface device is a haptic feedback interface device capable of providing haptic feedback to the user, for example through the user object 34. By haptic feedback it is meant any feedback to the user 22 that involves the user's sense of touch. For example, the haptic feedback may comprise the application of a passive force, an active force, and/or a tactile sensation, as will be described.

In the version shown in Figure 1, host computer 12 may be a personal computer, such as an IBM-compatible or Macintosh personal computer, or a workstation, such as a SUN or Silicon Graphics workstation. For example, the host computer 12 can be a personal computer which operates under the MS-DOS or Windows operating systems in conformance with an IBM PC AT standard. Alternatively, host computer 12 can be one of a variety of home video game systems commonly connected to a television set, such as systems available from Nintendo, Sega, Sony, or Microsoft. In other embodiments, host computer system 12 can be a "set top box" which can be used, for example, to provide interactive television functions to users, or other devices or appliances providing electronic functions to users.

In the described embodiment, host computer system 12 implements a host application program with which a user 22 is interacting via peripherals and interface device 14. For example, the host application program can be a computer aided design or other graphic design program, an operating system, a video game, a virtual reality simulation such as a medical simulation, a scientific analysis program, or other application program that utilizes haptic feedback. The host application program may comprise an interactive graphical environment, such as a graphical user

FITBIT 1002
Fitbit v. Immersion

interface (GUI) to allow the user to input information to the program. Typically, the host application provides images to be displayed on a display output device and/or outputs other feedback, such as auditory signals.

In the version illustrated, host computer 12 includes a host processor 16, random access memory (RAM) (not shown), read-only memory (ROM) (not shown), input/output (I/O) electronics (not shown), a clock (not shown), a display device 20, and an audio output device 21. Host processor 16 can include a variety of available microprocessors from Intel, AMD, Motorola, or other manufacturers. Processor 16 can be single microprocessor chip, or can include multiple primary and/or co-processors. Processor 16 preferably retrieves and stores instructions and other necessary data from RAM and ROM, as is well known to those skilled in the art. The clock may comprise a standard clock crystal or equivalent component to provide timing to electrical signals used by processor 16 and other components of the computer system. The clock is accessible by host processor 16 in the control process of the present invention, as will be described. Display device 20 is coupled to host processor 16 by suitable display drivers and can be used to display images generated by host computer system 12 or other computer systems. Display device 20 can be a display screen (LCD, plasma, CRT, etc.), 3-D goggles, projection device, or any other visual interface. In one version, the display device 20 displays a graphical user interface and a graphical image, such as a cursor or pointer, for interaction therewith. In another version, display device 20 displays images of a simulation or game environment. Alternatively or additionally, other images, such as images describing a point of view from a first-person perspective or images describing a third-person perspective of objects, backgrounds, etc, can be displayed. Accordingly, a user 22 of the host computer 12 and interface device 14 can receive visual feedback by viewing display device 20. Audio output device 21, such as speakers, is preferably coupled to host processor 16 via amplifiers, filters, and other circuitry well known to those skilled in the art. Host processor 16 outputs signals to speakers 21 to provide sound output to user 22 when an "audio event" occurs during the implementation of the host application program. Other types of peripherals can also be coupled to host processor 16, such as storage devices (hard disk drive, CD ROM drive, floppy disk drive, etc.), printers, and other input and output devices.

In the version shown, host computer 12 may receive sensor data or a sensor signal via a bus 24 in communication with the interface device 14 and other information. Processor 16 can receive data from bus 24 using I/O electronics, and can use I/O electronics to control other peripheral devices. Host computer 12 can also generate and output a signal, or "command", to

FITBIT 1002
Fitbit v. Immersion

interface device 14 via bus 24. The signal may be related to a haptic effect to be output by the interface device 14 to the user 22.

The host computer 12 may display graphical computer images. These computer images are related to logical software unit collections of data and/or procedures that may be displayed as an image by computer 12 on display screen 20, as is well known to those skilled in the art. The graphical image may interact with other graphical images within a graphical environment, and the interaction may be under the control of a user. For example, the graphical image may comprise a cursor or pointer that interacts with other graphical images in a graphical user interface, such as a Windows operating system. Alternatively or additionally, a gaming image may interact within a gaming graphical environment. For example, the graphical image may comprise a third-person view of a car. Alternatively, the graphical image may be at least a portion or all of the graphical environment as viewed from a first-person perspective, such as a displayed or simulated cockpit of an aircraft or a view from the cockpit of an aircraft.

In one version, the interface device 14 may coupled to the host computer 12 by a bi-directional bus 24. The bi-directional bus sends signals in either direction between host computer 12 and the interface device 14. Bi-directional bus 24 can be a serial interface bus, Universal Serial Bus (USB), MIDI bus, Firewire bus, parallel bus or other protocol bus well known to those skilled in the art. A wireless communication link (e.g., radio or infrared) can alternatively be used.

Interface device 14 may include a local processor 26, sensors 28, actuators 30, a user object 34, optional sensor interface 36, an optional actuator interface 38, and other optional input devices 39. The interface device 14 may comprise one or more housings for holding the sensors 28, actuators 30, local processor 26, and other related electronic components, to which user object 34 is directly or indirectly coupled. In the preferred embodiment, multiple interface devices 14 can be coupled to a single host computer system 12 through bus 24 (or multiple buses 24) so that multiple users can simultaneously interface with the host application program. In addition, multiple players can interact in the host application program with multiple interface devices 14 using networked host computers 12.

Local processor 26 may communicate with host 12 via bus 24 and may be included within a housing of interface device 14 to allow quick communication with other components of the

FITBIT 1002
Fitbit v. Immersion

interface device. Local processor 26 is considered "local" to interface device 14, e.g., at least partially dedicated to haptic feedback and sensor I/O of interface device 14. Processor 26 can be provided with software instructions to wait for commands or requests from computer host 16, decode or parse the command or request, and handle/control input and output signals according to the command or request. In addition, processor 26 preferably operates independently of host computer 16 by reading sensor signals and calculating appropriate forces from those sensor signals, time signals, and force processes selected in accordance with a host command. Suitable microprocessors for use as local processor 26 include the MC68HC711E9 by Motorola and the PIC16C74 by Microchip, for example. Local processor 26 can include one microprocessor chip, or multiple processors and/or co-processor chips. In other embodiments, processor 26 can include a digital signal processor (DSP) chip, or state machines, logic gates, an ASIC, etc.

Local memory 27, such as RAM and/or ROM, may be coupled to local processor 26 in interface device 14 to store instructions for processor 26 and store temporary and other data. A local clock 29 may be provided in the interface device 14 and may be coupled to the local processor 26 to provide timing data, similar to system clock 18 of host computer 12.

The host computer 14 and/or local processor 26 may be used to control the output of haptic feedback to the user. For example, in a host-control embodiment, host computer 12 can provide low-level haptic commands (e.g., streaming data) over bus 24, and the local processor 26 then directly provides the haptic commands to one or more actuators 30 to allow the data to control the actuators directly (or, the host commands are provided to the actuators 30 by other electronics, and no processor 26 is included in device 14). In another local control version, host computer system 12 can provide high level supervisory commands to local processor 26 over bus 24, and the local processor 26 parses or decodes the commands and manages low level control loops to sensors 28 and actuators 30 in accordance with the high level commands and force processes (e.g., firmware). A mixture of these types of control can also be used.

Sensors 28 detect the position, motion, and/or other characteristics of a user object 34 and/or a user's manipulation of the user object 34 along one or more degrees of freedom and provide one or more signals to processor 26 including information representative of those characteristics. One or more sensors 28 may be provided for a single degree of freedom or multiple degrees of freedom along which the user object 34 may be moved or forced. Examples of sensors suitable for several embodiments described herein are digital optical encoders, analog

FITBIT 1002
Fitbit v. Immersion

potentiometers, magnetic (Hall effect) sensors, stain gauges, optical sensors, velocity or acceleration sensors, or other types of sensors. Either relative or absolute sensors can be used. Sensors 28 can provide an electrical signal to an optional sensor interface 36, which can be used to convert sensor signals to signals that can be interpreted by the processor 26 and/or host computer system 12. Alternately, processor 26 can perform these interface functions without the need for a separate sensor interface 36 or the sensor signals can be provided directly to host computer system 12.

Actuators 30 transmit forces to the user 22 manipulating the interface device 34, where the forces can be transmitted via object 34 and/or through another feature of the interface device, such as the housing, in response to signals received from local processor 26 and/or host computer 14. If forces are output to the user object, the actuators can output forces in one or more directions along one or more degrees of freedom of object 34; an actuator 30 can provided for each degree of freedom along which forces are desired to be transmitted. In tactile embodiments where forces are transmitted to the user not kinesthetically via the user object, the actuator(s) 30 can cause forces in the housing, user object 34, or other contacted surface; such forces can include pulses, vibrations, textures, etc. Some embodiments can include drive transmissions (gears, capstans, belt drives, etc.) to amplify force output. Some embodiments can include an actuator assembly to convert actuator output to a force having a desired direction, magnitude, etc.

Actuators 30 can include two types: active actuators and passive actuators. Active actuators include motors, linear current control motors, stepper motors, pneumatic/hydraulic active actuators, voice coil actuators, moving magnet actuators, torquers, and other types of actuators that transmit a force to move or force an object. For example, active actuators can drive a rotational shaft about an axis in a rotary degree of freedom, or drive a linear shaft along a linear degree of freedom. Passive actuators can also be used for actuators 30. The passive actuator may comprise a magnetic particle brake, a friction brake, a pneumatic/hydraulic passive actuator, or the like, and may be used in addition to or instead of a motor to generate a damping resistance or friction in a degree of motion. Actuator interface 38 can be optionally connected between actuators 30 and processor 26 to convert signals from processor 26 into signals appropriate to drive actuators 30.

Other input devices 39 can optionally be included in interface device 14 and send input signals to local processor 26. Such input devices can include buttons, dials, switches, or other

FITBIT 1002
Fitbit v. Immersion

mechanisms. The interface device may have a separate power supply 40 or may be powered through its connection to the host computer 12. Alternatively, power from the host can be stored and regulated by interface device 14 and thus used when needed to drive actuators 30. Safety switch 41 may be included in interface device 14 to provide a mechanism to allow a user 22 to override and deactivate one or more actuators 30, or require a user 22 to activate one or more actuators 30, for safety reasons.

The user object (or manipulandum) 34 may be a device or article that may be grasped or otherwise physically contacted by a user 22 and which is in communication with interface device 14. The user 22 can manipulate and move the object along provided degrees of freedom to interface with the graphical environment generated by the host application program the user is viewing on display device 20. The user object 34 may be, for example, a joystick, mouse, trackball, stylus, steering wheel, medical instrument (laparoscope, catheter, etc.), pool cue, hand grip, knob, button, or other article.

Many types of user interface devices can be used with the features of the inventions described herein, including joysticks, knobs, mice, trackballs, touchpads, touchscreens, styluses, grips, steering wheels, gamepads, direction pads, etc.

The system of the present invention may comprise two primary modes or "control paradigms" of operation for interface device 14: position control (isotonic) mode and rate control (isometric) mode. In position control mode, movement of the interface device is directly translated into motion of a controlled cursor or entity, i.e. a direct mapping between user object and controlled object is provided. Thus, motion of a mouse on a surface is mapped to equivalent motion of a controlled cursor displayed on the display screen in the same direction and for a proportional distance. In rate control mode, movement of the interface device is translated to a new rate of change of a controlled value or a characteristic of a controlled object based on the new interface device position. For example, motion of a joystick in a direction can be mapped to motion of a controlled cursor in an equivalent direction at a velocity proportional to the position of the joystick with reference to the joystick's origin position. Under rate control, the user object can be held steady at a given position but the simulated object under control can be in motion at a given commanded velocity, while position control only allows the object under control to be in motion if the user object is in motion.

FITBIT 1002
Fitbit v. Immersion

FIGURE 2 is a diagrammatic illustration of a display screen 20 displaying a graphical environment. In the version shown, the graphical environment is a graphical user interface (GUI) 200 used for interfacing with an application program and/or operating system implemented by computer 12. One embodiment described herein implements haptic feedback technologies in position control (i.e. isotonic) mode to embellish a graphical user interface with physical sensations. Alternatively, an isometric mode may be employed. By communicating with interface device 14, the computer 12 can present not only standard visual and auditory information to the user, but also physical forces. These physical forces can be carefully designed to enhance manual performance as described below.

Herein, the manual tasks of the user to move a cursor displayed on screen 20 to a desired location or displayed object in a graphical environment by physically manipulating user object 34 in order to navigate the graphical environment, are described as "targeting" activities. "Targets," as referenced herein, are defined regions in the graphical environment, such as the GUI 200, to which a graphical object, such as a cursor, may be moved by the user. The "target" may be associated with one or more forces or haptic effects, for example one or more forces or haptic effects may be associated with a graphical object of the GUI 200 graphical environment. In the GUI 200 version, targets can be associated with, for example, graphical objects such as icons, pull-down menu items, and buttons. A target usually is defined as the exact dimensions of its associated graphical object, and is superimposed and "attached" to its associated graphical object such that the target has a constant spatial position with respect to the graphical object. In the GUI context, "graphical objects" are those images appearing on the display screen which the user may select with a cursor to implement a function of an application program or operating system, such as displaying images, executing an application program, or performing another computer function. For simplicity, the term "target" may refer to the graphical object itself; thus, an icon or window itself is often referred to herein as a "target." However, more generally, a target need not follow the exact dimensions of the graphical object associated with the target. For example, a target can be defined as either the exact displayed area of an associated graphical object, or a target can be defined as only a portion of the graphical object. A target can also be a different size and/or shape than its associated graphical object, and/or may be positioned a distance away from its associated graphical object. The entire screen or background of GUI 200 can also be considered a "target" which may provide forces on user object 34. In addition, a single graphical object can have multiple targets associated therewith.

FITBIT 1002
Fitbit v. Immersion

Upon moving the cursor to the desired target, the user typically maintains the cursor at the acquired target while providing a "command gesture" associated with a physical action such as pressing a button, squeezing a trigger, or otherwise providing a command to execute a particular program function associated with the target. The command gesture can be provided from any input device. For example, the "click" (press) of a physical button positioned on a mouse while the cursor is on an icon allows an application program that is associated with the icon to execute. Likewise, the click of a button while the cursor is on a portion of a window allows the user to move or "drag" the window across the screen by moving the user object. The command gesture can be used to modify forces or for other functions in the present invention as well. Or, the command gesture can be provided by manipulating the physical object of the interface device within designated degrees of freedom and/or with graphical objects displayed on the screen. In other embodiments, graphical objects on the screen can provide a command gesture when manipulated by a user. For example, a spring force on user object 34 can be associated with pressing a graphical button with a cursor to provide the feel of a mechanical button.

The GUI 200 permits the user to access various functions implemented by an operating system or application program running on computer system 12. These functions typically include, but are not limited to, peripheral input/output functions (such as writing or reading data to disk or another peripheral), selecting and running application programs and other programs that are independent of the operating system, selecting or managing programs and data in memory, viewing/display functions (such as scrolling a document in a window, displaying and/or moving a cursor or icon across the screen, displaying or moving a window, displaying menu titles and selections, etc.), and other functions implemented by computer system 12. For simplicity of discussion, the functions of application programs such as word processors, spreadsheets, CAD programs, video games, web pages, and other applications as well as functions of operating systems such as Windows™, MacOS™, and Unix, will be subsumed into the term "program functions." Typically, application programs make use of such functions to interface with the user; for example, a word processor will implement a window function of an operating system (or GUI, if the GUI is separate from the operating system) to display a text file in a window on the display screen. In addition, other types of interfaces are similar to GUI's and can be used with the present invention. For example, a user can set up a "web page" on the World Wide Web which is implemented by a remote computer or server. The remote computer is connected to host computer 12 over a network such as the Internet and the Web page can be accessed by different users through the network. The page can include graphical objects similar to the graphical objects

FITBIT 1002
Fitbit v. Immersion

of a GUI, such as icons, pull-down menus, etc., as well as other graphical objects, such as "links" that access a different web page or page portion when selected. These graphical objects can have forces associated with them to assist in selecting objects or functions and informing the user of the graphical layout on the screen.

GUI 200 is preferably implemented on host computer 12 and processor using program instructions. The use of program instructions to perform functions and operations on a host computer and microprocessor is well known to those skilled in the art, and can be stored on a "computer readable medium." Herein, such a medium includes by way of example memory such as RAM and ROM coupled to host computer 12, memory, magnetic disks (diskette, hard disk, etc.), magnetic tape, optically readable media such as CD ROMs, semiconductor memory such as PCMCIA cards or game cartridges, etc.

In Fig. 2, the display screen 20 displays GUI 200, which can, for example, be implemented by a Microsoft Windows® operating system, a Macintosh operating system, X-Windows in Unix, or any other available operating system incorporating a GUI. In the example shown, a window 201 contains various icons 202 that are grouped by window 201, here labeled as "Main", "Startup", and "Tools", although other or different icons may be grouped within window 201. A menu bar 204 may be included in window 201 in some GUI embodiments which permits pull-down menus to appear by selecting menu heading targets 205 with a user-controlled graphical image, such as a cursor 206, that is controlled by the user via a user object 34. In the subsequent description, the terms "user-controlled graphical image" and "cursor" will be used interchangeably.

The present invention provides haptic feedback to the user through user object 34 based on a location, a velocity, an acceleration, a history of one or more of these values, and/or other characteristics of the cursor 206 or other graphical objects within the GUI 200 environment (position of the cursor herein is generally associated with the position of user object 34, unless a rate control embodiment is described). Other "events" within the GUI may also provide forces. Several preferred embodiments of different forces or haptic effects can be output to the user. These haptic effects can be forces of a single magnitude in one direction, or they may be an interaction or sequence of forces, for example, to create the sensation of a texture, a vibration, a damping force, a spring, a barrier, etc. The terms "force", "force sensation", "haptic", and "haptic effect" are used interchangeably herein.

FITBIT 1002
Fitbit v. Immersion

Many different types of force sensations, or "force effects" as referred to herein, can be output to the user based on interactions of the cursor with graphical objects in the GUI 200. Two types of haptic feedback effects can benefit from the present inventions: kinesthetic haptic effects and tactile haptic effects. Kinesthetic effects are those that are output by outputting forces on the user object 34 in at least one of the degrees of freedom of the user object. For example, a joystick handle rotatable along X- and Y- axes may have motors to output forces in those axes, allowing kinesthetic haptic effects on the joystick handle. A kinesthetic mouse device allows forces to be output in the planar degrees of freedom of the mouse. A tactile haptic effect typically outputs forces to the user not the degrees of freedom of the user object; for example, a vibration can be output to the user contacting the housing of the device. Some haptic effects, such as vibrations, can be output by kinesthetic haptic devices or tactile haptic devices.

One type of haptic effect is an attractive/repulsive force. In one embodiment, targets such as window 201, icons 202 and menu headings 205 can have attractive force fields associated with them to bias the user object 34 toward the target and enhance the user's ability to move cursor 206 to or around the targets. Thus, this type of haptic effect is suitable for kinesthetic haptic feedback devices in which forces can be output on the user object 34, in the degrees of freedom in which the user object 34 is moved to control the cursor or other graphical image. In one embodiment, the haptic feedback depends upon a distance between cursor 206 and a target, such as window 201. The distance can be measured from one or more points within the window 201 or its perimeter.

For example, icons 202 may have an attractive force associated with them. This attractive force can originate from a desired point I within each icon 202, which may be located at the center position of the icon, or located at a different area of icon 202, such as near the perimeter of the icon. Likewise, window 201 may have an attractive force associated with it which originates from a point W within window 201, which may be at the center of the window. Points I and W are considered to be "field origin points." Alternatively, force fields can originate from a point or region not shown on the screen. These attractive forces are known as "external forces" since they affect the cursor 206 when the cursor is positioned externally to the targets. External and internal forces of targets are described in greater detail with respect to Fig. 3.

The attractive forces associated with window 201 and icons 202 are applied to user object

FITBIT 1002
Fitbit v. Immersion

34 to influence the movement of user object 34 and cursor 206. Thus, an attractive force associated with window 201 will cause host computer 12 (or processor 26) to command the actuators 30 of interface device 14 to apply appropriate forces on user object 34 to move or bias the user object 34. Forces are applied to user object 34 in a direction such that cursor 206 is correspondingly biased in a direction toward field origin point W of window 201. It should be noted that the forces to user object 34 do not actually have to move the user object in the appropriate direction. For example, when using passive actuators, the user object cannot be physically moved by the actuators. In this case, resistive forces can be applied so that user object 12 is more easily moved by the user in the appropriate direction, and is blocked or feels resistance when moving in other directions away from or tangent to point W.

The attractive force applied to user object 34, which would move or bias cursor 206 toward point W, is represented by dotted line 207 in Fig. 2. The force can be applied with reference to a single reference point of cursor 206, which is the tip point T in the described embodiment. In alternate embodiments, the reference point can be at other locations or areas. The attractive forces can be computed, for example, with a $1/R$ or $1/R^2$ relationship between field origin point W or I and cursor tip T to simulate gravity.

Repulsive force fields may also be associated with a field origin point. For example, it may be desired to prevent cursor 206 from moving to or accessing particular regions or targets on the screen within GUI 200. If window 201 is one such target, for example, a repulsive field in the opposite direction to that represented by line 207 can be associated with window 201 and can originate at field origin point W. The force would move user object 34 and cursor 206 away from the target, making it more difficult for the user to move cursor 206 onto the target.

In one embodiment, the position of cursor 206 determines which field forces will affect the cursor 206 and user object 34. As described in Fig. 3, targets can be associated with internal and external forces in relation to cursor 206. For example, attractive forces can be external forces and thus affect user object 34 and cursor 206 only when the cursor 206 is positioned externally to the target. In one embodiment, only the external forces of the highest level targets that are external to cursor 206 will affect the cursor 206 and object 34. Thus, in Figure 2, only the attractive force of window 201 may affect cursor 206 and user object 34, since the icons 202 and menu headings 205 are at a lower level (being within window 201). If cursor 206 were positioned within window 201, only the attractive fields of icons 202 and menu headings 205 would affect

FITBIT 1002
Fitbit v. Immersion

cursor 206 and user object 34 and the attractive force 207 would preferably be removed. In alternate embodiments, the forces from various targets can be combined or excluded in different ways.

In another example of such an embodiment (not shown), multiple windows 201 can be displayed on display screen 20. All three windows can be at the same hierarchical level, so that when the cursor 206 is positioned outside the perimeter of all three windows, cursor 206 and user object 34 are influenced by a combination of the three external attractive forces, one attractive force from each window. These attractive forces can be summed together as vectors to provide a resulting total attractive force in a resultant direction having a resultant magnitude. When the cursor is positioned in any of the windows, only external forces from objects within that window can be applied.

Tactile force feedback may also be applied to user object 34, where forces can be output through the housing or user object 34 by, for example, moving a mass, shaking the housing, moving parts of the housing or other buttons or surfaces, etc., which the user feels by contacting the housing or moving portion. Some examples of tactile devices are disclosed in U.S. Patent No. 6,211,861. Tactile force sensations can include vibrations, pulses or jolts, textures, etc. For example, when the user moves the cursor 206 over the border of window 201, a pulse can be output on the housing of the user object 34 or device 14, informing the user of this motion. Similarly, when the user moves the cursor over words in a word processing program, pulses can be output. Vibrations or textures can be output while the user is within a certain region, or dragging an object, or resizing an object, for example.

FIGURE 3 is a diagrammatic illustration of a displayed target illustrating one embodiment of internal and external forces associated with a target. As referred to herein, "external forces" are those haptic effects associated with a target which affect user object 34 when the cursor 206 is positioned externally to that target, i.e. when the cursor positioned outside the perimeter of the target. These types of haptic effects may often include attractive or repulsive forces. In contrast, "internal forces" are those forces associated with a target which affect user object 34 when the cursor 206 is positioned internally to the target, i.e., within the perimeter of the target. Each target can have external forces and internal forces assigned to it. The internal forces and/or external forces associated with a target may be designated as zero, effectively removing those forces.

FITBIT 1002
Fitbit v. Immersion

Target 220 may include an external target region 222 to which an external force associated with target 220 is assigned. External region 222 is defined from a target point in the target to a range limit 224 outside the target, where the external force will be in effect. The external region can be defined from outer perimeter 226 of target 220, or from an inner perimeter 228 of the target 220, if such perimeters are implemented. Attractive, repulsive, texture, vibration, or other haptic effects may be assigned as external forces to targets.

The internal force associated with a target affects user object 34 only when the cursor 206 is within the perimeter of the target. In some embodiments, the inner perimeter 228 is not used and the target 220 can be associated with a single internal haptic effect that is output whenever the cursor 206 is positioned within the target. In other embodiments, an internal target region may include a center region 230 and a capture region 232. Center region 230 is defined as the innermost, central region of target 320 and extends to an inner perimeter 228. In the center region, forces associated with the center region ("center region forces") applied to cursor 206 can be zero magnitude so as to allow substantially free movement of the cursor within this region (also, any external forces of any targets included within target 220 would be in effect). Alternatively, a particular force or haptic effect can be associated with center region 230, such as a texture or vibration, for example.

The capture region 232 is preferably provided at or near a perimeter of target 220. The forces associated with capture region 232 are applied to cursor 206 when the cursor is positioned within or is moved through the capture region. If the sampling rate of a sensor is too slow to detect cursor 306 within the capture region, a history of sensor readings can be checked to determine the path of the cursor and whether the capture force should be applied to user object 12. In the preferred embodiment, two different forces can affect cursor 206, depending on whether the cursor exits target 220, or enters target 220. When the cursor is moved from center region 230 to external region 222, an exit effect can be applied to user object 34. For example, the exit effect can be a barrier or "snap over" force positioned at inner perimeter 228, which preferably includes a spring force as represented symbolically by springs 234 in Fig. 3. The spring force causes a spring resistance to the motion of cursor 206 in the exit direction, which starts as a small resistive force in the direction toward the dead region 230 and which increases as the cursor is moved closer to outer perimeter 226. This barrier force prevents the cursor from easily "escaping" the target 220. Other forces can be substituted in other embodiments, such as a damping barrier

FITBIT 1002
Fitbit v. Immersion

force, a pulse, a vibration, etc. Outer perimeter 226 of target 220 can in some embodiments define a snap distance (or width) of the barrier, so that once cursor 206 is moved beyond perimeter 226, the exit capture force is removed

When the cursor 206 enters target 220, an entry effect can be applied to user object 34. For example, the entry effect may be the same effect as the exit effect, in the same direction toward the dead region 230 (if a direction is provided). For instance, if the entry effect is a spring, when cursor 206 first enters the capture region, the spring force can immediately begin to push the user object 34 in an equivalent direction as toward the center region. The closer the cursor is positioned to the center region, the less spring force is applied. Alternatively, an entry force different from the exit force can be applied. In such an embodiment, the direction of movement of cursor 206 should be established so that it is known whether to provide the exit capture force or the entry capture force.

Other forces can also be applied to the user object 34 (or other part of interface device 14) when operating interface device 14 in isotonic mode. For example, an "inertia" force can be applied when graphical objects are manipulated by the user for particular types of targets and when specific conditions are met. For example, the inertia force can be applied to the user object when the user moves cursor 206 into center region 230, holds down a button on the user object, and moves or "drags" the graphical object (and associated target 220) with cursor 206 across screen 20. The dragged target 220 has a simulated "mass" that will affect the amount of inertia force applied to user object 34. In some embodiments, the inertia force can be affected by the velocity and/or acceleration of cursor 206 in addition to or instead of the simulated mass. Other factors that may affect the magnitude of inertia force, such as gravity, can also be simulated. Alternatively, an icon's mass can be related to how large in terms of storage space (e.g. in bytes) its associated program or file is. Thus, force feedback can directly relate information about a target to the user. In addition, damping and/or friction forces can be provided instead of or in addition to the inertia forces. For example, each graphical object can be assigned a simulated damping coefficient or a coefficient of friction. Such friction might be useful when free-hand drawing in a CAD program, where the coefficient of friction might be based on "pen size." A texture force might also be applied when a graphical object is dragged. In addition, if simulated masses are being used to calculate the external force of a target, such as an attractive gravity force, then that same mass can be used to compute an inertia force for the target. Such haptic effects typically can be output by kinesthetic haptic feedback devices.

FITBIT 1002
Fitbit v. Immersion

Also, inertia forces of graphical objects can also be applied due to collisions or other interactions with other graphical objects and targets. For example, if cursor 206 is dragging an icon, and the icon collides with the edge of a window, then a collision force can be applied to user object 34. This collision force can be based on the speed/direction of the icon/cursor as it was moved, the simulated mass of the icon and/or cursor, and any simulated compliances of the icon/cursor and the edge. Also, certain edges, objects, or regions in GUI 200 can either be designated as "pass-through" objects or as "solid" objects that provide barrier forces that do not allow the cursor to pass into the objects.

Other examples of forces and associated graphical objects and functions include providing force jolts or "bumps" when the cursor 206 encounters a region, when an object is released after having been dragged across the screen, when a window is entered or exited by the cursor, or when a window is opened or closed. In a text document, these bumps can be provided when the cursor moves between words, lines, letters, paragraphs, page breaks, etc. Forces can be associated when a button in a GUI is "pressed", i.e., moved "into" the screen and back out, and/or when command gestures are provided. A "snap to" force simulates a detent in a surface, thus providing a small attraction to a point. This can be useful for menu items or snap-to grid lines in a CAD program or constraining motion to perpendicular or 45-degree angle directions.

Yet other forces include a spring force associated with a position of a target before it is moved. For example, when the user drags an icon, a selection of text, or pull-down menu, a virtual spring is simulated as being attached between the icon's current and former position. Such a spring or other type of force can also be provided on user object 34 when a graphical object is resized between former and current sizes. For example, if the window is dragged to a larger size, then a "stretching" spring force can be applied to the user object, and if the window is dragged to a smaller size, then a "compressing" spring force can be applied. Such features can be provided in a CAD program when graphical objects are stretched or otherwise manipulated.

The forgoing concepts and preferred embodiments can also be applied to other graphical objects appearing in a GUI. For example, pull-down menus (such as a "File" pull-down menu) and menu items in the menu can provide internal and external forces to assist a user in selecting menu items. Similarly, a scroll bar or "slider" can be associated with forces, such that the guide and "thumb" of the slider can be associated with external forces and internal forces to assist the

FITBIT 1002
Fitbit v. Immersion

user in manipulating the slider. "Pop-up" windows and panels in GUI 200 can similarly be provided with forces, where buttons in the pop up window may have external and internal forces associated with them. Forces associated with buttons can be "turned off" or otherwise changed after the button has been selected by the user using cursor 206.

It should be noted that similar haptic feedback can be provided in other graphical environments, such as non-GUI graphical environments. For example, in a 3-D video game, texture forces of a dungeon wall might be felt when a user moves a cursor over the wall. Or, a tank selected by the user with a cursor might have a high inertia force associated with it when it is moved in comparison to a small infantry soldier. Alternatively, in a 1-D control knob, a divot or pop might be felt when a target location, such as a numerical target on a scale, is approached by a pointer.

The present invention may provide isometric (rate control) functionality in the same interface device that provides isotonic (position control) functionality. For example, in one embodiment, isometric mode is entered by selecting an input device such as a button. Once isometric mode is entered, an opposing force on the user object can be applied by the actuators 30 (in kinesthetic haptic feedback devices), and the user's input force on the user object is provided as isometric (or elastic) input to the host computer to control, for example, the scrolling of a displayed document, the changing of a value, the speed of a cursor, the zooming or panning of a view, etc. In another embodiment, the interactions between a controlled graphical object such as a cursor and other graphical objects allow isometric input. In other embodiments, the isometric input can be applied to a displayed window or a different associated graphical object in a different way, e.g., to control a text cursor in the window, to zoom the view in the window (see Figures 4a-b), to pan the view in the window, etc. The whole view of screen 20 can alternately be panned or scrolled using such isometric input in some embodiments. In a similar embodiment, isometric input can be provided by interacting cursor 206 with typically non-isometric graphical objects displayed on screen 20.

FIGURES 4a and 4b are diagrammatic illustrations of display screen 20 showing an isometrically-controlled zoom function of a CAD program. Fig. 4a shows a cube 270 as a graphical object as displayed by the CAD program. The cube 270 can be manipulated as desired by the user to change the shape of the cube or alter other characteristics. In many cases, isotonic input is the most natural and efficient type of input to move, stretch, copy, or otherwise

FITBIT 1002
Fitbit v. Immersion

manipulate cube 270. A user may wish to zoom in the view of cube 270 to see additional detail. In the preferred embodiment, this may be conveniently accomplished by providing isometric input. The view of Fig. 4b shows a zoomed-in view of a portion of cube 270, where dashed box 272 of Fig. 4a indicates the extent of the zoomed view. In this example, to zoom from the view of Fig. 4a to the view of Fig. 4b, the user can press and hold an input device such as a button on the interface device. This can cause a computer-generated resistive force to be applied to the user object in all directions as a result of actuator control. The user then moves the user object against this force in an upward direction to cause a magnification zoom. When the user releases the button, normal isotonic manipulation of cursor 206 is allowed.

In a different embodiment, the user may use cursor 206 to control the zoom function. In Fig. 4a, a "zoom in" isometric object 274 and a "zoom out" isometric object 276 are displayed. Alternatively, the objects need not be displayed. The cursor 206 can be moved against any surface of the appropriate object 274 or 276 to command the associated zoom function of the CAD program. The present invention also allows additional computer-generated forces to be overlaid on the resistive isometric force on user object 34. For example, when the user reaches the maximum zoom magnification, a small jolt can be applied to the user object 34 to inform the user of this condition. In different tactile embodiments of interface device 14, such jolts can be provided in an isometric control mode, but resistive forces are not applied to the motion of the user object.

Enhanced Navigation in Graphical Environments

Haptic Effects as a Function of Velocity

The navigation of a graphical environment can be enhanced to further improve a user's efficiency and/or enjoyment during the navigation. For example, a number of graphical objects, each with a associated haptic effect, may be positioned between a cursor and a target. As a user manipulates the user object 34 to position the cursor at the target, several of the untargeted graphical objects may be in the pathway of the cursor, so that the user may cause the cursor to pass over the untargeted graphical objects. This can result in the user experiencing haptic effects for untargeted graphical objects that are not of immediate interest to the user. This overloading of haptic information, or "haptic clutter," may be disconcerting to the user and may reduce or negate

FITBIT 1002
Fitbit v. Immersion

the positive haptic effect that would otherwise be experienced upon reaching the target or during motion to the target. To make haptic navigation more natural, haptic sensations should only be output to the user when they are relevant, such as, for example, when the cursor is near the target position, or only output for objects that are intended for targeting.

In one version of the inventions described herein, user intention for cursor motion can be related to the velocity of motion of the cursor and/or user object of the interface device. The haptic clutter associated with passing the cursor over untargeted graphical objects may be reduced by relating characteristics of the haptic effect to the velocity of the cursor. It has been discovered that a user typically causes the cursor to move at a high velocity when a target is not in immediate proximity to the cursor and then slows the movement of the cursor as it approaches nearer to the target. Thus, according to one invention herein, when the cursor is moving at a high velocity, the haptic effects may be lessened in strength or muted since it is unlikely that the cursor is near an object targeted by the user. As the cursor slows, the haptic effects are strengthened to enhance the user's ability to more accurately and quickly locate the target.

As shown in FIGURES 5a and 5b, the strength of the haptic effect may be proportional to the velocity of the movement of the cursor. Herein, for position control (isotonic) embodiments, the velocity of the cursor is also intended to mean the velocity of the user object in one or more degrees of freedom which controls the cursor. The velocity may be determined in different ways. For example, the velocity can be determined by the interface device 14 (e.g. local processor 26) or by host computer 12 by dividing the measured motion or displacement of the cursor (or user object) by a specific time interval. For example, in one version, the local processor 26 may determine the position of the cursor at fixed intervals of time. The change in displacement during the period between intervals may be divided by the amount of time that lapses during the period, and the value may be stored as the current velocity of the cursor. Also, several such velocity values can be stored over time and averaged to determine the velocity. Alternatively, when using periods of fixed duration, the change in displacement is directly related to an approximation of the velocity of the cursor during the period, and the change in displacement may be stored as the current velocity of the cursor. In other embodiments, the velocity can be determined in other ways; for example, velocity sensors can directly determine the velocity of the user object 34, or velocity can be determined from acceleration data from an accelerometer measuring motion of the user object 34.

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According to one aspect of the present inventions, after a haptic effect has been determined based on cursor interaction with a target, and the haptic effect is ready to be output on the user object 34 (e.g., when the cursor passes into the external or internal region of an object, or, more generally, passes over, or within a haptic-activating area of, a graphical object having an associated haptic effect), the magnitude of the haptic effect is adjusted based on a function of the current velocity of the cursor (which may in some cases be the same as or equivalent to the current velocity of the user object 34 in at least one degree of freedom). Once the magnitude is adjusted, the haptic effect is output and felt by the user (if the magnitude is more than zero magnitude after adjustment). It should be noted that the haptic effect magnitudes are determined in a normal fashion, and then the magnitudes are adjusted or modulated according to the present inventions.

The function that maps cursor/object velocity to haptic effect strength can be any function, such as linear, a higher order polynomial function, step function, discontinuous function, etc. It should be noted that when a strength of a haptic effect is referred to as "zero" herein, this can be implemented in many different ways, including setting a haptic effect to play with a zero magnitude, revoking the command of the haptic effect, stopping the haptic effect, etc.

For example, the graph 300 of Fig. 5a shows a linear proportional mapping of cursor velocity to magnitude (strength, i.e. the force gain) of a haptic effect. The force gain is normalized to a range of zero to one. At the lowest cursor velocities at or near zero, the strength of the haptic effect has a gain of "1" and at the highest velocities, the gain is close to "0." Between velocities of zero and the highest velocity measurable, the strength of the haptic effect is determined based on predetermined linear curve 302, where higher cursor velocities map to a lower strength effect. Thus, the faster the user moves the user object 34, the more it is assumed that he or she does not want to select nearby graphical objects, and the haptic sensations caused by cursor interactions with those nearby objects are reduced in magnitude. The local processor 26 can perform this haptic effect magnitude change in some embodiments or modes, while the host computer can perform this function in other embodiments or modes.

In the graph 306 of Fig. 5b, a different embodiment shows a step function 308 used for the mapping between effect strength and cursor/user object velocity. At a predetermined range 310 of low velocities from zero to a predetermined velocity threshold V1, the strength of the haptic effect is a first value, for example 100% magnitude, a gain of "1." In a predetermined range 312

FITBIT 1002
Fitbit v. Immersion

of high velocities, from V1 to the highest measured velocity, the strength of the haptic effect is multiplied by a gain of K1 which is less than one. This embodiment is simpler to perform but does not provide the gradual adjustment of effect strength that the embodiment of Fig. 5a does. Alternatively, the strength gain function of Fig 5b may include more steps than the single step shown in Fig. 5b to achieve a higher resolution effect strength modification based on velocity.

FIGURE 5c is a graph 320 illustrating another embodiment of a function that can be used to map cursor or user object velocity to haptic effect strength. For a first section 322 of the described function, at low velocities in the range from zero to a first velocity threshold V1, the gain is at 1, so that the haptic effect strength is normal. In the range of velocities between threshold V1 and a higher threshold V2, the function 324 is used, which linearly maps velocities to magnitude using a linear function. In section 326 of the function, where the range of velocities is above threshold V2, the gain is set to a value K2, which is gain less than 1 and at the level of the low end of the linear function 324. This function thus provides "saturation" regions at the highest and lowest velocities. Velocity thresholds V1 and V2 can be chosen based on which velocities users typically move the user object 34 at when desiring full force strength and minimal force strength. In other embodiments, additional function sections can be included, or discontinuous functions.

By adjusting the strength of a haptic effect in accordance with cursor velocity, the use of beneficial haptic effects can be increased. For example, in a word processing application, a haptic effect associated with every character in a document can be overwhelming for the user, since the cursor can move over many characters in a short space of time. However, by setting a haptic effect strength so that the haptic effects associated with characters are only felt when the cursor is moving slowly over the characters (or are felt at much less magnitude at faster cursor velocities), the user will be given improved feedback on the positioning of the cursor within the document. This is because the user would only typically need to experience the character-associated haptic sensations when moving the cursor slowly on or around those characters to manipulate or navigate through them (for placement of a text cursor, etc.). Similarly, in spreadsheet applications, haptic effects associated with individual cells, or with information within cells, may be output at or near full strength only when the cursor is moving at lower velocities, when the user wishes to manipulate data at the detail level of individual cells.

Some advantageous uses of velocity-modulated strength of haptic effects can be, for

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example, in selecting graphical objects or items in a graphical environment, in cursor placement within the graphical environment, and in dragging and other similar tasks. When performing selecting tasks, the user may typically reduce the speed of cursor motion to be able to finely move the cursor to a particular graphical object and select it, e.g. text or a cell in a spreadsheet. Since cursor speed is slow for such a task, the stronger haptic sensations output for the slower speeds can aid in selection. Cursor placement tasks also benefit from the modulated haptic effects. When placing a cursor between two words, two characters, or two cells in a spreadsheet, for example, the user moves the cursor slowly, and can benefit from stronger haptic sensations to aid in the cursor placement, e.g. haptic output such as pulses or vibrations informs the user where precisely objects are located in related to the cursor. For example, a pulse that is output at each character haptically informs the user precisely where the cursor is within a word. Finally, dragging and other "analog tasks" which move, modify, or otherwise manipulate graphical objects can benefit from velocity-modified haptic sensations. For example, resizing an object, moving an object, rotating an object, etc., can benefit from haptic effects informing the user of the particular task being performed or aiding in the object manipulation (with textures and/or damping, for example, to make fine motions easier).

Some embodiments can examine the velocity of the cursor in different ways for use in modulating the strength of the haptic effects. For example, the average velocity of the cursor over a predetermined period of time can be examined. Some embodiments may use an absolute cursor velocity in the graphical environment, while others may use the velocity of the cursor between graphical objects, e.g. how fast the cursor is moving between one text word and the next, between one text character and the next, or between one icon and the next encountered icon.

In some embodiments, more than one velocity function may be used. For example, one function can be used at one range of velocities, while a different function can be used for a different range of velocities. Another embodiment can, for example, cater magnitude strength to different motions in different directions or situations. For example, it has been determined that users may have different vertical cursor movement characteristics than horizontal movement characteristics. A first user may use, for example, a horizontal tool bar displayed at the upper portion of a display screen and accordingly would develop a higher velocity routine in navigating the cursor to targets at the top of the screen. Another user may have a vertical toolbar on the side of a screen and accordingly develop a routine of fast horizontal movements. In addition, within an application such as a word processing application or a spreadsheet, vertical and horizontal

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Fitbit v. Immersion

cursor movements are often at different rates. Thus, the strength of a haptic effect may be a function of a vertical velocity of a cursor and a function of a horizontal velocity of the cursor, where different functions can be associated with horizontal and vertical velocities. For example, considering the velocity threshold (V_1) version of Figure 5b, there may be provided a vertical velocity threshold above which haptic effects are output at a lower strength and a different horizontal velocity threshold above which haptic effects are output at a lower strength. In another version, a linear or other function of vertical velocity may be used to determine a strength component and a linear or other function of horizontal velocity may be used to determine a second strength component. The strength components may be summed or otherwise related or combined to determine the strength of the haptic effect to be output to the user object 34. The multiple velocity functions may be predetermined, may be individually selected by a user, or may be scaled so that a user need only select one velocity function, for example the user may select a scaled value and the vertical velocity threshold and the horizontal velocity threshold are automatically determined and applied during navigation. Alternatively, the velocity function(s) used can be adaptive to user motion, e.g. determined on the fly by analyzing user motion for a period of time. Functions may also be determined based on other factors or characteristics. For example, average user velocities, past user velocities, areas on the screen where the cursor often is positioned, the extent of the screen which the user moves the cursor to, the application program being used, etc., may each or all be useful in determining a function that is best suited to the user and/or to the program or environment being used.

In another version, different velocity functions may be associated with different haptic effects and/or with different targets. For example, if a haptic effect of a vibration is associated with an icon and a haptic effect of a pop or pulse is associated with a character in a word processing application, different velocity thresholds may be desirable for modulating the strengths of the respective effects. A user may be able to target an icon at a higher velocity than the user can target an area between two characters. Accordingly, the icon effect velocity threshold may desirably be greater than the character effect velocity threshold. As a result, above a upper velocity threshold, both haptic effects would be output at a low strength, such as a gain of "0", and below a lower velocity threshold, both haptic effects would be output at a higher strength, such as at a gain of "1", and at an intermediate velocity between the upper and lower thresholds, the character effect may be output at a low strength and the icon effect may be output at a higher strength.

FITBIT 1002
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In some embodiments, different thresholds or functions can be used for different targeting tasks in the graphical environment. For example, in one embodiment, for a selection task as described above, a function having a lower velocity threshold can be used, allowing greater strength haptic effects to be output for more velocities. Since, in many embodiments, the user is pressing a button or performing some other command gesture during selection, it is known whether selection is taking place and thus haptic effects can be output more strongly. With a cursor placement task, a function having a higher velocity threshold can be used to allow only very slow movements to cause full strength haptic effects, since it may not be known whether the user desires to place a cursor with fine motion, or is simply moving the cursor around with coarse motion (in the latter case, haptic effects may not be desired). Dragging objects, resizing objects, and other "analog tasks" can use different functions than other tasks, if desired.

The use of velocity as a modulator for haptic effects and, in effect, to help determine the user's volition in cursor navigation is advantageous when selecting and highlighting text or cells in word processing or spreadsheet applications. For example, when it is desirable to highlight only a few words in a word processing application or a few cells in a spreadsheet program, strong haptic effects are desirable to enhance the user's ability to accurately select the intended words or cells. However, when highlighting several pages of text or several rows or columns of cells, it is less necessary to have haptic feedback for fine cursor movements. Since the cursor is typically moved at a higher velocity when highlighting large areas, the velocity filters of Figs. 5a, 5b and 5c and those discussed above are advantageous.

Object Density for Use in Modulating Effect Strength

Other characteristics of the graphical environment may also be used to adjust haptic effect strength. For example, the cursor may encounter a large number of graphical objects when moving across the screen even if the cursor velocity is low, if there is a high density of graphical objects. For instance, small characters in a word or a large number of small icons on a crowded desktop screen may undesirably cause lots of haptic effects to be output if the user moves the cursor relatively slowly across all these objects. Therefore, velocity alone may not in some circumstances provide a good indication of when to reduce strength of haptic effects associated with objects, since the same cursor velocity may in one case call for higher strength effects, while in different case of higher numbers of graphical objects, or more closely-spaced graphical objects, call for lower strength haptic effects. In addition, in some embodiments, velocity determination

FITBIT 1002
Fitbit v. Immersion

may be too coarse, e.g. velocity may not be able to be measured with sufficient accuracy to provide helpful haptic effects.

One embodiment of the present inventions can look at the rate that the cursor encounters or interacts with graphical objects (e.g. moves over or within the haptic-activating area), which is indicative of the density of the graphical objects, to help determine whether haptic effect strength should be reduced to aid navigation of the graphical environment. For example, as the cursor is moved across several graphical objects, a count of the objects can be made within a predetermined period of time. If it is determined that a large number of graphical objects (e.g. over a predetermined threshold number of objects) are being encountered by the cursor in that period of time, the haptic effect strength can be reduced. The strength reduction can be performed according to a function similar to those functions of Figs. 5a-5c or others discussed above, but having a horizontal axis based on the count of graphical objects encountered by the cursor rather than velocity of the cursor, where a higher object count reduces the haptic effect strength. Other methods can also be used to determine object density. For example, the time elapsed when the cursor is moved between two graphical objects can be measured for modulating haptic effect strength. Once a cursor leaves one object, a timer measures the time until the cursor enters another object; the length of time can determine effect strength modulation according to a predetermined function. In some embodiments, short time durations between objects indicates high object density and may cause haptic effect strength to be reduced so that the user is not overwhelmed with many haptic effects all at once; longer times between objects may allow the haptic effects to be output at high or full strength.

These graphical object density determinations can also be made in conjunction with the velocity determination referred to for the embodiments of Figs. 5a-5c and similar embodiments, where both graphical object density and cursor velocity can be used to find the most appropriate strength for haptic effects. For example, if a low velocity is measured but a high object density is found, the haptic effect strength can be reduced, and if a high velocity is measured, the haptic effect strength can be reduced without even having to look at graphical object density. The adaptive functions and other features described above can also be used in conjunction object density determination where appropriate.

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Haptic Effects as a Function of Engagement Duration

Navigation of a graphic image in a graphical environment may alternatively or additionally be enhanced by outputting a haptic effect having a strength based on or that is a function of the time duration of cursor engagement (i.e., interaction) with a target. For example, a target that has an associated haptic effect, such as an attractive or spring force, can assist the user in positioning the cursor over the target when the user is navigating the cursor to the target. However, that haptic effect (or any haptic effect output upon exit of the cursor from the target) may discourage or fight against movement of the cursor away from the target when the user is moving the cursor to a different target. It has been determined that the exiting haptic effect can be enhanced by making the strength or duration of the effect a function of the amount of time the cursor is engaged with the target (e.g., positioned over the target). In one version, the strength of the haptic effect is at least partially inversely proportional to the amount of time. Accordingly, when a cursor is positioned over a target for a longer amount of time, a smaller-strength haptic effect will be output when the user directs the cursor away from the target.

In one embodiment of the invention, a time threshold (t_1) is predetermined. FIGURE 6a is a graph 350 illustrating one embodiment of providing a time threshold, where the horizontal axis indicates the time the cursor is at or engaged with the target, and the vertical axis indicates the strength of the associated haptic effect(s), or normalized force gain. Function 352 indicates that at those amounts of time below the time threshold t1, an exiting haptic effect is output at a first strength, here shown as a gain of "1" (normal strength), and at those times above the time threshold t1, the exiting haptic effect can be output at a second strength, here shown as a gain k1 that is less than "1," for example "0" to turn off the haptic effect entirely, or any fraction of 1 to reduce the strength of the effect. Thus, the haptic effect does not interfere with the user moving the cursor away from the target, since time t1 is close enough to the time of engagement so that the haptic effect is turned off or reduced in strength typically before the user can move the cursor away. The amount of time at a target may be determined by the host computer 12 or by the local processor 26. Time threshold t1, in one example, can be about 100 - 200 ms, but may be different time spans in different embodiments or for different graphical objects, tasks, haptic effects, etc. Alternatively, the function shown in Fig. 6a may be provided with additional steps or may be a linear or higher order function.

FIGURE 6b is a graph 360 illustrating a different function 362 for use with engagement

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Fitbit v. Immersion

duration. The effect strength rises rapidly at low time amounts, tapers off at peak time P, and then gradually drops to lower effect strengths at larger time amounts. This version is advantageous in that exiting haptic effects are not as reduced in strength soon after the cursor engages the target, but only gradually reduces effect strength, thereby reducing the amount of overshooting of a target during navigation. Accordingly, a user can direct a cursor toward a target with less precision and with less concentration than if the user must carefully position the cursor over the target and stop the cursor thereon.

In some embodiments, the timer that starts the counting of time of engagement can start only after any haptic effects output upon initial engagement have subsided. For example, when a cursor first encounters a target, a haptic effect may be output, such as a pulse or vibration. It may in some cases be a more compelling experience to the user for the method to wait until the initial output effect has finished playing before starting the count of time of engagement, even though this may be after the actual time of engagement. For haptic effects that have no duration, such as an attractive force that always attracts the cursor to a target, the timer can begin counting immediately upon engagement of the target by the cursor.

In other embodiments, the strength of the associated haptic effect(s) can be based on other durations instead of cursor engagement duration. For example, one embodiment can provide haptic effect strength as a function of the amount of time the cursor is not moving (e.g. after being positioned at a target).

Using engagement time (and times of other cursor activity) to modulate the strength of a haptic effect is also valuable for haptic effects that are applied within a target. For example, if a vibration is applied to indicate positioning over a target, modulating the effect strength over time will lessen or remove the haptic effect when it is not needed. This modulation also allows for the application of additional haptic effects within the target without overloading the user with different effects.

As with the velocity-dependent effects, the time-dependent effects may have multiple time-dependent functions. For example, one target may have a first time threshold and a second target may have a second time threshold; or a single target may have different time thresholds and/or functions, dynamically determined based on past cursor movement by the user or other

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events or characteristics of the graphical environment. Or, different cursor navigation tasks can use different functions, e.g. for selecting, placement, dragging, etc

Although the present invention has been described in considerable detail with regard to certain preferred versions thereof, other versions are possible, as discussed above. Thus, alterations, permutations and equivalents will become apparent to those skilled in the art upon a reading of the specification and study of the drawings. Also, the various features of the embodiments herein can be combined in various ways to provide additional embodiments of the present invention. Furthermore, certain terminology has been used for the purposes of descriptive clarity, and not to limit the present invention. Therefore, the appended claims should not be limited to the description of the preferred versions contained herein and should include all such alterations, permutations, and equivalents as fall within the true spirit and scope of the present invention.

FITBIT 1002
Fitbit v. Immersion

What is claimed is:

CLAIMS

1. An interface device capable of communicating with a computer running an application program and generating a graphical environment, the interface device comprising:

a user manipulatable object capable of controlling the motion of a cursor displayed in the graphical environment,

an actuator operative to output haptic effects to a user of the interface device,; and

a modulator to modulate the magnitude of the at least one haptic effect in relation to a velocity of said cursor in the graphical environment, and wherein said haptic effect magnitude is modulated based on said cursor velocity using a selected one of a plurality of available predetermined functions, said selected function being selected based on a navigation task of said cursor in said graphical environment.

2. An interface device as recited in claim 1 wherein at least one of said functions causes said magnitude of said haptic effect to be greater at a lower cursor velocity than at a higher cursor velocity.

3. An interface device as recited in claim 1 wherein said actuator outputs at least one haptic effect for each of a plurality of graphical objects over which said cursor moves in a path of said cursor within said graphical environment

4. An interface device as recited in claim 1 wherein said magnitude of said haptic effect is modulated after said haptic effect has been determined and is ready for output.

5. An interface device as recited in claim 1 wherein one of said predetermined functions is a step function, causing said haptic effect to be output at full magnitude for cursor velocities under a velocity threshold, and output at zero magnitude for cursor velocities above said velocity threshold.

6. An interface device as recited in claim 1 wherein one of said predetermined functions includes a linear sloped function, wherein said magnitude of said haptic effect is inversely proportional to said cursor velocity.

FITBIT 1002
Fitbit v. Immersion

7. An interface device as recited in claim 5 wherein said linear sloped function causes said magnitude of said haptic effect to be adjusted by a constant first gain for a predetermined velocity range between zero and a first threshold, and to be adjusted by a constant second gain for a predetermined velocity range between a second threshold and a maximum velocity, where said linear sloped function is provided between said first threshold and said second threshold.

8. An interface device as recited in claim 1 wherein one of said predetermined functions is based on previous motion of said cursor in said graphical environment.

9. An interface device as recited in claim 1 wherein said modulator modulates said magnitude of said haptic effect if said cursor is engaged with a target in said graphical environment for more than a predetermined amount of time.

10. An interface device as recited in claim 1 wherein said modulator modulates said magnitude based on a time function, wherein said time function provides a magnitude of said haptic effect that is inversely proportional to an amount of time that has lapsed since said cursor engaged said target.

11. An interface device as recited in claim 1 wherein said application program is a word processing program and said graphical objects include text characters or text words.

12. An interface device as recited in claim 1 wherein said application program is a spreadsheet and said graphical objects include cells of said spreadsheet.

13. An interface device capable of communicating with a computer running an application program and generating a graphical environment, the interface device comprising:

a user manipulatable object capable of controlling the motion of a cursor displayed in the graphical environment;

an actuator operative to output a haptic effect to a user of the interface device; and

a modulator to modulate the magnitude of the haptic effect in relation to a rate of interaction of said cursor with a plurality of graphical objects displayed in said graphical

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Fitbit v. Immersion

environment, wherein said magnitude of said haptic effect at a lower rate of interaction is greater than said magnitude of said haptic effect at a higher rate of interaction.

14. An interface device as recited in claim 13 wherein said actuator outputs a haptic effect for each of a plurality of graphical objects over which said cursor moves in a path of said cursor within said graphical environment.

15. An interface device as recited in claim 14 wherein said each haptic effect associated with said plurality of graphical objects is modulated in magnitude based on said rate of interaction using a single predetermined function.

16. An interface device as recited in claim 13 wherein said magnitude of said haptic effect is modulated after said haptic effect has been determined and is ready for output.

17. An interface device as recited in claim 13 wherein said modulation includes examining a number of graphical objects encountered by said cursor in a predetermined period of time to determine said rate of interaction.

18. An interface device as recited in claim 13 wherein said haptic effect magnitude is modulated based on a time elapsed from said cursor exiting one graphical object and interacting with another graphical object.

19. An interface device as recited in claim 13 wherein said modulator modulates said magnitude of said haptic effect if said cursor is engaged with a target in said graphical environment for more than a predetermined amount of time.

20. A method for adjusting a magnitude of haptic effects associated with graphical objects displayed in a graphical environment provided by a computer, the method comprising:

determining a haptic effect to be output by an actuator to a user of an interface device, said haptic effect initiated based on an interaction of a cursor with one of said graphical objects, said determining a haptic effect including determining a magnitude of said haptic effect;

selecting one of a plurality of predetermined functions based on a navigation task being performed using said cursor; and

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Fitbit v. Immersion

adjusting said determined magnitude of said haptic effect according to said selected function and based on a characteristic of said cursor in said graphical environment, said adjusting being performed after said haptic effect is determined.

21. A method as recited in claim 20 further comprising determining a haptic effect for each of a plurality of graphical objects with which said cursor interacts, and adjusting all of said haptic effects based on said selected function.

22. A method as recited in claim 20 wherein one of said predetermined functions is a step function, wherein said haptic effect is output at full magnitude for cursor velocities under a velocity threshold, and wherein said haptic effect is at zero magnitude for cursor velocities above said velocity threshold.

23. A method as recited in claim 20 wherein one of said single functions includes a linear sloped function, wherein said magnitude of said haptic effect is inversely proportional to said cursor velocity.

24. A method as recited in claim 23 wherein said magnitude of said haptic effect is adjusted by a constant first gain for a predetermined velocity range between zero and a first threshold, and is adjusted by a constant second gain for a predetermined velocity range between a second threshold and a maximum velocity, where said linear sloped function is provided between said first threshold and said second threshold.

25. A method as recited in claim 20 wherein said function is selected based on previous motion of said cursor in said graphical environment.

26. A method as recited in claim 20 wherein said navigation task being performed includes selecting at least one of said graphical objects.

27. A method as recited in claim 20 wherein said navigation task being performed includes positioning said cursor with respect to said graphical objects.

28. A method as recited in claim 20 wherein said navigation task being performed includes moving or dragging one of said graphical objects.

FITBIT 1002
Fitbit v. Immersion

29. A method as recited in claim 20 wherein said magnitude of said haptic effect is adjusted if said cursor is engaged with a target in said graphical environment for more than a predetermined amount of time.

30. An interface device capable of communicating with a computer running an application program and generating a graphical environment, the interface device comprising:

a user manipulatable object capable of controlling the motion of a cursor displayed in the graphical environment;

an actuator operative to output a haptic effect to a user of the interface device; and

a modulator to modulate the magnitude of the haptic effect based on an amount of time that said cursor engages said graphical object displayed in said graphical environment, wherein said magnitude of said haptic effect is reduced after a predetermined period of time.

31. An interface device as recited in claim 30 wherein said actuator outputs a haptic effect for each of a plurality of graphical objects over which said cursor moves within said graphical environment.

32. An interface device as recited in claim 30 wherein said magnitude of said haptic effect is modulated after said haptic effect has been determined and is ready for output.

33. An interface device as recited in claim 30 wherein said modulator modulates said magnitude based on a time function, wherein said time function provides a magnitude of said haptic effect that is inversely proportional to an amount of time that has lapsed since said cursor engaged said target.

34. An interface device as recited in claim 30 wherein said haptic effect is reduced to a zero magnitude after said predetermined amount of time.

35. An interface device as recited in claim 31 wherein said application program is a CAD program providing said graphical objects.

FITBIT 1002
Fitbit v. Immersion

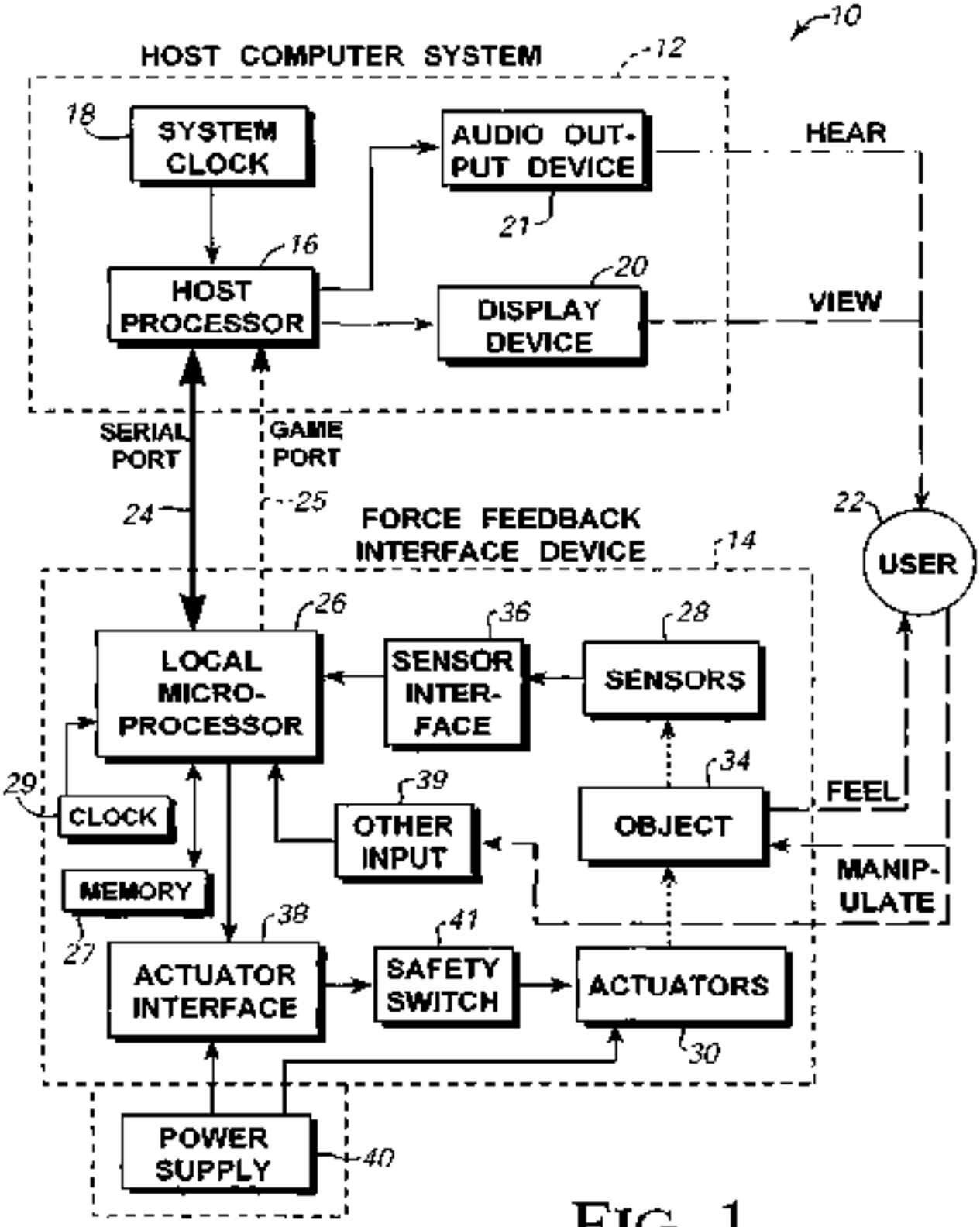


FIG. 1

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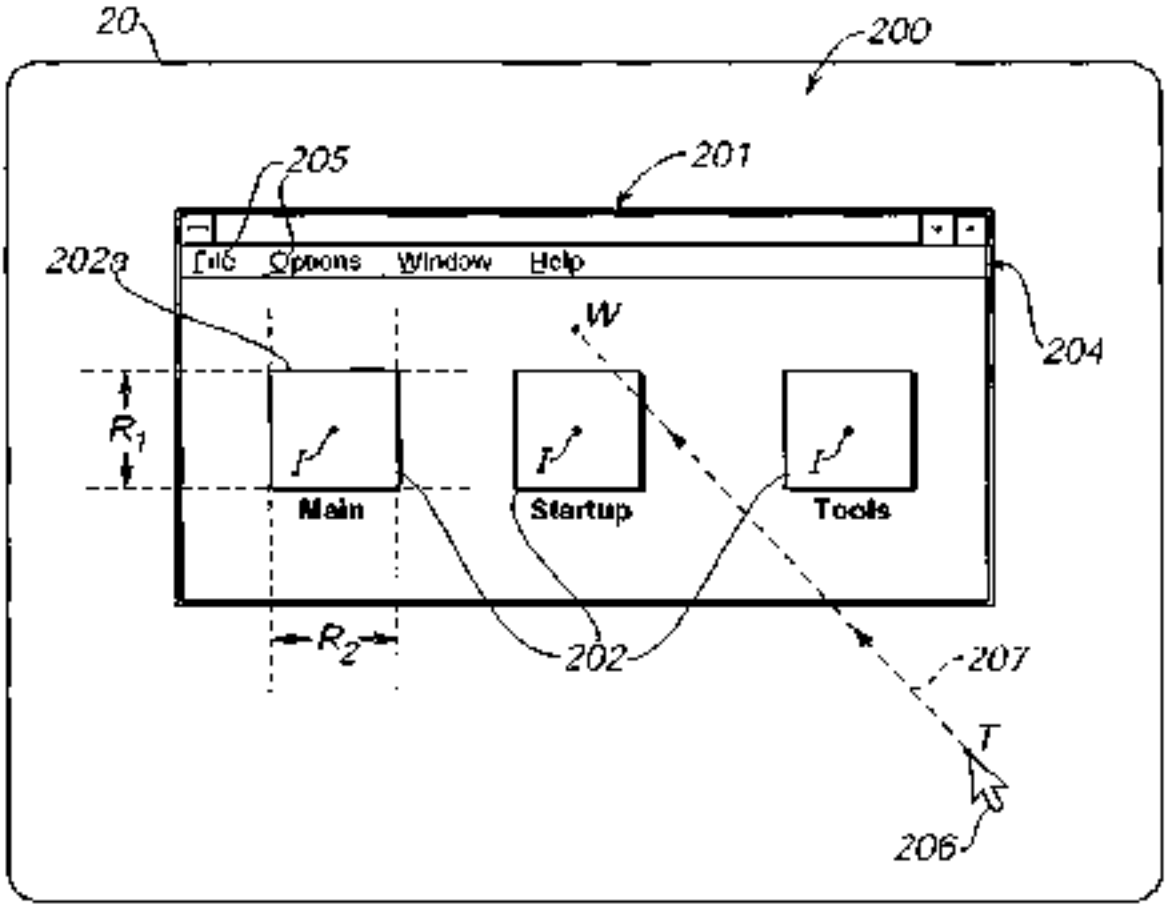


FIG. 2

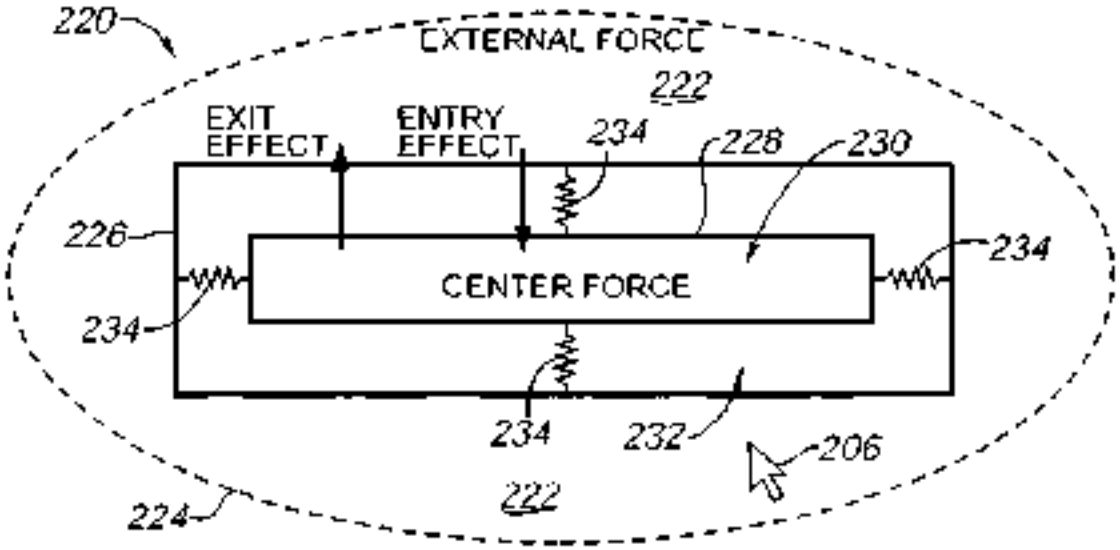


FIG. 3

FITBIT 1002
Fitbit v. Immersion

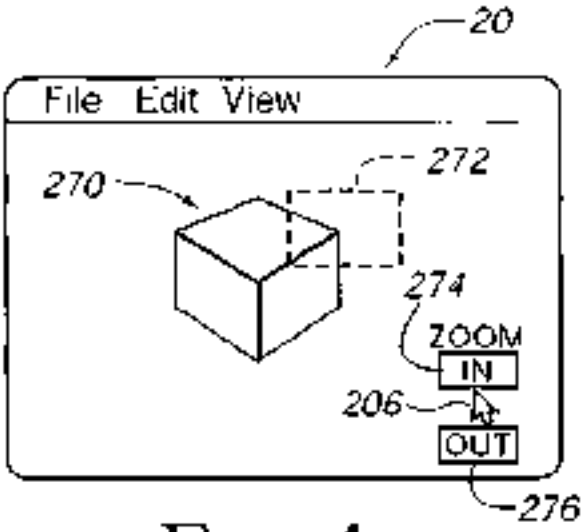


FIG. 4a

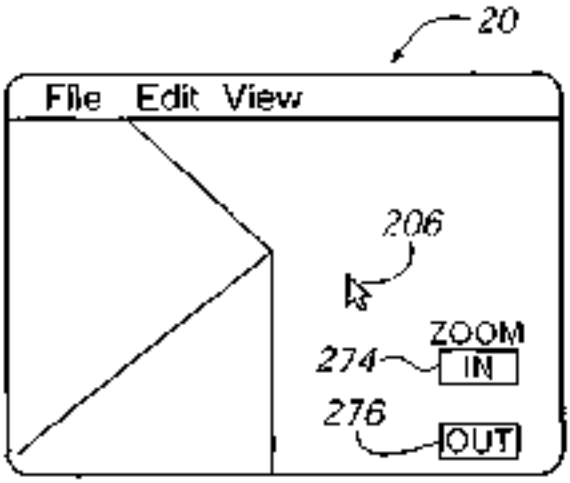


FIG. 4b

FITBIT 1002
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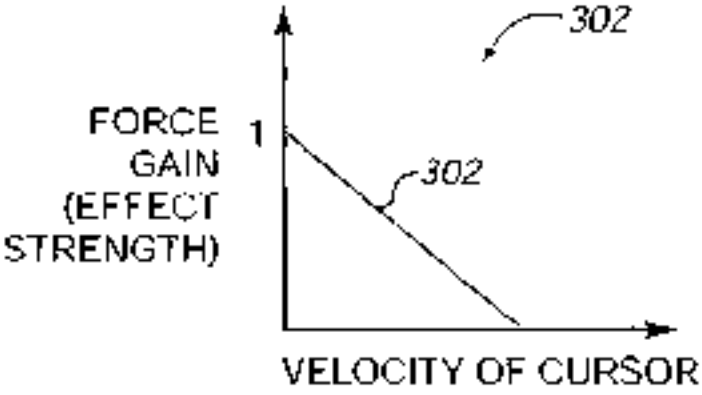


FIG. 5a

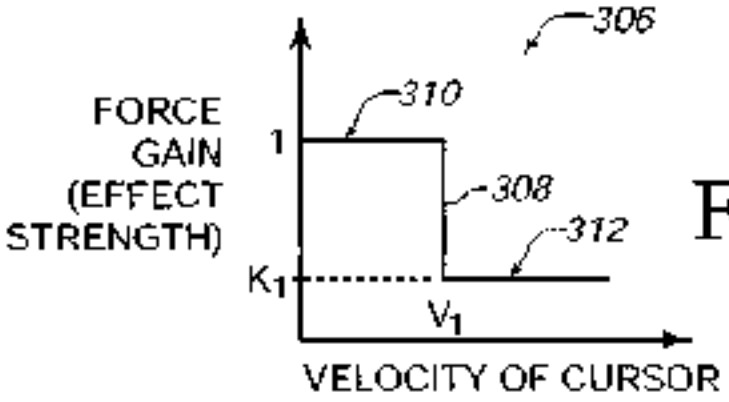


FIG. 5b

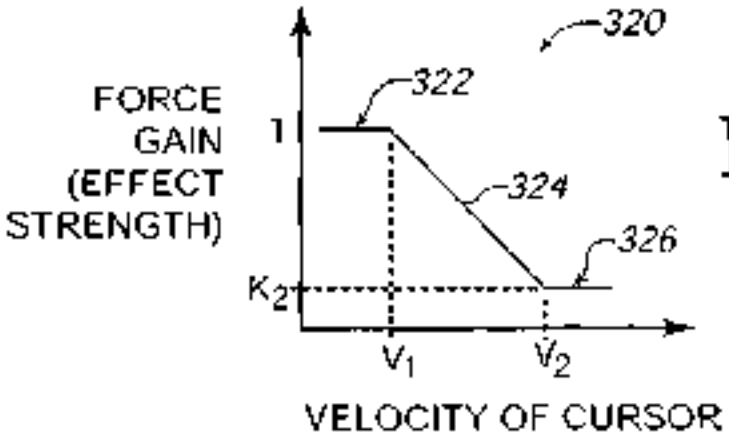


FIG. 5c

FITBIT 1002
Fitbit v. Immersion

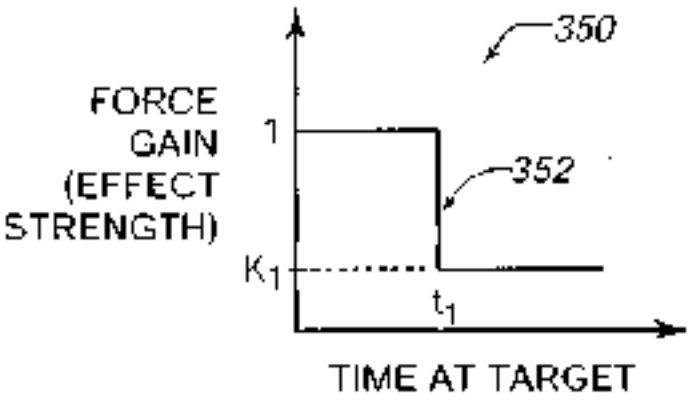


FIG. 6a

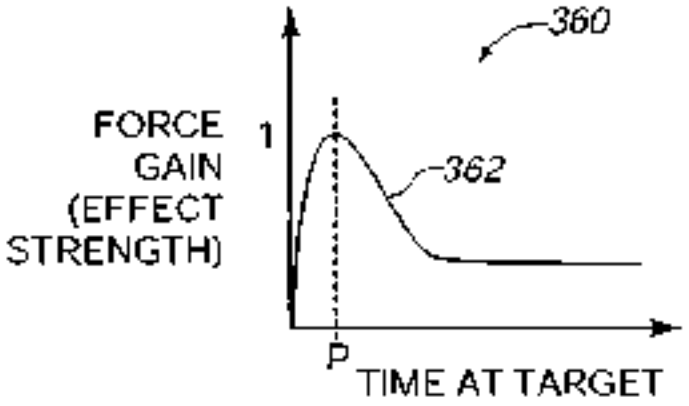


FIG. 6b

FITBIT 1002
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DISTINGUISHING TILT AND TRANSLATION MOTION COMPONENTS IN HANDHELD DEVICES

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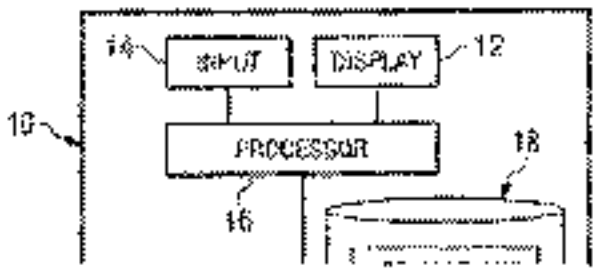
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Application number: EP20050724864 20050307

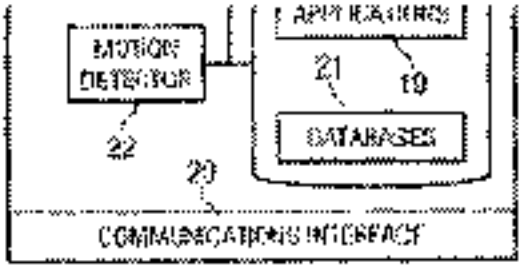
Priority number(s): WO2005US07409 20050307 ; US20040807569 20040323 ; US20040807558 20040323 ; US20040807570 20040323 ; US20040807568 20040323 ; US20040807588 20040323 ; US20040807561 20040323 ; US20040807557 20040323 ; US20040807565 20040323 ; US20040807562 20040323 ; US20040807566 20040323 ; US20040807559 20040323 ; US20040807572 20040323 ; US20040807571 20040323 ; US20040807560 20040323 ; US20040807589 20040323 ; US20040807567 20040323 ; US20040807564 20040323 ; US20040807563 20040323

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Abstract not available for EP1728142 (A2)
Abstract of corresponding document: WO2005103863 (A2)



FITBIT 1002
Fitbit v. Immersion



A motion controlled handheld device includes a first accelerometer operable to detect acceleration along a first axis and a second accelerometer operable to detect acceleration along a second axis. The second axis is perpendicular to the first axis. The device includes a tilt detection component operable to detect rotation having a component around at least one of the first axis and the second axis and a display operable to present a current image. The device includes a motion tracking module operable to track motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component. The device also includes a controller operable to generate the current image and to modify the current image in response to the motion of the device.

[illegible] Worldwide Database [illegible]

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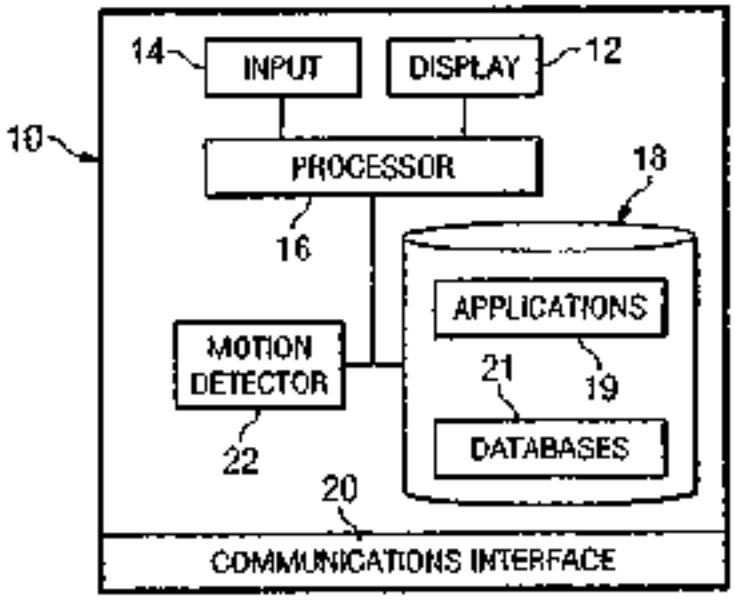
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(*Continued on next page*)

(54) Title: DISTINGUISHING TILT AND TRANSLATION MOTION COMPONENTS IN HANDHELD DEVICES



(57) Abstract: A motion controlled handheld device includes a first accelerometer operable to detect acceleration along a first axis and a second accelerometer operable to detect acceleration along a second axis. The second axis is perpendicular to the first axis. The device includes a tilt detection component operable to detect rotation having a component around at least one of the first axis and the second axis and a display operable to present a current image. The device includes a motion tracking module operable to track motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component. The device also includes a controller operable to generate the current image and to modify the current image in response to the motion of the device.

WO 2005/103863 A2

FITBIT 1002
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DISTINGUISHING TILT AND TRANSLATION MOTION COMPONENTS IN HANDHELD DEVICES

TECHNICAL FIELD

The present invention relates generally to portable devices and, more particularly, to portable devices with a motion interface.

BACKGROUND

The use of computing devices, such as cellular phones and personal digital assistants (PDAs) has grown rapidly. Such devices provide many different functions to users through different types of interfaces, such as keypads and displays. Some computing devices utilize motion as an interface by detecting tilt of the device by a user. Some implementations of a motion interface involve tethering a computing device with fishing lines or carrying large magnetic tracking units that require large amounts of power.

SUMMARY

In accordance with the present invention, a handheld device with motion a motion interface is provided.

In accordance with a particular embodiment, a motion controlled handheld device includes a first accelerometer operable to detect acceleration along a first axis and a second accelerometer operable to detect acceleration along a second axis. The second axis is perpendicular to the first axis. The device includes a tilt detection component operable to detect rotation having a component around at least one of the first axis and the second axis and a display operable to present a current image. The device includes a motion tracking module operable to track motion of the device in

FITBIT 1002
Fitbit v. Immersion

three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component. The device also includes a controller operable to generate the current image and to modify the current image in response to the motion of the device.

The display may comprise a viewable surface, and the first axis and the second axis may be substantially parallel to the viewable surface. The tilt detection component may comprise a third accelerometer operable to detect acceleration along a third axis, where the third axis is perpendicular to the first axis and perpendicular to the second axis. The motion tracking module may be further operable to distinguish translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer. The tilt detection component may comprise a third accelerometer operable to detect acceleration along a third axis, where the third axis is perpendicular to the first axis and perpendicular to the second axis. The tilt detection component may also comprise a camera operable to generate a video stream and a video analysis module operable to detect a direction of motion based on the video stream.

In accordance with another embodiment, a method for controlling a handheld device comprises detecting acceleration along a first axis using a first accelerometer and detecting acceleration along a second axis using a second accelerometer. The second axis is perpendicular to the first axis. The method also includes detecting rotation having a component around at least one of the first axis and the second axis using a tilt detection component and tracking motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component. The method includes displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

Technical advantages of particular embodiments of the present invention include a handheld device with motion detection components capable of distinguishing between tilt and translation of the device and a plane of translation. Accordingly, the device can recognize a larger number of motions to serve as input thus increasing the device's functionality. In some embodiments, a number of

FITBIT 1002
Fitbit v. Immersion

different types of motion detection components may be combined and utilized thus allowing a manufacturer to design the device using the most suitable components depending on the functionalities desired for the device.

Other technical advantages will be readily apparent to one skilled in the art from the following figures, descriptions and claims. Moreover, while specific advantages have been enumerated above, various embodiments may include all, some or none of the enumerated advantages.

BRIEF DESCRIPTION OF THE DRAWINGS

For a more complete understanding of particular embodiments of the invention and their advantages, reference is now made to the following descriptions, taken in conjunction with the accompanying drawings, in which:

FIGURE 1 illustrates a handheld device with motion interface capability, in accordance with a particular embodiment;

FIGURE 2 illustrates a motion detector of the handheld device of FIGURE 1, in accordance with a particular embodiment;

FIGURE 3 illustrates the use of motion detector components of the handheld device of FIGURE 1, in accordance with a particular embodiment;

FIGURE 4 illustrates an example handheld device with motion detection capability, in accordance with a particular embodiment;

FIGURE 5 illustrates an example of selection and amplification of a dominant motion of a handheld device, in accordance with a particular embodiment;

FIGURE 6 is a flowchart illustrating preferred motion selection, in accordance with a particular embodiment;

FIGURE 7 is a flowchart illustrating the setting of a zero-point for a handheld device, in accordance with a particular embodiment;

FIGURE 8 illustrates an example of scrubbing functionality with a handheld device for virtual desktop navigation, in accordance with a particular embodiment;

FIGURE 9 is a flowchart illustrating the scrubbing process of FIGURE 8, in accordance with a particular embodiment;

FIGURE 10A illustrates an example of menu navigation using gesture input, in accordance with a particular embodiment;

FITBIT 1002
Fitbit v. Immersion

FIGURE 10B illustrates example gestures which may be used to perform various functions at a handheld device, in accordance with a particular embodiment;

FIGURE 11 illustrates an example of map navigation using motion input, in accordance with a particular embodiment;

FIGURE 12A illustrates a form of motion input cursor navigation, in accordance with a particular embodiment;

FIGURE 12B illustrates another form of motion input cursor navigation, in accordance with a particular embodiment;

FIGURE 13 is a flowchart illustrating a process for utilizing feedback in response to motion input, in accordance with a particular embodiment;

FIGURE 14 illustrates an example system utilizing spatial signatures with a handheld device, in accordance with a particular embodiment;

FIGURE 15 illustrates an example system in which motion input of a handheld device controls multiple other devices, in accordance with a particular embodiment;

FIGURE 16 is a flowchart illustrating an environmental modeling process of a handheld device, in accordance with a particular embodiment;

FIGURE 17 illustrates example gestures which may be mapped to different functions of a handheld device, in accordance with a particular embodiment;

FIGURE 18 is a flowchart illustrating the utilization of a preexisting symbol gesture, in accordance with a particular embodiment;

FIGURE 19 is a flowchart illustrating the use of context-based gesture mapping, in accordance with a particular embodiment;

FIGURE 20 is a flowchart illustrating the use of user-based gesture mapping, in accordance with a particular embodiment;

FIGURE 21 is a flowchart illustrating the assignment process for user-created gestures, in accordance with a particular embodiment;

FIGURE 22 illustrates three gestures input using a handheld device with varying levels of precision, in accordance with a particular embodiment; and

FIGURE 23 is a flowchart illustrating a gesture recognition process utilizing a number of features, in accordance with a particular embodiment.

FITBIT 1002
Fitbit v. Immersion

DETAILED DESCRIPTION

FIGURE 1 illustrates a handheld device 10 with motion interface capability, in accordance with a particular embodiment of the present invention. Handheld device 10 can recognize movement of the device and can perform various functions corresponding to such movement. Thus, movement of the device operates as a form of input for the device. Such movement input may directly alter what is being displayed on a device display or may perform other functions. Handheld device 10 may comprise a mobile phone, personal digital assistant (PDA), still camera, video camera, pocket calculator, portable radio or other music or video player, digital thermometer, game device, portable electronic device, watch or any other device capable of being held or worn by a user. As indicated in the examples listed above, handheld device 10 may include wearable portable devices such as watches as well. A watch may include any computing device worn around a user's wrist.

Handheld device 10 includes a display 12, input 14, processor 16, memory 18, communications interface 20 and motion detector 22. Display 12 presents visual output of the device and may comprise a liquid crystal display (LCD), a light emitting diode (LED) or any other type of display for communicating output to a user. Input 14 provides an interface for a user to communicate input to the device. Input 14 may comprise a keyboard, keypad, track wheel, knob, touchpad, stencil or any other component through which a user may communicate an input to device 10. In particular embodiments, display 12 and input 14 may be combined into the same component, such as a touchscreen.

Processor 16 may be a microprocessor, controller or any other suitable computing device or resource. Processor 16 is adapted to execute various types of computer instructions in various computer languages for implementing functions available within system handheld device 10. Processor 16 may include any suitable controllers for controlling the management and operation of handheld device 10.

Memory 18 may be any form of volatile or nonvolatile memory including, without limitation, magnetic media, optical media, random access memory (RAM), read only memory (ROM), removable media or any other suitable local or remote memory component. Memory 18 includes components, logic modules or software executable by processor 16. Memory 18 may include various applications 19 with

FITBIT 1002
Fitbit v. Immersion

user interfaces utilizing motion input, such as mapping, calendar and file management applications, as further discussed below. Memory 18 may also include various databases, such as gesture databases and function or gesture mapping databases, as further discussed below. Components of memory 18 may be combined and/or divided for processing according to particular needs or desires within the scope of the present invention. Communications interface 20 supports wireless or wireline communication of data and information with other devices, such as other handheld devices, or components.

Motion detector 22 tracks movement of handheld device 10 which may be used as a form of input to perform certain functions. Such input movement may result from a user moving the device in a desired fashion to perform desired tasks, as further discussed below.

It should be understood that handheld device 10 in accordance with particular embodiments may include any suitable processing and/or memory modules for performing the functions as described herein, such as a control module, a motion tracking module, a video analysis module, a motion response module, a display control module and a signature detection module.

In particular embodiments, input movement may be in the form of translation and/or gestures. Translation-based input focuses on a beginning point and endpoint of a motion and differences between such beginning points and endpoints. Gesture-based input focuses on an actual path traveled by the device and is a holistic view of a set of points traversed. As an example, when navigating a map using translation-based input, motion in the form of an "O" may change the display during the movement but may ultimately yield no change between the information displayed prior to the movement and the information displayed at the end of the movement since the device presumably will be in the same point as it started when the motion ends. However, in a gesture input mode the device will recognize that it has traveled in the form of an "O" because in gesture-based input the device focuses on the path traveled during the motion or movement between a beginning point and an endpoint of the gesture (e.g., even though the beginning and endpoints may be the same). This gesture "O" movement may be mapped to particular functions such that when the device recognizes it has traveled along a path to constitute an "O" gesture, it may

FITBIT 1002
Fitbit v. Immersion

perform the functions, as further elaborated upon below. In particular embodiments, movement of the device intended as a gesture may be recognized as by the device as a gesture by matching a series, sequence or pattern of accelerations of the movement to those defining gestures of a gesture database.

Handheld devices in accordance with other embodiments may not include some of the components of the device illustrated in FIGURE 1. For example, some embodiments may include a handheld device 10 without an input 14 separate from a motion detector such that motion of the device provides the sole or primary input for the device. It should be noted that handheld devices in accordance with other embodiments may include additional components not specifically illustrated with respect to device 10.

FIGURE 2 illustrates motion detector 22 of FIGURE 1, in accordance with a particular embodiment of the present invention. In this embodiment, motion detector 22 includes accelerometers 24a, 24b and 24c; cameras 26a, 26b and 26c; gyros 28a, 28b and 28c; rangefinders 30a, 30b and 30c; and a processor 32.

Accelerometers 24a, 24b and 24c detect movement of the device by detecting acceleration along a respective sensing axis. A particular movement of the device may comprise a series, sequence or pattern of accelerations detected by the accelerometers. When the handheld device is tilted along a sensing axis of a particular accelerometer, the gravitational acceleration along the sensing axis changes. This change in gravitational acceleration is detected by the accelerometer and reflects the tilt of the device. Similarly, translation of the handheld device, or movement of the device without rotation or tilt also produces a change in acceleration along a sensing axis which is also detected by the accelerometers.

In the illustrated embodiment, accelerometer 24a comprises an x-axis accelerometer that detects movement of the device along an x-axis, accelerometer 24b comprises a y-axis accelerometer that detects movement of the device along a y-axis and accelerometer 24c comprises a z-axis accelerometer that detects movement of the device along a z-axis. In combination, accelerometers 24a, 24b and 24c are able to detect rotation and translation of device 10. As indicated above, rotation and/or translation of device 10 may serve as an input from a user to operate the device.

FITBIT 1002
Fitbit v. Immersion

The use of three accelerometers for motion detection provides certain advantages. For example, if only two accelerometers were used, the motion detector may not be able to disambiguate translation of the handheld device from tilt in the plane of translation. However, using a third, z-axis accelerometer (an accelerometer with a sensing axis at least approximately perpendicular to the sensing axes of the other two accelerometers) enables many cases of tilt to be disambiguated from many cases of translation.

It should be understood that some unique movements may exist that may not be discernible from each other by accelerometers 24a, 24b and 24c. For example, movement comprising a certain rotation and a certain translation may appear to accelerometers 24a, 24b and 24c as the same movement as a different movement that comprises a different particular rotation and a different particular translation. If a motion detector 22 merely included three accelerometers to detect movement (without any additional components to ensure greater accuracy), some unique, undiscernible movements may be mapped to the same function or may not be mapped to a function to avoid confusion.

As indicated above, motion detector 22 also includes cameras 26a, 26b and 26c, which may comprise charge coupled device (CCD) cameras or other optical sensors. Cameras 26a, 26b and 26c provide another way to detect movement of the handheld device (both tilt and translation). If only one camera were installed on a device for movement detection, tilt of the device may be indistinguishable from translation (without using other motion detection components, such as accelerometers). However, by using at least two cameras, tilt and translation may be distinguished from each other. For example, if two cameras were installed on handheld device 10 (one on the top of the device and one on the bottom of the device), each camera would see the world moving to the right when the device was translated to the left. If the device is lying horizontally and is rotated by lifting its left edge while lowering its right edge, the camera on the bottom will perceive the world as moving to the right while the camera on the top will perceive the world as moving to the left. Thus, when a device is translated, cameras on opposite surfaces will see the world move in the same direction (left in the example given). When a device is rotated, cameras on opposite surfaces will see the world move in opposite directions.

FITBIT 1002
Fitbit v. Immersion

This deductive process can be reversed. If both cameras see the world moving in the same direction, then the motion detector knows that the device is being translated. If both cameras see the world moving in opposite directions, then the motion detector knows that the device is being rotated.

When the device is rotated, the magnitude of the movement of the world to the cameras is directly related to the magnitude of the rotation of the device. Thus, the amount of the rotation can accurately be determined based on such movement of the world to the cameras. However, when the device is translated, the magnitude of the translation is related to both the magnitude of the movement of the world to the cameras and to the distance to the objects in the field of view of the cameras. Therefore, to accurately determine amount of translation using cameras alone, some form of information concerning the distance to objects in the camera fields of view must be obtained. However, in some embodiments cameras with rangefinding capability may be used.

It should be understood that even without distance information, optical information can be of significant value when correlated against the information from accelerometers or other sensors. For example, optical camera input may be used to inform the device that no significant motion is taking place. This could provide a solution to problems of drift which may be inherent in using acceleration data to determine absolute position information for certain device functions.

As discussed above, distance information may be useful to determine amount of translation when cameras are being used to detect movement. In the illustrated embodiment, such distance information is provided by rangefinders 30a, 30b and 30c. Rangefinders 30a, 30b and 30c may comprise ultrasound rangefinders, laser rangefinders or any other suitable distance measuring component. Other components may also be used to determine distance information. For example, cameras with rangefinding capability may be used, and multiple cameras may be utilized on the same side of the device to function as a range-finder using stereopsis. Determined distance information allows for accurate and explicit computation of the portion of any apparent translation that is due to translation and the portion that is due to rotation.

FITBIT 1002
Fitbit v. Immersion

As indicated above, motion detector 22 additionally includes gyros 28a, 28b and 28c. Gyros 28a, 28b and 28c are used in combination with the other components of motion detector 22 to provide increased accuracy in detecting movement of device 10.

Processor 32 processes data from accelerometers 24, cameras 26, gyros 28 and rangefinders 30 to produce an output indicative of the motion of device 10. Processor 32 may comprise a microprocessor, controller or any other suitable computing device or resource, such as a video analysis module for receiving a video stream from each camera. In some embodiments, the processing described herein with respect to processor 32 of motion detector 22 may be performed by processor 16 of handheld device 10 or any other suitable processor, including processors located remote to the device.

As discussed above, motion detector 22 includes three accelerometers, three cameras, three gyros and three rangefinders. Motion detectors in accordance with other embodiments may include fewer or different components than motion detector 22. For example, some embodiments may include a motion detector with three accelerometers and no cameras, gyros or rangefinders; two or three accelerometers and one or more gyros; two or three accelerometers and one or more cameras; or two or three accelerometers and one or more rangefinders. In addition, the location of the motion detection components on the device may vary on different embodiments. For example, some embodiments may include cameras on different surfaces of a device while other embodiments may include two cameras on the same surface (e.g., to add rangefinding functionality).

Altering the type, number and location of components of motion detector 22 may affect the ability of motion detector to detect or accurately measure various types of movement. As indicated above, the type and number of components of motion detectors may vary in different embodiments in order to fulfill particular needs. Fewer or less accurate components may be used in particular embodiments when it is desired to sacrifice accuracy to reduce manufacturing cost of a handheld device with motion detection capabilities. For example, some handheld devices may only need to detect that the device has been translated and may not need to detect exact amount of such translation to perform desired functions of the device. Such handheld devices

FITBIT 1002
Fitbit v. Immersion

may thus include a motion detector with cameras and without any sort of rangefinder or other component providing distance information. In particular embodiments, components described above, such as cameras and rangefinders, may also be used for other purposes by the device than those described above relating to motion detection functionality.

FIGURE 3 is a diagram illustrating the use of the motion detector components of handheld device 10 of FIGURE 1. Raw data from motion detection components is processed at processor 32. Such raw data includes x-axis accelerometer raw data 23a, y-axis accelerometer raw data 23b and z-axis accelerometer raw data 23c from accelerometers 24a, 24b and 24c, respectfully; camera raw data 25a, camera raw data 25b and camera raw data 25c from cameras 26a, 26b and 26c, respectfully; gyro raw data 27a, gyro raw data 27b and gyro raw data 27c from gyros 28a, 28b and 28c; and rangefinder raw data 29a, rangefinder raw data 29b and rangefinder 29c from rangefinders 30a, 30b and 30c, respectively. If the handheld device includes more, fewer or different motion detection components as may be the case in some embodiments, the raw data may correspond to the components included.

The raw data is processed at processor 32 to produce motion detector output 34 identifying movement of device 10. In the illustrated embodiment, motion detector output 34 comprises translation along x, y and z axes and rotation with respect to the x, y and z axes. The motion detector output is communicated to a processor 16 of the handheld device which identifies the operation, function or task the device should perform (i.e., device behavior 36) based on the device motion. The performance of certain operations, functions or tasks based on particular movements is further discussed below.

FIGURE 4 is an isometric illustration of an example handheld device 31 with motion detection capability, in accordance with particular embodiments. Handheld device 31 includes an x-axis accelerometer 33, a y-axis accelerometer 35 and a camera 37 oriented towards the z-axis. X-axis 38, y-axis 39 and z-axis 40 are also illustrated with respect to device 31 for reference. Handheld device 31 may detect movement, including tilt and translation in various directions, using accelerometers 33 and 35 and camera 37. Handheld device 31 may also include other components, such as components illustrated and described above with respect to handheld device 10.

FITBIT 1002
Fitbit v. Immersion

such as display 12, input 14, processor 16, memory 18 and communications interface 20. As indicated above, particular embodiments may include handheld devices having various types of motion detection components (including accelerometers, gyros, cameras, rangefinders or other suitable components) in any combination and positioned or oriented in any suitable manner upon the devices.

In particular embodiments, a user interface function may utilize input motion along one axis of motion at a time. For example, a device application may allow a user to scroll through a list displayed on the handheld device by moving the device along a particular axis (e.g., in one direction or in two opposite directions). It may be very difficult for a user to constrain the motion of the device to that particular axis as desired. In other words, some user generated device rotation or movement along another axis may be difficult to avoid. To counter this problem, the device may include preferred motion selection including the selection and amplification of a dominant motion and the minimization of movement in other directions or axes.

FIGURE 5 illustrates an example of selection and amplification of a dominant motion and minimization of movement in another direction as discussed above. In the illustrated example, actual motion 41 represents movement of a handheld device. Actual motion 41 comprises movement 42 along one axis 44 and movement 46 along another axis 48 perpendicular to axis 44. Since the amount of movement 42 is greater than the amount of movement 46, the handheld device may select movement 42 as the dominant motion. The handheld device may then amplify this dominant motion and minimize movement 46 (the other motion) such that actual motion 41 is treated by the device as represented motion 50. The amount or size of amplification of the dominant motion may vary in various embodiments according to particular factors, such as the particular application being run on the device at the time. Moreover, amplification of a dominant motion may also be based on magnitude of acceleration, speed of motion, ratio of a motion in one direction (e.g., movement 42) to motion in another direction (e.g., movement 46), size of underlying desktop being navigated or user preferences. In some embodiments, a handheld device may implement preferred motion selection only when certain motion characteristics occur. For example, in some cases the handheld device may select and amplify a dominant motion if motion in one axis is

FITBIT 1002
Fitbit v. Immersion

more than two times greater than any other motion. The other, smaller motion may then be minimized.

The selection and amplification of the dominant motion and minimization of other motion may further expand a user's ability to take advantage of motion user interfaces and may also allow the handheld device, or applications running on the device, to filter out undesired, user-induced noise. With this capability, the user may be able to, for example, move the device left to pick a list to examine, then scroll that list by moving up and down. Motion along inappropriate axes may be ignored or substantially reduced by the device.

In particular embodiments, the selection and amplification of a dominant motion and minimization of other motion may also be applied to rotational motion of the device. Dominant motion around an axis may be selected and amplified in the same manner as motion along an axis as described above with respect to translational motion. Moreover, rotation around another axis (that is not dominant rotation) may be minimized.

FIGURE 6 illustrates a preferred motion selection flowchart 60, in accordance with a particular embodiment of the present invention. In flowchart 60, raw data corresponding to movement of a handheld device is received. In the illustrated embodiment, the movement raw data includes x-acceleration data 62a, y-acceleration data 62b and z-acceleration data 62c that is processed at step 64 to yield an output indicating movement of the device. Other embodiments may include other types of movement raw data, such as optical or camera data, gyro data and/or rangefinder data. After the processing of the raw acceleration data 62, a dominant axis of motion is selected at step 66. If the selected dominant axis of motion is the x-axis, then the movement along the x-axis is augmented at step 68a. If the selected dominant axis of motion is the y-axis, then the movement along the y-axis is augmented at step 68b. If the selected dominant axis of motion is the z-axis, then the movement along the z-axis is augmented at step 68c. The amount of augmentation of movement in the dominant axis of motion may vary in different embodiments according to the application being utilized or other characteristics. In some embodiments, user preferences 69 may be utilized to determine type or amount of movement augmentation. Movement along axes other than the dominant axis of motion may be minimized as discussed above,

FITBIT 1002
Fitbit v. Immersion

such that such movement is ignored by a particular application in use. At step 70, the augmented movement is processed to yield device behavior 72. This processing step may include accessing an application being used to determine the particular device behavior to perform based on the augmented movement. Augmented movement may yield any of a number of types of device behavior according to the application in use, a particular user or otherwise.

For particular user interfaces utilizing motion input, there may be value in having the position of a virtual display, or the information displayed at display 12 of handheld device 10, linked to the position of the device. For example, in particular embodiments using translation-based input such as for navigating a map displayed at the device, the position of the handheld device may directly determine the portion of the map displayed at display 12. However, if device position information is kept in absolute terms (e.g., as with global positioning satellite (GPS) based systems) the utility for many tasks such as map or menu navigation may be impaired. Thus, it is beneficial in certain circumstances to define a "zero point," or an origin in a local context, that may be used to determine the behavior of the device. For example, if a zero point is defined when the device is at a point A, then motion between point A and a point B may be used as input. Particularly useful applications of setting a zero point may include external behaviors such as moving the virtual display or locating applications in the space around a user's body. Setting a zero point also addresses internal behaviors such as instructing the device to ignore the gravitational acceleration at the current orientation to allow the device to act only on additional, and presumably user generated, accelerations.

Handheld devices according to particular embodiments may include application user interfaces that utilize motion input only at certain times. At other times, for example, the motion of the device may not be utilized as input, and it may be useful to disengage or "turn off" motion sensitivity or the motion detection capability of the device. Disengagement of motion sensitivity may comprise, for example, deactivation of motion detector 22 of device 10 or other component, such as a motion response module of the device. Particular embodiments thus allow for the selective engagement and disengagement of the motion sensitivity of the device.

FITBIT 1002
Fitbit v. Immersion

As an example, a motion response module which modifies display 12 based on motion detected at motion detector 22, may have a mode of operation in which it awaits a trigger for switching to another mode of operation in which motion sensitivity is enabled. When motion sensitivity is not enabled, any motion of the device may be disregarded. The trigger may also set a zero-point for the device. When the zero-point is set, the motion response module may measure a baseline orientation of the device based on measurement from motion detection components. The baseline orientation may comprise the position of the device (determined from information from motion detector components) when the trigger is received. Future movement of the device will be compared against the baseline orientation to determine the functions to perform or the modifications which should be made at display 12 based on the user's motion of the device.

Particular embodiments provide for any number of user-initiated actions to act as a single trigger for zero-point selection and selective engagement/disengagement of the motion sensitivity of the device. Such actions may include, for example, the pressing of a key on input 14, moving device 10 in a particular way (e.g., movement corresponding to a particular gesture), and tapping display 12. It should be understood that any user-initiated action may set a zero-point and engage motion sensitivity of the device at the same time.

In some embodiments, a period of inactivity or minimal activity (i.e., relative stillness) may also set a zero-point and engage or disengage motion sensitivity. FIGURE 7 illustrates a flowchart 80 for the passive setting of a zero-point for a handheld device. Change in acceleration with respect to an x-axis is detected at step 82a, change in acceleration with respect to a y-axis is detected at step 82b and change in acceleration with respect to a z-axis is detected at step 82c. At steps 84a, 84b and 84c, it is determined whether any acceleration change detected is greater than a particular respective threshold. If detected acceleration change along each of the three axes is not greater than a set threshold, then the device may be considered at rest, and at step 86 a zero-point will be set. An at rest position may be determined, for example, from stabilization of the raw data or motion components of components of motion detector 22. However, if detected acceleration change along any of the three axes is greater than a set threshold, then the process returns to acceleration change

FITBIT 1002
Fitbit v. Immersion

detection at steps 82. Thus, this method of passively setting a zero-point may ensure that when the handheld device is at rest, a zero point will be set. Moreover, if a device is in constant motion but not being moved by a user at a particular time (e.g., resting in a train moving at a constant speed), a zero-point will be set since there will be no detected change in acceleration. The use of thresholds to determine whether an acceleration change is high enough so as not to trigger the setting of a zero-point enables a user to hold the device still to passively set the zero-point. Otherwise, this may be difficult since a device with highly sensitive accelerometers may detect acceleration change as a result of very minor unintended, user-initiated movement. It should be understood that similar methods may be used in connection with motion detectors with components other than accelerometers. Thresholds may also be used in such similar methods to account for small, unintended movements that may otherwise prevent setting of a zero point.

Particular embodiments of the present invention include the ability to allow a user to repeatedly selectively engage and disengage the motion sensitivity of the handheld device in order to allow greater movement through a virtual desktop (or information space) using motion input in a limited amount of physical space. This process can be analogized to "scrubbing" with a mouse controlling a cursor, or lifting the mouse off of a surface and replacing the mouse on the surface at a different location to allow greater movement of the cursor. Lifting the mouse breaks the connection between the motion of the mouse and the motion of the cursor. Similarly, a user may be able to engage and disengage the connection between the motion of a handheld device, such as device 10, and the operations, functions or actions based on movement of the device.

FIGURE 8 illustrates an example of the use of scrubbing functionality to navigate across a virtual desktop, or information space, larger than the display of a handheld device. In the illustrated example, a handheld device is used to navigate through virtual desktop 90. Virtual desktop 90 is illustrated as a grid map and may represent any suitable information through which a user may desire to navigate. Information of virtual desktop displayed at the handheld device is represented by box 92. In this embodiment, translation of the handheld device is used to navigate through virtual desktop 90. For example, a user may move the handheld device from right to

FITBIT 1002
Fitbit v. Immersion

left to navigate from right to left through information of virtual desktop 90. It should be understood that while the example illustrated describes moving the device to the right to implement the scrubbing process, it should be understood that handheld devices of particular embodiments may be moved in any suitable manner to implement the scrubbing process.

As indicated above, box 92 represents the information of virtual desktop 90 currently displayed at the device. If a user desired to view information represented at box 94, the user may move the handheld device from left to right. For purposes of this example, imagine that the user moves the device to the right, and the information of virtual desktop 90 contained in box 94 is displayed at the device. Also imagine that the user's arm is now outstretched to the user's right such that the user must walk or otherwise move further right in order to view at the display of the device information of virtual desktop 90 that is to the right of box 94. If this were the case, and the user could not, or did not desire to, walk or otherwise move further to the right so that the device would be moved further to the right, then the user could selectively disengage the motion sensitivity of the handheld device, move the device back to the left, selectively reengage the motion sensitivity of the device and move the device back to the right to display information to the right of box 94. In this manner, the user could display information of virtual desktop 90 contained in box 96, and this process could be repeated to display information contained in box 98, which is further to the right of box 96.

The selective disengagement and reengagement of the motion sensitivity of the device in order to allow greater movement within a virtual desktop in a limited amount of physical space may be enabled in any of a variety of ways, such as by a key on an input of the device, moving the device according to a particular gesture or movement (e.g., an arc movement) or tapping the device display. Any other user-initiated action may be used to disengage and reengage motion sensitivity for this purpose. Particular embodiments may allow multiple actions to disengage and reengage motion sensitivity of the device. Moreover, a user action that disengages motion sensitivity of the device may be different from a user action that reengages motion sensitivity. This scrubbing process may be performed in any suitable application, such as map navigation, menu navigation and scrolling through a list.

FITBIT 1002
Fitbit v. Immersion

FIGURE 9 is a flowchart illustrating the steps of the scrubbing process described above with respect to FIGURE 8, in accordance with a particular embodiment. The flowchart begins at step 100, where the handheld device is moved to the right to go from displaying information of box 92 of virtual display 90 to information of box 94. As indicated above, the user may desire to display information further to the right of box 94 but may have run out of physical space to move the device further to the right. Thus, the user disengages the motion sensitivity of the device at step 102. Any suitable user action may perform such disengagement, such as the pressing of a button on the device or moving the device according to a particular gesture. At step 104, the user moves the device to the left so that the user will have more physical space through which the user may move the device to the right when motion sensitivity is reengaged.

At step 106, the user reengages motion sensitivity of the device. Again, such reengagement may be performed by any suitable user action, and such user action may be different from the user action performed to disengage motion sensitivity in step 102. Since motion sensitivity has been reengaged, the user moves the device to the right at step 108 in order to change the information being displayed at the device from the information of box 94 to the information of box 96. At step 110, it is determined whether further movement of the device to the right is needed. If further movement is needed (e.g., to display the information of virtual display 90 in box 98), then the process returns to step 102 where motion sensitivity of the device is again disengaged. If no further movement is needed, then the process ends. As indicated above, this scrubbing process may be utilized in any suitable application of the device that supports motion input, and the device may be moved in any suitable manner in order to implement this functionality.

As indicated above, a particular movement of the device (e.g., a particular gesture) may be utilized in the scrubbing process to signal to the device not to change the information presented on the display during such movement. This allows the user to return the device to a position from which the user may move the device to further change the information presented on the display. For example, the device may be at a base reference position from which movement of the device changes the information displayed. A particular predetermined movement (e.g., an arc movement) may be

FITBIT 1002
Fitbit v. Immersion

used which may signal to the device not to change the information displayed based on motion until the movement is completed. Once the predetermined movement is completed, the base reference position may be reset such that future movement of the device from the base reference position further changes the information displayed. The base reference position may identify a baseline orientation of the device represented by baseline components of the motion data received by the motion detection components of the device. In particular embodiments, gestures may be received, as determined by movement from the base reference position, to perform particular commands which change the information displayed at the device.

As discussed with respect to various embodiments described above, handheld devices in accordance with particular embodiments may utilize multiples types or modes of input to operate the device. Such input modes include motion input modes, such as a translation input mode and a gesture input mode. While multiple input modes may sometimes be used in combination with each other, in some cases the handheld device may be set to recognize a certain mode type at one time. In some situations, the handheld device may be set to function based on multiple types of non-motion input and only one type of motion input (e.g., translation or gesture) at a particular time.

To facilitate this flexibility of the handheld device in recognizing multiple input modes, in particular embodiments a certain trigger may be used to switch between input modes. For example, a user may press a particular key or may move the device in a certain manner (e.g., a particular gesture) to switch input modes. In some cases where an application of the device recognizes and functions based upon multiple types of motion input, a particular key may be pressed or a particular gesture may be formed using the device to switch between a translation motion input mode and a gesture motion input mode. The trigger may also comprise the mere switch from one application to another or the switch from one displayed image to another. In some situations, the trigger may switch between a non-motion input mode and a motion input mode. Any particular user-action may be implemented to act as a trigger to switch between different input modes, such as between different motion input modes. In some embodiments, a voice command or physical action upon the device (e.g., a device or screen tap) may be utilized to switch input modes.

FITBIT 1002
Fitbit v. Immersion

In particular embodiments, a user action that reengages motion sensitivity of a device may also contain other information that might otherwise affect device behavior. For example, if a user makes one motion to reengage translation sensitivity, it may render the device more sensitive to motion than if the user makes a different motion to reengage motion sensitivity. A reengaging motion may comprise a gesture that indicates the user's identity or context, thereby engaging a variety of operational settings, such as user preferences.

As indicated above, particular embodiments include the ability to receive motion input to control various functions, tasks and operations of a handheld device and may be used to alter information displayed at the device in the process. In some cases, such motion input may be in the form of gestures, as opposed to mere translation-based input. Gesture input may be used to navigate through a multidimensional menu or grid in some applications. For example, as discussed above with respect to the scrubbing process, a display of a handheld device may be smaller than the amount of information (e.g., menu options, map information) that can be presented on the display. This may lead to a menu structure that is narrow and deep. In many cases, broad, shallow menu structures may be preferred over a narrow, deep menu structure because a user is not required to remember as much information concerning where functionalities are located.

FIGURE 10A illustrates an example of menu navigation using gesture input, in accordance with a particular embodiment. In the illustrated embodiment, a handheld device is used to navigate through virtual desktop 120. Virtual desktop 120 includes a menu tree with menu categories 122 for selection. Each menu category 122 may include respective sub-categories for selection. In some embodiments, menu categories 122 may comprise categories of functions, while sub-categories of each menu selection may include the actual functions under each such category. In other embodiments, menu categories may comprise nouns (e.g., "folder," "document," "picture"), while sub-categories comprise verbs (e.g., "move," "paste," "cut"). If the handheld device comprised a cellular phone, menu categories 122 may include "calls," "phone book," "messages," "planner," "sounds," "setup" or other items. Each menu category 122 may include functions which may be accessed once a menu category 122 is selected. While two menu levels are illustrated in FIGURE 10A, it

FITBIT 1002
Fitbit v. Immersion

should be understood that a multidimensional desktop or display of information for motion interface navigation may include any number of selections (e.g., menus) utilizing any number of levels.

In the illustrated example, menu category 122e has been selected, and sub-categories 124 of menu category 122e are displayed as available for selection. Boxes 126 and 128 represent information displayed at the handheld device for the user. As illustrated, virtual desktop 120 includes more information, or menus, which can be displayed at the device at one time. A user may move the device according to particular gestures to navigate across or through the virtual desktop. Gestures may also be used to navigate through different menu levels and to make menu selections. As an example, a user may move device 10 in the form of a clockwise circle 130 to navigate a predetermined amount to the right across virtual desktop 120 (e.g., moving from information of box 126 to information of box 128). A particular menu category 122 may be selected by an away gesture 132, or a downward gesture (e.g., to select menu category 122e), and thus display sub-categories 124 for selection. Similarly, to move to the left across virtual desktop 120, a user may move device 10 in the form of a counterclockwise circle 134. In some cases, navigation may be accomplished through four gestures: a forward gesture, a backward gesture, a left gesture and a right gesture. In some embodiments, gestures comprising motion vectors in perpendicular directions may be used for navigation.

In particular embodiments, gestures may be used that are mirror images of other used gestures to execute opposite functions from those accomplished by the other gestures. For example, a motion toward a user might zoom in while an opposite motion, a motion away from the user, may zoom out. Using mirror image or reciprocal gestures mapped to opposite functions may make a motion user interface for a device easier to learn and to use.

In some cases, the menu item at the center of the display may be highlighted for selection, while in other cases a particular gesture may indicate which menu selection of a plurality of displayed selections a user desires to select. It should be understood that the menus or other information through which a user may navigate using gestures may be presented at the handheld device in any number of ways. In some embodiments, only one level of information (i.e., one menu level) may be

FITBIT 1002
Fitbit v. Immersion

displayed at once, while sub-levels or higher levels are not displayed until they are available for selection.

FIGURE 10B illustrates example gestures which may be utilized to perform various functions, such as functions enabling a user to navigate through a virtual desktop. The illustrated example gestures include an "up" gesture 133 to navigate in an upward direction through the desktop, a "down" gesture 135 to navigate down, a "left" gesture 136 to navigate left, a "right" gesture 137 to navigate right, an "in" gesture 138 to navigate in a direction towards the user and an "out" gesture 139 to navigate away from the user. It should be understood that these are mere example gestures and commands for particular embodiments, and other embodiments may include different gestures or similar gestures mapped to different commands for navigating through a desktop or performing other functions with a handheld device.

FIGURE 11 illustrates another example of map navigation using motion input, in accordance with a particular embodiment of the present invention. FIGURE 11 includes a virtual desktop 140 representing an information grid divided into sixteen portions, each referenced by a respective letter (A, B, C, . . . P). Portions of virtual desktop 140 are identified using reference letters only for purposes of describing particular embodiments, and portions of virtual desktops in accordance with other embodiments may or may not be identified in a device application by a reference character or otherwise. Virtual desktop 140 includes more information that can be displayed at a particular handheld device at one time. Virtual desktop 140 may represent any suitable information through which a user may desire to navigate using a handheld device, such as a street map. A user may desire to navigate across virtual desktop 140 to display different portions of information on the handheld device display and may also desire to zoom in (and out of) virtual desktop 140 (i.e., change the granularity of the information displayed) to more clearly view certain portions of the information of virtual desktop 140.

In the illustrated example, box 142 represents information currently displayed at handheld device 10. Box 142 includes portions A, B, E and F of virtual desktop 140. In particular embodiments, if a user desires to change the information of desktop 140 displayed at the device to, for example, information of boxes C, D, G and H, then the user can use motion input to move box 142 representing the display of the device

FITBIT 1002
Fitbit v. Immersion

to the right the necessary amount (two portions to the right in the illustrated example). Such motion input may comprise translation input (moving the handheld device 10 to the right an applicable amount to change the information displayed) or a gesture input (moving the handheld device 10 according to a particular gesture mapped to this function). As an example, one gesture may be mapped to moving the display one portion to the right, while another gesture may be mapped to moving the display two portions to the right. Thus, using translation input or gesture input, the user may navigate across desktop 140.

The handheld device 10 may also allow the user to zoom in on certain information displayed for a clearer view of such information, for example, through translation input or gesture input. As an example using gesture input, if the information displayed at the device included four of the sixteen portions (e.g., box 142 displaying portions A, D, E and F), then a user may use one of four gestures, each mapped to zoom in on a particular portion, to zoom in on one of the four displayed portions. If the user moved the handheld device according to the gesture mapped to zoom in on portion B, then the device may display information represented by box 144 (portions B1, B2, B3, B4, B5, B6, B7, B8 and B9) collectively forming the information of portion B of virtual desktop 140 in an enlarged view. Thus, the information of portion B may be more largely and clearly displayed. When viewing the information of box 144 on the device, the user may zoom out or zoom in again on a particular portion currently displayed using appropriately mapped gestures. If the user moved the handheld device according to a gesture mapped as zooming in on portion B2 (this could be the same gesture as that used to zoom in on portion B when information of box 142 was displayed), then the device may display information of box 146 (portions B2a, B2b, B2c, B2d, B2e, B2f, B2g, B2h and B2i). The user may also be able to navigate across the virtual desktop when zoomed in on a particular portion. For example, when zoomed in on portion B (viewing information of box 144), the user may use translation or gesture input to move across the virtual desktop to view enlarged views of portions other than portion B. As an example, when viewing information of box 144 the user may make a gesture that moves the information displayed to the right such that the entire display shows only information of portion C of virtual desktop 140 (i.e., zoomed in on portion C showing portions C1,

FITBIT 1002
Fitbit v. Immersion

C2, C3, C4, C5, C6, C7, C8 and C9). It should be understood that a user may navigate through the information of virtual desktop 140 (both navigating across and zooming in and out) in any suitable manner using motion input.

As indicated above, any suitable gestures may be used to both navigate across a virtual desktop (or across a particular level) and to navigate between or through different levels or dimensions of a multidimensional desktop. Moreover, in some embodiments motion, such as gestures, may be used to navigate across the multidimensional desktop, and non-motion actions may be used to select or navigate between dimensions. Such non-motion actions may include the pressing of a key in a device input. Thus, a combination of motion and non-motion actions may be used for multidimensional virtual desktop or menu navigation in particular embodiments.

Particular embodiments may allow gesture-based navigation through any suitable application, such as a multidimensional grid, menu, calendar or other hierarchical application. For example, in a calendar application certain gestures may be used to navigate within one level, such as months, while other gestures may be used to navigate between levels, such as between years, months, days, hours and events. Moreover, different applications implemented in the handheld device that use such gesture navigation may use different gestures. Thus, the particular navigation gestures may change according to the particular application in use. In some embodiments, translation-based interfaces may be used to navigation through multidimensional information of a virtual desktop, as opposed to merely using gesture-based movements. For example, movement along x and y-axes may be used to travel within a level of a hierarchy, while movement along a z-axis may be used to travel between levels of the hierarchy.

Another example might involve using a telephone directory with institutions, letters of the alphabet, names, contact details (e.g., office, cellular and home phone numbers, email) and action to initiate contact all along different levels of a hierarchy. In this example, the hierarchy may contain information (nouns) and actions (verbs). One could map this example onto only two axes with, for example, a y-axis being used to select within a level of hierarchy and an x-axis being used to move between levels. A z-axis could be used to confirm the actions and help prevent inadvertent execution of actions.

FITBIT 1002
Fitbit v. Immersion

In some cases, the number of levels traversed may depend on the magnitude of the motion, particular in translation-based navigation. Moving the device a small amount may navigate one level at a time, while moving the device a large amount may navigate multiple levels at a time. The greater the magnitude of motion, the more levels may be navigated at once. As applied to gesture-based motion inputs, different gestures may be used to navigate different numbers of levels in the hierarchy at once. These gestures may be different magnitudes of the same motion or entirely different motions.

The use of motion interface navigation through a multidimensional desktop or information display increases may allow menus to be flattened since a user may more easily navigate across a particular menu or dimension of a virtual desktop too large to fit on a device's display. As a result of the menu flattening, the user may be required to memorize less information thus increasing functionality and capability of the device for the user.

As discussed above, handheld devices in particular embodiments allow a user to navigate across a virtual desktop using motion input. In some cases, a user may utilize a cursor to navigate across information displayed at the handheld device. For example, certain information may be displayed at the device, and the user may utilize motion input to move the cursor around the device display and to select particular items displayed to perform certain functions. In some cases, motion input may be utilized to move a cursor, while a non-motion action (such as pressing a button) may be used to select an item currently indicated by the cursor. It should be understood that both gesture and translation motion input may be utilized in various embodiments of cursor navigation.

In particular embodiments, information displayed may be fixed with respect to the device, and the cursor may remain fixed in space such that movement of the device is used to navigate the cursor across the information. FIGURE 12A illustrates an example utilizing this form of motion input cursor navigation. Display 147 represents a display of a handheld device. In order to describe this cursor navigation example, display has been divided into a grid to show information being displayed. The grid includes portions A-P. Display 147 includes a cursor 148 between portions C, D, G and H. As stated above, in this embodiment the information displayed

FITBIT 1002
Fitbit v. Immersion

remains fixed with respect to the device when the device is moved, and the cursor remains fixed in space. However, the cursor's position with respect to the information displayed changes according to motion input. When the device is translated to the right, according to right movement 149, the cursor is translated according to a motion opposite to the translation of the device.

Display 150 represents a possible display after the device is moved according to right movement 149, with cursor 148 now between portions A, B, E and F. It should be understood that since this example involves translation-based input, the magnitude of the movement of the device (e.g., to the right in this example) may directly affect the magnitude of the movement of the cursor with respect to the information displayed. Display 152 represents another display after the handheld device has been moved according to up movement 151, with cursor 148 now between portions I, J, M and N. As evident, the cursor will have moved down with respect to information displayed since it remains fixed in space. Display 154 represents another display after the handheld device has been moved according to left movement 153, with cursor 148 now between portions K, L, O and P. As evidence, the cursor will have moved to the right with respect to information displayed. Thus, in this form of cursor navigation, motion of the device changes the position of the cursor on the information. In this manner for example, the handheld device may be moved instead of using a stylus to point to certain portions of information displayed.

At any point in the cursor navigation process, a user may utilize any form of input (e.g., gesture, key press, etc.) to select or otherwise perform a function according to the information currently indicated at the cursor. For example, with respect to display 152, a user may use a particular gesture or press a button to zoom in, select or perform some other function based on information between portions I, J, M and N currently indicated by cursor 148.

As described above with respect to FIGURE 12A, particular embodiments may translate the cursor in a motion opposite from the motion of the device to move the cursor across the information displayed. In one example of implementation, input motion of the device may be divided into motion along each of three axes, two of which are parallel to the device display (e.g., an x-axis and a y-axis). While motion of the device in the x-axis and y-axis plane changes information displayed at the device

FITBIT 1002
Fitbit v. Immersion

based on such motion, the cursor may be moved at the same time according to a translation vector that is opposite to the sum of movement in the x-axis direction and the y-axis direction to substantially maintain the position of the cursor in space. In some cases, when the cursor would move past a display edge off of the display according to the translation vector, the vector may be reduced in order to keep the cursor within the display. Such reduction may include reducing one or more components of the translation vector to maintain the cursor within a certain distance from the display edge.

It should be understood that the division of information displayed into portions A-P is done only for illustrating and describing the embodiments described above, and information displayed at handheld devices of particular embodiments may not include such a division or other type of reference information.

FIGURE 12B illustrates another form of motion input cursor navigation, in accordance with a particular embodiment. In this example, the cursor remains in a fixed position with respect to the display while motion input is used to navigate across a virtual desktop larger than the device display. FIGURE 12B includes virtual desktop 158 which comprises information through which a user may navigate using motion input at a handheld device, such as a street map. Virtual desktop 158 includes more information that can be displayed at a particular handheld device at one time. In order to describe this cursor navigation example, virtual desktop 158 has been divided into a grid to differentiate between information presented at the desktop. The grid includes 6 rows (A-F) and 7 columns (1-7). Portions of the grid may be identified herein for this example using their row letter and column number (e.g., portion B7 or D2). It should be understood that the division of virtual desktop 158 into portions referenced by row and column number is done only for illustrating and describing the embodiments described above, and the virtual desktops of particular embodiments may not include such a division or other type of reference information.

Box 160 represents information of virtual desktop 158 currently displayed at a handheld device. Display 161 represents the display of a handheld device showing information of box 160. Display 161 also includes a cursor 159 positioned at the intersection of portions B2, B3, C2 and C3. As indicated above, as a user utilizes motion input to move around the virtual desktop (i.e., to change the information

FITBIT 1002
Fitbit v. Immersion

displayed at the device), the cursor remains in a fixed position with respect to the display. However, the cursor's position changes with respect to the information of the virtual desktop displayed at the handheld device. For example, a user may utilize motion input to change the information displayed at the device to that represented at box 162. The information displayed at the device changes (to portions B5, B6, C5 and C6); and cursor 159 will remain fixed at the device display (e.g., in this case at the center of the display) such that its position changes with respect to the information of virtual desktop 158, as illustrated at display 163. If the user desired to use motion input to change the information displayed at the device to that represented at box 164, the information displayed at the device changes to portions E3, E4, F3 and F4, as illustrated at display 165. Cursor 159 is positioned between these illustrated portions in the center of the display since its position relative to the display remains fixed in this embodiment.

Thus, according to the form of cursor navigation illustrated with respect to FIGURE 12B, the cursor will remain at a position fixed with respect to the device display, while its position with respect to the information of a virtual desktop changes. As discussed above with respect to the embodiment described and illustrated with respect to FIGURE 12A, at any point in the navigation process, a user may utilize any form of input (e.g., gesture, key press, etc.) to select or otherwise perform a function according to the information currently indicated at the cursor. For example, with respect to display 163, a user may use a particular gesture or press a button to zoom in, select or perform some other function based on information between portions B5, B6, C5 and C6 currently indicated by cursor 159.

It should be understood that any particular input, such as a gesture or key press, may be used to switch cursor navigation modes at the device. For example, a user may switch between the translation-controlled cursor mode of FIGURE 12A and the fixed cursor mode of FIGURE 12B.

As discussed above, particular embodiments allow a user to move handheld device 10 according to a gesture to perform particular functions or operations. In some cases however, a user may not move the device according to the particular gesture intended, and the device may, as a result, not be able to recognize the movement as the intended gesture. In order to indicate that a particular movement of

FITBIT 1002
Fitbit v. Immersion

the device by a user is recognized as a particular gesture, handheld devices in some embodiments provide feedback to notify the user that the movement was in fact recognized as a gesture.

This feedback may comprise an audio format, such as speech, a beep, a tone or music, a visual format, such as an indication on the device display, a vibratory format or any other suitable feedback format. Audio feedback may be provided through a user interface speaker or headphone jack of device 10, and vibratory feedback may be provided through a user interface vibration generation module of device 10. Audio, visual and vibratory feedback may be varied to provide capability for multiple feedback indicators. As an example, vibratory feedback may be varied in duration, frequency and amplitude, singly or in different combinations over time. The richness and complexity of the feedback may be expanded by using feedback of different types in combination with one another, such as by using vibratory feedback in combination with audio feedback. In some cases, the feedback may be gesture-specific, such that one or more recognized gestures have their own respective feedback. For example, when a certain gesture is recognized the device may beep in a particular tone or a particular number of times, while when one or more other gestures are recognized the beep tones or number of beeps may change. The use of audio feedback may be especially valuable for gestures that do not have an immediately visible on-screen manifestation or function, such as calling a certain number with a cellular phone. Different types of feedback may also be context or application specific in some embodiments. Different contexts might include device state, such as what application is in focus or use, battery level, and available memory, as well as states defined by the user, such as quiet or silent mode. For example, a handheld device may utilize vibratory feedback in response to gesture input while in silent mode when audio feedback would otherwise be used. This feedback process may also be utilized by a handheld motion input device of a computer or other component.

Similar to the feedback relating to gesture recognition described above, handheld devices in particular embodiments may also provide feedback for the user in the event that a particular user movement was not recognized as a gesture when the device is in a gesture input mode. For example, if a motion appears intended to be a gesture, but cannot be assigned to a particular gesture that is known to the device, it

FITBIT 1002
Fitbit v. Immersion

may play a sound indicating failure. This notifies the user that the user must make another attempt at moving the device according to the intended gesture for the device to perform the operation or function desired. The feedback notifying the user that a movement was not recognized may also comprise an audio, visual, vibratory or other suitable format and may be a different feedback than that communicated when a particular movement is recognized by the device as a particular gesture. In order to determine whether a user's intent was to input a gesture, handheld device 10 may look at certain characteristics of the movement that imply that the motion was intended to be a gesture. Such characteristics may include, for example, the amplitude of the motion, the time course of the above-threshold motion and the number and spacing of accelerations. If a particular gesture is unrecognized by the device, a system of gestural feedback may be used to determine the gesture intended. For example, audio feedback may indicate possibilities determined by the handheld device, and the user may utilize gestures to navigate an auditory menu to select the intended gesture.

In particular embodiments, a system of audio or vibratory feedback may be used such that a user could operate handheld device 10 without having to resort to viewing display 12. For example, handheld devices in some embodiments may provide audio, visual or vibratory feedback to a user navigating a menu or other information of a virtual desktop. In effect, this device feedback combined with the motion input of a user could act as a type of "conversation" between the user and the device. As indicated above, multiple types and complexities of feedback may be utilized. The feedback process could be particularly advantageous in environments where it may be inconvenient, unsafe or impractical to look at the device display (e.g., while driving or while in a dark environment).

It should be understood that feedback, such as audio, visual and vibratory feedback, may also be used in some embodiments in connection with translation motion input. For example, a feedback indicator may be given when a user reached a limit or edge of a virtual desktop using translation input.

FIGURE 13 is a flowchart 170 illustrating a process for utilizing feedback in response to motion input, in accordance with a particular embodiment. At step 172 of the process raw motion data is received at handheld device 10. As described above, the raw motion data may be received by any combination of accelerometers, gyros,

FITBIT 1002
Fitbit v. Immersion

cameras, rangefinders or any other suitable motion detection components. At step 174, the raw motion data is processed to produce a motion detector output indicative of the motion of the device. Such processing may include various filtering techniques and fusion of data from multiple detection components.

At step 176, the device state may be checked, because in some embodiments the feedback for a particular motion depends on the state of the device when the motion is received. As indicated above, example device states may include the particular application in focus or use, battery level, available memory and a particular mode, such as a silent mode. At step 178, the motion detector output is analyzed with respect to the device state. At step 180, it is determined whether the motion indicated by the motion detector output is meaningful or otherwise recognizable given the particular device state. For example, a particular gesture may perform a certain function in one application (e.g., a calendar application) while the gesture serves no function in another application. If the gesture is recognizable or meaningful give the state of the handheld device, then at step 182 feedback is provided. As indicated above, in particular embodiments feedback may be in an audio, visual or vibratory format. In some cases the feedback may merely be an indication that the device recognizes the gesture given the state of the device. In other cases, the feedback may be a further query for additional input, for example if the user was utilizing a particular application of the device that provided for a series of inputs to perform one or more functions. At step 184, the device behaves according to the motion input and device state, and the process may return to step 172 where additional raw motion data is received.

If it is determined at step 180 that the motion indicated by the motion detector output is not meaningful or recognizable given the particular device state, then the process proceeds to step 186. At step 186, it is determined whether the motion is above a particular threshold. This determination may be made to determine whether particular motion input was, for example, intended to be a gesture. As indicated above, threshold characteristics for this determination may include the amplitude of the motion input, the time course of the motion input and the number and spacing of accelerations of the motion. If it is determined that the motion input was not above a particular threshold, then the process may return to step 172 where additional raw

FITBIT 1002
Fitbit v. Immersion

motion data is received. If, however, the motion input was above a threshold such that a gesture may have been intended but was not recognized or meaningful given the device state, feedback is provided at step 188. The feedback may include audio, visual and/or vibratory feedback and may indicate that the gesture was not recognizable or meaningful. In particular embodiments, the feedback may also provide a query regarding the intended gesture or may otherwise provide the user with a number of potentially intended gestures from which the user may select the particular gesture intended by the motion. It should be understood that particular embodiments may not include some of the steps described (e.g., some embodiments may not include the threshold determination of step 186), while other embodiments may include additional steps or the same steps in a different order. As suggested above, particular embodiments may utilize motion input feedback (e.g., including feedback "conversations") in any of a number of applications and ways and the type and complexity of feedback systems may vary greatly in different embodiments.

As indicated above, handheld devices according to particular embodiments may receive gesture motion input to control any number of functions of any number of applications running at the device. Some applications that utilize gesture involve may comprise mobile commerce (mCommerce) applications in which a mobile device, such as handheld device 10, is used to conduct various transactions, such as commercial or consumer purchases. Many mCommerce applications utilize some form of authentication to authenticate a user, such as personal identification numbers (PINs), credit card information and/or possession of the mobile device. However, many forms of authentication can be "leaked." They can be shared intentionally or inadvertently. Another form of authentication is a user's written signature, which does not suffer from such leaking problems since forgery is typically difficult to accomplish and may be easy to detect. Particular embodiments may utilize motion input to receive a user's signature as a form of authentication in mCommerce or other transactions through the handheld device.

A written signature may be considered a two dimensional record of a gesture. When utilizing a handheld device with motion input, a user's signature may be in three dimensions and may thus comprise a "spatial signature." Moreover, when combined with other forms of input received at the device, a user's signature can take

FITBIT 1002
Fitbit v. Immersion

on any number of dimensions (e.g., four, five or even more dimensions). For example, a three-dimensional gesture "written" in space using the device and detected at motion detector 22 may be combined with key-presses or other inputs to increase the number of dimensions of the signature.

These spatial signatures can be tracked, recorded, and analyzed by motion detectors 22 of handheld devices. They can be recorded with varying degrees of precision with varying numbers of motion detector components to serve as an effective form of authentication. A user's spatial signature may take comprise a three-dimensional form based on the user's traditional two-dimensional written signature or may comprise any other suitable gesture which the user records at the handheld device as his or her signature.

In some embodiments, the process for recognizing a spatial signature may involve pattern recognition and learning algorithms. The process may analyze relative timings of key accelerations associated with the signature. These may correspond to starts and stops of motions, curves in motions and other motion characteristics. In some cases, some hash of a data set of a points of a signature motion may be stored, and subsequent signatures may be compared against the hash for recognition. This may further verify if the signature was genuine by determining whether it was unique. For example, in particular embodiments, a signature may be detected (e.g., by a signature detection module of device 10) by comparing a particular movement of the device with respect to an initial or reference position. Such comparison may be made by comparing a sequence of accelerations of the movement with a predetermined sequence of accelerations of a stored spatial signature. This determination may be made regardless of the scale of the user's input motion signature.

In some embodiments, the device can detect whether motion of the device matches the signature by determining whether positions of the device in motion relative to an initial position match the spatial signature.

FIGURE 14 illustrates an example system 200 utilizing spatial signatures as authentication for mCommerce transactions. System 200 includes handheld device 10, mCommerce application 202, authenticator 204 and communication network 206. mCommerce application 202 may comprise any suitable application for transacting

FITBIT 1002
Fitbit v. Immersion

business with a handheld device of a user. Such transactions may include consumer purchases, such as products or services of a business or other user from a website, online bill paying, account management or any other commercial transaction. Authenticator 204 authenticates, or verifies, a spatial signature input by the user at handheld device 10 to complete an mCommerce transaction. Authenticator 204 may store one or more spatial signatures of one or more users for authentication in an mCommerce transaction. In some embodiments, authenticator may be located within handheld device 10, within mCommerce application 202 or at any other suitable location. Communication network 206 is capable of transmitting information or data between components of system 200 and may include one or more wide area networks (WANs), public switched telephone networks (PSTNs), local area networks (LANs), the Internet and/or global distributed networks such as intranets, extranets or other form of wireless or wireline communication networks. Communication network 206 may include any suitable combination of routers, hubs, switches, gateways or other hardware, software or embedded logic implementing any number of communication protocols that allow for the exchange of information or data in system 200.

In operation, when a user utilizes handheld device 10 to conduct a transaction with mCommerce application 202, the user may utilize motion input to communicate an authentication signature, for example by moving the device according to the user's three-dimensional signature. As an example, a user might use their cellular phone at a point-of purchase (e.g., store) instead of a credit card. Instead of signing a paper document that then needs to be shipped and processed, the user could simply move device 10 according to the user's spatial signature. As indicated above, the user's signature may include more than three dimensions in some embodiments. The signature may have been previously recorded by the user using handheld device 10 or another mobile device, and the recorded signature may be stored at handheld device 10, mCommerce application 202, authenticator 204 or other suitable location such as a signature storage database for signatures of multiple mCommerce users.

The motion of handheld device 10 may be processed at the device, and motion output indicative of the motion may be transmitted to mCommerce application 202. mCommerce application 202 may communicate the motion output to authenticator 204 for verification that the motion input received at device 10 was in fact the

FITBIT 1002
Fitbit v. Immersion

signature of the user attempting to transact mCommerce. If authenticator 204 verifies the user's signature, then mCommerce application may complete the transaction with the user. As indicated above, authenticator 204 may be located within handheld device 10 or at mCommerce application 202 in particular embodiments and may access signatures for verification stored at device 10, mCommerce application 202 or any other suitable location.

Authentication may also be used by handheld devices in a non-mCommerce application, for example when electronic security is desired to perform functions such as sending private or secure data using the device. A user desiring to transmit data or other information using handheld device 10 may use their spatial signature in the encryption process. Spatial signatures may be used in any of a variety of ways to secure data for communication through a network and may be utilized in connection with public/private key encryption systems. For example, in some embodiments handheld device 10 may authenticate a user's signature received through motion input and then use its own private key to encrypt data for transmission. In other cases, data may be communicated to handheld device 10 such that an intended recipient must input their spatial signature to receive the decrypted data. In some embodiments, data may be communicated to a computer wirelessly connected to handheld device 10, and the intended recipient must use handheld device 10 as a way to communicate the user's signature to the computer for data decryption. Moreover, in particular embodiments, a user's spatial signature itself may represent an encryption key such that motion of the device generates the encryption key instead of the signature motion merely being used for authentication. In some cases a device may recognize a combination of accelerations as a signature by converting the signature into the equivalent of a private key. The handheld device may then use the private key as part of an authentication process for a transaction.

In particular embodiments, a spatial signature may be used to manage physical access to a building or event. For example, the signature input by a user at a device may be checked against a list of people allowed to enter as IDs are checked at "will call" for an event.

In particular embodiments, a user may utilize motion input for handheld device 10 to control other devices, such as audio/video equipment, home appliances

FITBIT 1002
Fitbit v. Immersion

and devices, computing devices or any other device capable of being controlled by a handheld device. Devices may be controlled by handheld device 10 through communications interface 20 of device 10 utilizing any of a number of wireless or wireline protocols, including cellular, Bluetooth and 802.11 protocols. In some embodiments, device 10 may receive motion input to control, through wireless or wireline communication, other devices through a network. Thus, devices controlled through motion input of device 10 may be at any location with respect to device 10, such as in the same room or across a country. Moreover, control of the other device may be implemented through any number of intermediate devices (e.g., through a network).

As an example, if handheld 10 device were a Bluetooth-enabled cellular phone, then particular gestures or other motion of the cellular phone may wirelessly communicate commands to control another device, such as a laptop across a room to drive a PowerPoint presentation. Other devices which may be controlled through motion input of handheld device 10 may include televisions, radios, stereo equipment, satellite receivers, cable boxes, DVD players, digital video recorders, lights, air conditioners, heaters, thermostats, security systems, kitchen appliances (e.g., ovens, refrigerators, freezers, microwaves, coffee makers, bread makers, toasters), PDAs, desktop and laptop PCs, computer peripheral equipment, projectors, radio controlled cars, boats and planes and any other device. As another example, a commuter may shake their cellular phone in a certain manner to tell their heater at home to turn on before the commuter arrives at home. In some embodiments, a handheld device may receive and process raw motion data to determine commands or intended functions for communication to other devices. In other embodiments, a motion detector of a handheld device may output raw data received from its motion detection components for communication to one or more devices controlled by device 10 through the motion of device 10. As a result, different devices controlled by device 10 may treat the same raw motion data of device 10 differently. For example, a particular gesture of device 10 may perform different functions of different devices controlled by device 10.

FIGURE 15 illustrates an example system 220 in which handheld device 10 controls multiple other devices through motion input of device 10. System 220 includes handheld device 10, laptop 222 and remote device 224 connected, through

FITBIT 1002
Fitbit v. Immersion

wireless or wireline links, to handheld device 10 through communication network 226. Handheld device 10 receives raw motion data of a particular motion of the device through motion detection components, such as accelerometers, cameras, rangefinders and/or gyros. The raw motion data is processed at the handheld device. Particular databases, such as gesture and gesture mapping databases, may be accessed to determine a matching gesture and intended function based on motion tracked by a control module of the device. The intended function may be for another device to be controlled by handheld device 10, such as laptop 222 or remote device 224. Thus, the motion input is the interface for the underlying operational signal communicated from device 10 to the controlled device. In other embodiments, the raw motion data or other data merely indicating a particular motion input for device 10 may be directly sent to laptop 222 and/or remote device 224 without determining a function at device 10. In these embodiments, laptop 222 and/or remote device 224 may themselves process the raw motion data received from handheld device 10 to determine one or more intended functions or operations they should perform based on the raw motion data. In some embodiments, a user of device 10 may indicate to device 10 through motion or otherwise the other devices that handheld device 10 should communicate raw motion data or intended functions of such other devices, as applicable. While two devices controlled by handheld device 10 are illustrated, it should be understood that particular embodiments may include any number of devices of varying types to be controlled by handheld device 10 through motion input as discussed above.

As indicated above, particular embodiments include the ability to control other devices, such as other local or remote devices, through motion input of handheld device 10. In some embodiments a user of handheld device 10 selects the other device that a particular motion input of device 10 is intended to control. For example, a user may use input 14 of handheld device 10 (e.g., by pressing a button or moving a trackwheel) to select a local or remote device to control before moving device 10 according to a particular motion mapped to a function or operation desired for the other device. In particular embodiments however, a user may move handheld device 10 according to a particular gesture in order to select the other device (e.g., other local or remote device) to be controlled at the time through motion input of device 10.

FITBIT 1002
Fitbit v. Immersion

Thus, particular embodiments provide gesture motion selection of other devices to be controlled by handheld device 10.

Handheld device 10 may include a device selection module operable to detect a device selection gesture which indicates that a user desires to control a particular device. Each controllable device may include its own gesture command maps which correlate gestures to be input using device 10 and commands of the controllable device. A control module of the handheld device may select a particular command map corresponding to the controllable device selected for control. In some embodiments, device 10 may include a device locator operable to detect, for each of a plurality of remote devices, a direction from the handheld device to each remote device. In this case, the user may move handheld device 10 in the direction of a particular remote device the user desires to control in order to select that remote device for control.

While motion input for device 10 may be used for such control of the other devices, other types of input (e.g., utilizing input 14) may also be used to control other local or remote devices selected for control by gesture input. In some embodiments different gestures may be each mapped to control a different device. In other embodiments, device 10 may display possible other devices for control and particular gesture(s) to utilize to indicate a user's selection as to which other device the user desires to presently control through device 10. Handheld devices according to the present invention may utilize any particular manner of gesture selection of one or more local or remote devices to be controlled by the handheld devices.

As discussed above, particular embodiments include handheld devices 10 capable of detecting motion of the device through a motion detector 22 to modify the behavior of the device in some way according to the motion detected. Handheld devices 10 in some embodiments are capable of modeling their particular environment and subsequently modifying their behavior based on such environment. One distinction between modeling an environment of a handheld device and detecting a particular motion of the device is that in the former case there may be reasoning involved and in the latter case there may be no such reasoning. As an example, if a handheld device changes its behavior when moved according to a particular gesture, that may be considered sensing or detecting a particular motion and reacting based on

FITBIT 1002
Fitbit v. Immersion

the motion detected. If, on the other hand, the handheld device determines that it is sitting face down on a table and reacts accordingly, that may be considered modeling its environment. As another example, if a handheld device moves to the left and changes its behavior based on such movement, that may be considered detecting motion and reacting. If the handheld device finds itself in free fall and powers-down so as to survive an impending collision with the ground, that may be considered modeling its environment. A further distinction may be that environmental modeling may not require an immediate response to a user input, while detecting an event, such as a particular motion, generally does require such an immediate response. Modeling an environment may thus involve sensing or detecting a pattern of motion (or lack thereof), matching it to a predefined set of environmental conditions and modifying the behavior of the device based on the modeled environment. The behavior implemented based on the environment modeled may also change based on a particular application in use or in focus. In some cases, the device may change its sensitivity to particular motions based on the environment modeled.

As an example, a handheld device may recognize, through accelerometers or other motion detection components, that it is at rest on an approximately horizontal surface. Such recognition may result from a determination that the device is not moving, or still, with a static 1g of acceleration orthogonal to a surface. The device may be able to differentiate resting on a table from resting in a user's hand, for example, because a user's hand typically will not be able to hold the device perfectly still. The device may, as a result, behave in a certain manner according to the recognition that it is at rest on an approximately horizontal surface. For example, if handheld device 10 recognized that it was lying at rest on a table, it may power off after lying in such position for a certain amount of time. As another example, a cellular phone in a vibrate mode may vibrate more gently if it recognizes it is on a table upon receipt of a call or upon any other event that may trigger vibration of the phone. In some embodiments, the device may recognize its orientation while lying on a table such that it may behave in one manner when lying in a "face down" position (e.g., it may power off) while it may behave in a different manner when lying in a non-face down position. If handheld device 10 comprised a cellular phone, it may enter a speaker mode when it is on a call and recognizes that it is placed by a user in a

FITBIT 1002
Fitbit v. Immersion

"face up" position on a table while on the call. If, on the other hand, the cellular phone is on a call and is placed face down on the table, it may enter a mute mode.

As another example, handheld device 10 may recognize through a brief period of approximately 0g that it is in free-fall and then may behave to reduce damage due to impending impact with the ground or another surface. Such behavior may include, for example, powering down chips and/or hard drives, retracting lenses, applying covers or any other device behavior. In particular embodiments, non-hand-held devices or devices that do not otherwise detect motion for input may also be able to model their environment and to behave based on the environment modeled. As an additional example, acceleration patterns may be detected to recognize that a handheld device 10 is in a moving environment (e.g., being held by a user in a car or on a train) and may adjust various sensitivities, threshold and/or other characteristics to enable better performance of the device in that environment.

In other embodiments, handheld device 10 may comprise a digital camera. Through its motion detection components, the camera may determine whether it is on a tripod or is being held by a user when a picture is taken. The camera may set a shutter speed for the picture based on that determination (e.g., slow shutter speed if on a tripod or fast shutter speed if being held by a user).

If handheld device 10 comprised a device that utilized a cradle for syncing up with another device, such as a PC, then device 10 may recognize that it is in the cradle based on its stillness (or supported state) and its particular orientation. The device may then operate or function according to its state of being in the cradle (e.g., it may then sync up with its associated PC).

FIGURE 16 is a flowchart 230 illustrating an environmental modeling process, in accordance with a particular embodiment. At step 232, raw motion data is received at handheld device 10. As described above, the raw motion data may be received by any combination of accelerometers, gyros, cameras, rangefinders or any other suitable motion detection components. At step 234, the raw motion data is processed to produce a motion detector output from which motion and orientation of the device is determined at step 236. Boxes 237 represent example motions and orientations of the device, such as rotating around the z-axis in box 237a, translating along the x-axis in box 237b, oriented at particular angles α, θ, ω in box 237c and still

FITBIT 1002
Fitbit v. Immersion

in box 237n. These are mere example motions and orientations of the device, and any number of motions may be utilized that are determined at step 236. In some embodiments, the determined orientations may comprise an orientation of the device with respect to gravity.

At step 238, handheld device 10 determines its environment based on the motion and orientation determined at step 236. Boxes 239 represent example environments of the device, such as face down on a table in box 239a, falling in box 239b, on a train in box 239c and held in hand at box 239n. Any number of environments may be determined based on motions and orientations determined at step 236. In particular embodiments, the environmental determination may also be based on a history of the device, such as a motion/orientation history. For example, when implementing a speaker mode function of a cellular phone, the device may detect a quite period when horizontal in the middle of a call after a short jarring is detected (e.g., the short jarring caused by a user placing the phone face up on a table). The phone can detect that it was jarred so that stillness and a perpendicular position relative to gravity may take on a different meaning than had the jarring not occurred. Thus, the determination of the environment may be based on the motion and orientation of the device and its history. The history may comprise a previous motion/orientation of the device or any other information relating to a device's history.

At step 240, the determined environment is mapped to a particular behavior. The mapped behavior may depend on any number of factors in addition to the determined environment, such as desired characteristics of the particular user using the device at the time or the particular application in use or focus at the time. For example, the behavior according to a particular modeled environment may include engaging a mute function of the handheld device in box 241a, powering down chips of the device to survive an impact in box 241b and increasing a motion activation threshold of the device in box 241n. The mute behavior indicated in box 241a may be implemented when a cell phone's environment comprises laying face down on a table while on a call. The powering down chips behavior in box 241b may be implemented when the environment of handheld device 10 comprises a free fall of the device. The increasing a motion activation threshold behavior of box 241n may be implemented

FITBIT 1002
Fitbit v. Immersion

when a handheld device's environment comprises being in a car or train where bumpiness may require a greater movement threshold for a user's motion input to register as an intended input. Particular embodiments may include any number of behaviors mapped to one or more modeled environments. At step 242, the handheld device behaves according to the behavior to which its environment is mapped at step 240.

As indicated above, users may move handheld devices according to particular gestures to cause the devices to perform desired functions, operations or tasks. In particular embodiments, gestures used as motion input for the device may comprise pre-existing symbols, such as letters of the alphabet, picture symbols or any other alphanumeric character or pictographic symbol or representation. For example, gestures used as motion input may mimic upper and lower case members of an alphabet in any language, Arabic and Roman numerals and shorthand symbols. Preexisting gestures may be used for handheld input devices for other local and remote devices as well. Using preexisting gestures for handheld device input may facilitate the learning process for users with respect to gesture motion interfaces.

FIGURE 17 illustrates example gestures which may be mapped to particular functions. For example, if handheld device 10 comprised a cellular phone, a user may move device 10 in the form of heart 250 to call the user's girlfriend, boyfriend or spouse or house 252 to call the user's home. As another example, if handheld device 10 were a PDA or other device running an application managing files or data, moving the device in the form of C-gesture 254 may be a command for copying data, O-gesture 256 may be a command for opening a file, D-gesture 258 may be a command for deleting data and X-gesture 260 may be an exit command for a file or application. The logical connection between gestures and their intended functions or operations (e.g., "O" for opening a file) further facilitates user interaction and learning.

Any number of pre-existing symbols may be used as gestures for motion input as commands for performing any number of functions, operations or tasks of a handheld device. Many preexisting gestures typically exist in two dimensions. Handheld device 10 may recognize such gestures. In some cases, for example, handheld device 10 may disable receipt of a particular dimension so that any movement in a third dimension when a user is attempting to input a two-dimensional

FITBIT 1002
Fitbit v. Immersion

gesture is not received or detected in order to facilitate recognition of the two-dimensional gesture. In some embodiments, handheld device 10 may receive three-dimensional gestures that may be based on preexisting two-dimensional gestures. Receiving and detecting three-dimensional gestures increases the capabilities of the device by, for example, increasing the number and types of gestures which may be used as motion input.

FIGURE 18 is a flowchart 270 illustrating the utilization of a preexisting symbol gesture, the letter "O," as motion input. As illustrated in step 272, a user moves handheld device 10 in the form of the letter "O." At step 274, handheld device 10 receives raw motion data of the "O" movement from motion detection components and process such raw motion data at step 276 to determine the actual motion of the device. At step 278, handheld device 10 accesses a gesture database 280 which may include a plurality of gestures recognizable by the device to map the motion to the gesture "O." The plurality of gestures of the gesture database may each be defined by a series of accelerations of a movement. The actual motion of the device may be matched to a series of accelerations of one of the gestures of the gesture database. At step 282, handheld device 10 maps the gesture "O" to a particular function by accessing a function database 284 (or a gesture mapping database) which may include a plurality of functions that may be performed by one or more applications running on the device. In particular embodiments, the gesture and function databases may be comprised in memory 18 of the device. The particular function mapped to the gesture "O" may depend on a particular application in focus or being used by the user at the time. For example, in some applications "O" be comprise a command to open a file, while in other applications it may comprise a command to call a certain number. In some cases, one gesture may be mapped to the same function for all applications of the device. At step 286, the device behaves according to the mapped function, such as opening a file.

As indicated above, gestures used as motion input for handheld device 10 may have different meanings (e.g., functions, operations, tasks) based on a particular context, such as a particular application in use or in focus, a particular device state with respect to an application or otherwise, a particular modeled environment or any combination of these or any other context. For example, a particular gesture may be

FITBIT 1002
Fitbit v. Immersion

mapped as a command to scroll a page up when running a web browser at the device, while the gesture may be mapped as a command to examine a different date when running a calendar program. The ability for particular gestures to be mapped to different commands depending on the context, such as the application in use, increases the functionality of the device.

Handheld devices in some embodiments may be able to utilize simpler motion detection components if gestures are mapped to different commands depending on the context. As an example, a handheld device may include particular motion detection components such that the handheld device may only be able to recognize and distinguish between twenty different gestures. If each gesture is mapped to a different function for each of four different applications, then the ability to only recognize twenty unique gestures still provides eighty different functions on the device (twenty for each application). If each gesture were mapped to its own function, no matter what application was in focus, then the overall capability of the device would be reduced, and some gestures would likely not be used in some applications. The ability to use less complex components that are able to recognize and distinguish between fewer gestures as a result of mapping gestures to a plurality of functions depending on the context can lead to reduced costs in the components utilized in the device and can also simplify the task of physically learning gestures required to control the device. As indicated above, gestures may be mapped to different functions, operations or tasks depending on the application in use, device state, modeled environment or other context. In some cases, gestures may be mapped to different functions depending on the state of a particular application. For example, in the case of a word processing program, some gestures may have some functions when in one state of the program (e.g., a menu state) while the same gestures may have different functions when in another state of the word processing program (e.g., a document editing state). In this case, a command map associated with the gesture function mappings may include gesture mappings for each such state.

FIGURE 19 is a flowchart 290 illustrating the use of context-based gesture mapping, in accordance with a particular embodiments. In the illustrated embodiment, a gesture has different functions assigned based on the application in focus. At step 292, handheld device 10 receives raw motion data of a particular

FITBIT 1002
Fitbit v. Immersion

gesture movement and process such raw motion data at step 294 to determine the actual motion of the device. At step 296, handheld device 10 maps the motion to a gesture, for example, by accessing a gesture database. At step 298, handheld device 10 determines which application is in focus. For example, if the device were capable of running four different applications, then it would determine which of the four was in focus or was being used at the time. The device then performs the function mapped to the gesture according to the application in focus. The identification of such function may be accomplished in some embodiments by accessing a function database which may also be referred to as a gesture mapping database since it correlates gestures of a gesture database to functions. In the illustrated embodiment, if Application 1 is in focus, then the device performs Function 1 at step 300a; if Application 2 is in focus, then the device performs Function 2 at step 300b; if Application 3 is in focus, then the device performs Function 3 at step 300c; and if Application 4 is in focus, then the device performs Function 4 at step 300d.

As a further example of context-based gesture mapping, a handheld device with phone and PDA capabilities may run four applications: a phone application, a calendar application, a file management application and an e-mail application. A gesture input mimicking the letter "S" may have different functions depending on the application in focus. For example, if the phone application is in focus, then receiving the gesture input "S" may be a command for calling a particular number designated to the "S" gesture. If the calendar application is in focus, then receiving the gesture input "S" may be a command for scrolling to the month of September in the calendar. If the file management application is in focus, then receiving the gesture input "S" may be a command for saving a file. If the e-mail application is in focus, then receiving the gesture input "S" may be a command for sending an e-mail. Particular embodiments contemplate great flexibility in the ability to map gestures to different functions depending on the context.

As discussed above, gestures may have different functions depending on a particular context at the time. In particular embodiments, handheld devices may be customizable to allow users to assign device functions to pre-defined gestures. The functions may be context-based such that some gestures may have different functions depending on an application in use, a device state or a modeled environment.

FITBIT 1002
Fitbit v. Immersion

Handheld devices in some embodiments may allow different users of the same device to assign different functions to the same gesture, and such functions may also be context-based as discussed above.

For example, a handheld device 10 may be utilized by a number of different users at different times. Each user may assign different functions for the same gestures. When the handheld device receives a gesture input, it must thus know which user is using the device at the time to determine which function the user intends the device to perform. The device may determine the user in any of a variety of ways. In some embodiments, users may log into the device prior to use by using a username and password or otherwise. In other embodiments, the handheld device may be able to identify the user based on the manner in which the user moves the device for motion input, such as the way the user forms a gesture using the device. As indicated above, each user may also assign commands to gestures based on context, such as based on the application in focus at the device. The ability for the handheld device to map functions to gestures based on particular users further increases the device's capabilities and flexibility, particularly if the device is able to recognize and distinguish only a particular number of gestures.

FIGURE 20 is a flowchart 310 illustrating the use of user-based gesture mapping, in accordance with a particular embodiment. In the illustrated embodiment, a gesture has different functions assigned based on the user using the device. At step 312, handheld device 10 receives raw motion data of a particular gesture movement and process such raw motion data at step 314 to determine the actual motion of the device. At step 316, handheld device 10 maps the motion to a gesture, for example, by accessing a gesture database. At step 318, handheld device 10 determines which user is using the device. Such determination may be made, for example, through a log in system in which users log into the device prior to use. Handheld device 10 may determine the current user through other suitable methods as well. At steps 320, the device performs the functions assigned to the gesture input based on the user using the device. In the illustrated embodiment describing the process with four possible users, if User 1 is using the device, then the device performs Function 1 at step 320a; if User 2 is using the device, then the device performs Function 2 at step 320b; if User 3 is

FITBIT 1002
Fitbit v. Immersion

using the device, then the device performs Function 3 at step 320c; and if User 4 is using the device, then the device performs Function 4 at step 320d.

As indicated above, in some embodiments, gestures may be assigned different functions based on both users using the device and a context. In this situation, the illustrated flowchart 310 described above may have an additional step to determine the context at the time (e.g., step 298 of flowchart 290 determining the application in focus). The particular function desired for performance by a certain gesture thus depends on both the user using the device at the time and the context, such as the particular application in focus at the time.

As previously discussed, some embodiments include handheld devices with the ability to receive preexisting symbols as gestures for motion input. Some of those embodiments as well as other embodiments may include the ability for user's to create their own gestures for mapping to functions and/or keys. The gestures may comprise any user-created symbol or other motion that the user desires to utilize as motion input for one or more particular functions, operations or tasks that the device is able to perform. Users may be able to create motions with some personal significance so they may more easily remember the motion's command or intended function.

FIGURE 21 is a flowchart 330 illustrating the assignment process for user-created gestures, in accordance with a particular embodiments. At step 332, an indication is received from a user for gesture creation. The indication may be received in any of a variety of ways using any suitable input format (e.g., keys, trackwheel, motion, etc.). The user may move the device according to the user-created gesture such that raw motion data for the user-created gesture is received at the handheld device at step 334. The raw motion data may comprise a sequence of accelerations of a movement after stabilization of the device from a base reference position until an indication is received to stop recording the reference positions. Indications to start and stop recording a user-created gesture may include motion or non-motion indications (e.g., key presses and key releases). The raw motion data is processed at step 336. At step 338, the motion is stored as a gesture, for example, at a gesture database. In particular embodiments, the indication for gesture creation may be received after the user moves the device according to the user-created gesture. For example, the user may move the device according to a user-created gesture that is

FITBIT 1002
Fitbit v. Immersion

currently unrecognizable by the device. The device may query the user to determine if the user desires to store the unrecognized gesture for a particular function. The user may respond in the affirmative so that the user may utilize the gesture as motion input in the future.

At step 340, function mapping information for the gesture is received from the user. The function mapping information may comprise functions, operations or tasks of the device that the user desires the user-created gesture to command. In particular embodiments, such function mapping information may comprise a series of functions (e.g., a macro) that one gesture may command. The user may assign different functions for a gesture according to an application in focus. In some cases, a user may desire to map different gestures to different keys or keystrokes of the device. One examples of mapping a series of functions to a gesture may include mapping a long string of characters to a gesture (e.g., telephone numbers including pauses, where appropriate). At step 342, the function mapping information is stored, for example, at a function database or gesture mapping database.

As indicated above, it may be difficult for a user to move handheld device 10 in the same precise manner for one or more gestures each time those gestures are used as input. Particular embodiments thus allow for varying levels of precision in gesture input. Precision describes how accurately a gesture must be executed in order to constitute a match to a gesture recognized by the device, such as a gesture included in a gesture database accessed by the device. The closer a user generated motion must match a gesture in a gesture database, the harder it will be to successfully execute such gesture motion. As discussed above, in particular embodiments movements may be matched to gestures of a gesture database by matching a detected series of accelerations of the movements to those of the gestures of the gesture database.

As the precision of gestures required for recognition increases, one may have more gestures (at the same level of complexity) that can be distinctly recognized. As an example, if the precision required was zero, then the device could only recognize a single gesture but it would recognize it easily because anything the user did would be recognized as that gesture. If, however, the precision required was infinite then it would be virtually impossible for a user to form a gesture that was recognized by the device, but the device could support an infinite number of gestures with only

FITBIT 1002
Fitbit v. Immersion

infinitesimal differences between them. One area in which the precision requirement is especially applicable is in the area of spatial signatures. With spatial signatures, the level of precision correlates well with the level of security.

In particular embodiments, the precision required by handheld device 10 for gesture input may be varied. Different levels of precision may be required for different users, different regions of the "gesture space" (e.g., similar gestures may need more precise execution for recognition while gestures that are very unique may not need as much precision in execution), different individual gestures, such as signatures, and different functions mapped to certain gestures (e.g., more critical functions may require greater precision for their respective gesture inputs to be recognized). Moreover, in some embodiments users may be able to set the level(s) of precision required for some or all gestures or gestures of one or more gesture spaces. As an example, a user may set the precision required for spatial signatures higher than for other gestures for the user thus increasing security for spatial signature input.

As indicated above, in particular embodiments gestures may be recognized by detecting a series of accelerations of the device as the device is moved along a path by a user according to an intended gesture. Recognition occurs when the series of accelerations is matched by the device to a gesture of a gesture database.

In some embodiments, each gesture recognizable by handheld device 10, or each gesture of a gesture database, includes a matrix of three-dimensional points. In addition, a user movement intended as a gesture input includes a matrix of three-dimensional points. Handheld device 10 may compare the matrix of the movement with the matrices of each recognizable gesture (or each gesture in the gesture database) to determine the intended gesture. If a user moves the device such that the movement's matrix correlates to each point of an intended gesture's matrix, then the user may be deemed to have input the intended gesture with perfect precision. As the precision required for gesture input is reduced, then the greater the allowable differences between a user gesture movement and an intended gesture of a gesture database for gesture recognition.

FIGURE 22 illustrates three gestures input using a handheld device with varying levels of precision. In the illustrated embodiment, the intended gesture comprises an "O." Gesture movement 350 is input as a perfect "O," or with 100%

FITBIT 1002
Fitbit v. Immersion

precision for the intended gesture. Gesture movement 352 is input with less than 100% precision as it does not form a perfect "O." Gesture movement 354 is input with less precision than gesture movement 352. The precision requirement for the input of gesture "O" may be set at handheld device to accept varying levels of precision. For example, the precision level may be set such that only gesture movement 350 is recognized as gesture "O," gesture movements 350 and 352 are both recognized as gesture "O" or gesture movements 350, 352 and 354 are all recognized as gesture "O." As indicated above, the higher the precision requirement, then the more space available for additional recognizable gestures. For example, if the precision level for handheld device 10 were set such that only gesture movement 350 was recognized as gesture "O," then gesture movements 352 and 354 may be recognized as other, distinct gestures.

In particular embodiments, handheld devices may alter gestures recognized for performing particular functions based on a user's personal precision. In this manner, a handheld device may have dynamic learning capability of gesture mappings. For example, if a particular gesture of a gesture database is mapped to a particular function, and a user's repeated attempts to input the gesture lack precision in a consistent manner; then the handheld device may alter the gesture in the gesture database to match the consistent gesture movement of the user such that the user's consistent gesture motion input will be mapped to the particular function.

As an example, if a particular gesture comprises a square motion and a user's motion intended for the gesture comprises more of a triangular motion on a consistent basis (e.g., on multiple consecutive times), then the handheld device may be able to recognize this consistent difference in an intended gesture and the actual user motion to change the intended gesture (e.g., a square) in the gesture database mapped to the function intended to the user's actual consistent motion (e.g., triangle). Thus, after such change is made, any time the user inputs the triangle gesture then the function previously mapped to the square gesture will be commanded. The device may determine the gesture intended in any of a variety of ways, such as through two-way communication with the user through any form of input. In particular embodiments, this dynamic learning of users' input characteristics may be applied on a user-specific

FITBIT 1002
Fitbit v. Immersion

basis. For example, in the example described above another user may still input the square gesture using the same handheld device to command the same function.

As indicated above, as the precision of user motion with respect to intended gestures increases, then the number of gestures available for mapping to functions increases. In some embodiments, handheld devices may recognize that a user's precision increases over time and the devices may, as a result, increase the gestures available for use. Increasing gestures available for input may also increase the functions capable of being commanded through gesture input.

As an example, a user's personal precision for inputting gestures may be such that the user is only able to input a certain number of gestures that will be recognized by the handheld device. However, over time, the user's personal precision may increase. This increase may be recognized by the handheld device and, as a result, the device may enable additional gestures that the user may use as gesture input. In some embodiments, the enabling of additional gestures may occur when the user's precision increases over a particular precision threshold, or a certain precision level. Since the user's precision has increased, the handheld device will be able to recognize when the user attempts to input these additional gestures. As indicated above, providing additional gestures for input by a user may also increase the number of functions that the user is able to command through gesture input, since each gesture may be mapped to command a different function.

Handheld devices in particular embodiments may also allow users to set and vary noise thresholds of the device. Noise thresholds are the magnitude of motion of the device that must be detected in order to be considered intended motion input (e.g., an intended gesture) of the user. For example, if noise thresholds are set low, then minimal motion of the device may be considered by the device as motion input. However, if noise thresholds are set high, then greater movement of the device would be required before the motion is considered intended input from the user. If, for example, a user is travelling in a car on a bumpy road, the user may desired to set the noise threshold higher so that when the device moves as a result of bumps in the road then such movement may not be considered by the device to be intended motion input.

FITBIT 1002
Fitbit v. Immersion

In particular embodiments, noise thresholds may automatically change at the device based on a modeled environment. For example, if a device determines that the environment comprises traveling in a car, then the device may automatically increase the noise threshold so that minimal movements resulting from the car will not register as user-intended motion.

FIGURE 23 is a flowchart 370 illustrating a gesture recognition process utilizing a number of features described herein, in accordance with a particular embodiment. At step 372, raw motion data of a particular gesture movement is received. The raw motion data is processed at step 374 where the actual motion of the device is determined. Such processing may include various filtering techniques and fusion of data from multiple detection or sensing components. At step 376, the actual motion is mapped to a gesture. Mapping the actual motion to a gesture may include accessing a user settings database 378, which may include user data 379 comprising, for example, user precision and noise characteristics or thresholds, user-created gestures and any other user-specific data or information including user identities 381. User-specific information may be important, for example, because different users of the handheld device may have different settings and motion input characteristics. For example, an older user may have less precision than a younger user when inputting gestures such that the older person may have fewer gestures available. Moreover, a more experienced user may have more device functionality available through gesture input.

User settings database 378 may also include environmental model information 380 which may factor in determining the gesture applicable at the time. As discussed above, through environmental modeling, the device can internally represent its environment and the effect that environment is likely to have on gesture recognition. For example, if the user is on a train, then the device may automatically raise the noise threshold level. The device may also reduce the precision required, depending upon how crowded the gesture space is near the gesture under consideration. Mapping the actual motion to a gesture may also include accessing gesture database 382.

At step 384, the gesture is mapped to a function for the device. This step may include accessing a function mapping database 386 which may include correlation

FITBIT 1002
Fitbit v. Immersion

between gestures and functions. Different users may have different mappings of gestures to functions and different user-created functions. Thus, function mapping database 386 may also include user-specific mapping instructions or characteristics, user-created functions (e.g., macros and/or phone numbers) and any other function information which may be applicable to mapping a particular gesture to one or more functions. In some embodiments, gestures may be mapped to individual keystrokes. User identities 381 may also be accessed in this step. In addition, device context information 388 may also be accessed and utilized in mapping the gesture, which may include environmental model information 389, application in focus information 390 and device state information 391, such as time and date information, location information, battery condition and mode information (e.g., silent mode). At steps 392, the device performs the appropriately-mapped one or more function(s), such as Function 1 at step 392a, Function 2 at step 392b or Function 3 at step 392c.

As discussed above, in particular embodiments handheld device 10 may comprise a cellular phone with many of the capabilities described herein. For example, cellular phones with motion input capabilities may use motion input to flatten menus as discussed above. The cellular phone may detect device states and environments, such as free fall or the cellular phone being face down or face up to map to behaviors such as mute, speaker phone and power-off. Other detection of device states may include detecting that the phone is being held to disengage mute or speakerphone states. The cellular phone may utilize gestures to control dialing (e.g., through gestural speed dial) or to lock/unlock a keypad of the device. For example, the device may be moved in a clockwise circle to dial home, a counterclockwise circle to dial work and in the shape of a heart to dial a significant other. Users may also be able to program the cellular phone to customized gestural mappings.

In particular embodiments handheld device 10 may comprise a digital camera utilizing motion input for at least some of the functions described herein. For example, digital cameras with motion input capabilities may use motion input to flatten menus as discussed above. Motion may also be used to allow a user to zoom in (and back out) on still photos or video to examine it more closely for smoother and more intuitive functionality. Motion may be used to zoom in and out of a number of thumbnails of photographs or video clips so that it is easy to select one or more to

FITBIT 1002
Fitbit v. Immersion

review. Virtual desktops may be used to review many thumbnails of many digital photos or video clips or to review many digital photos or video clips by translating the camera or using gestural input. Gestures and simple motions may be used alone or in combination with other interface mechanisms to modify various settings on digital still and video cameras, such as flash settings, type of focus and light sensing mode. Moreover, free fall may be detected to induce the camera to protect itself in some way from damage in an impending collision. Such protection may include dropping power from some or all parts of the camera, closing the lens cover and retracting the lens.

In particular embodiments handheld device 10 may comprise a digital watch utilizing motion input for at least some of the functions described herein. For example, digital watches with motion input capabilities may use motion input to flatten menus as discussed above. In some embodiments, the tapping of the watch or particular gestures may be used to silence the watch. Other functions may also be accessed through taps, rotations, translations and other more complex gestures. These functions may include changing time zones, setting the watch (e.g., setting the time and other adjustable settings), changing modes (e.g., timers, alarms, stopwatch), activating the backlight, using a stopwatch (e.g., starting, stopping and splitting the stopwatch) and starting and stopping other timers.

In some embodiments, motion detection may be separate from a display. For example, a display may be worn on glasses or contacts, and other parts of the handheld device may be dispersed across a user's body such that the display may not be part of the same physically component as the motion input device or component

As discussed above, particular figures illustrate various methods, flowcharts and processes which may be performed in particular embodiments. It should be understood that steps may be performed in any order, and steps from a particular method, flowchart or process may be combined with other methods, flowcharts or processes or other steps from the same method, flowchart or process in various embodiments without departing from the scope of the invention.

Although the present invention has been described in detail with reference to particular embodiments, it should be understood that various other changes, substitutions, and alterations may be made hereto without departing from the spirit and scope of the present invention. For example, although the present invention has

FITBIT 1002
Fitbit v. Immersion

been described with reference to a number of elements included within handheld device 10, these elements may be combined, rearranged or positioned in order to accommodate particular architectures or needs. In addition, any of these elements may be provided as separate external elements to each other where appropriate. The present invention contemplates great flexibility in the arrangement of these elements as well as their internal components.

Numerous other changes, substitutions, variations, alterations and modifications may be ascertained by those skilled in the art and it is intended that the present invention encompass all such changes, substitutions, variations, alterations and modifications as falling within the spirit and scope of the appended claims.

FITBIT 1002
Fitbit v. Immersion

WHAT IS CLAIMED IS:

1. A motion controlled handheld device comprising:

a first accelerometer operable to detect acceleration along a first axis;

a second accelerometer operable to detect acceleration along a second axis, the second axis perpendicular to the first axis;

a tilt detection component operable to detect rotation having a component around at least one of the first axis and the second axis;

a display operable to present a current image;

a motion tracking module operable to track motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component; and

a controller operable to generate the current image and to modify the current image in response to the motion of the device.

2. The motion controlled handheld device of Claim 1, wherein:

the display comprises a viewable surface; and

the first axis and the second axis are substantially parallel to the viewable surface.

3. The motion controlled handheld device of Claim 1, wherein:

the tilt detection component comprises a third accelerometer operable to detect acceleration along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis; and wherein:

the motion tracking module is further operable to distinguish translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer.

FITBIT 1002
Fitbit v. Immersion

4. The motion controlled handheld device of Claim 1, wherein the tilt detection component comprises:

a third accelerometer operable to detect acceleration along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

a camera operable to generate a video stream; and

a video analysis module operable to detect a direction of motion based on the video stream.

5. The motion controlled handheld device of Claim 4, wherein the tilt detection component further comprises:

a range finder operable to determine distance information including a distance between the device and an object in the video stream; and wherein:

the video analysis module is further operable to determine a magnitude of translation of the device using the distance.

6. The motion controlled handheld device of Claim 1, wherein the tilt detection component comprises:

a first camera operable to generate a first video stream, the first camera aligned to focus in a first direction along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

a second camera operable to generate a second video stream, the second camera aligned to focus in a second direction along the third axis, the second direction opposite the first direction; and

a video analysis module operable to detect a direction of motion of the device based on the first video stream and the second video stream.

7. The motion controlled handheld device of Claim 6, wherein the tilt detection component further comprises a third accelerometer operable to detect acceleration along the third axis.

FITBIT 1002
Fitbit v. Immersion

8. The motion controlled handheld device of Claim 6, wherein the video analysis module is further operable to:

detect first edges of objects in the first video stream;

detect second edges of objects in the second video stream;

identify movement of the first edges and the second edges;

determine a differential between the movement of the first edges and the movement of the second edges; and

determine tilt components and translation components based on the differential.

9. The motion controlled handheld device of Claim 1, further comprising:

a gesture database comprising a plurality of gestures, each gesture defined by a motion of the device with respect to a first position of the device; and

a gesture mapping database mapping each of the gestures to a corresponding command; and wherein

the controller is further operable to compare the tracked motion of the device against the gestures to determine a received gesture, to identify the corresponding command mapped to the received gesture, and to execute the identified command to modify the current image.

10. The motion controlled handheld device of Claim 1, wherein:

the motion tracking module is further operable to identify translation of the device within a plane formed by the first axis and the second axis based upon motion of the device;

the current image displays a subsection of a larger image; and

the controller is further operable to continuously modify the current image to display another subsection of the larger image based on a resulting position of the device resulting from the translation.

11. The motion controlled handheld device of Claim 1, wherein the motion tracking module is further operable to disregard acceleration detected by the first

FITBIT 1002
Fitbit v. Immersion

accelerometer and acceleration detected by the second accelerometer that register below a noise threshold.

12. A method for controlling a handheld device comprising:

detecting acceleration along a first axis using a first accelerometer;

detecting acceleration along a second axis using a second accelerometer, the second axis perpendicular to the first axis;

detecting rotation having a component around at least one of the first axis and the second axis using a tilt detection component;

tracking motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component; and

displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

13. The method of Claim 12, wherein:

the display comprises a viewable surface; and

the first axis and the second axis are substantially parallel to the viewable surface.

14. The method of Claim 12, further comprising:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

distinguishing translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer.

FITBIT 1002
Fitbit v. Immersion

15. The method of Claim 12, further comprising:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

monitoring a video stream generated by a camera of the device; and

detecting a direction of motion based on the video stream.

16. The method of Claim 15, further comprising:

determining distance information including a distance between the device and an object in the video stream; and

determining a magnitude of translation of the device using the distance.

17. The method of Claim 12, further comprising:

monitoring a first video stream generated by a first camera of the device, the first camera aligned to focus in a first direction along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

monitoring a second video stream generated by a second camera of the device, the second camera aligned to focus in a second direction along the third axis, the second direction opposite the first direction; and

detecting a direction of motion of the device based on the first video stream and the second video stream.

18. The method of Claim 17, further comprising:

detecting first edges of objects in the first video stream;

detecting second edges of objects in the second video stream;

identifying movement of the first edges and the second edges;

determining a differential between the movement of the first edges and the movement of the second edges; and

determining tilt components and translation components based on the differential.

FITBIT 1002
Fitbit v. Immersion

19. The method of Claim 12, further comprising:

comparing the tracked motion of the device against a gesture database, the gesture database comprising a plurality of gestures with each gesture defined by a motion of the device with respect to a first position of the device;

identifying a command mapped to the received gesture; and

executing the identified command to modify the current image.

20. Logic for controlling a handheld device, the logic embodied in a computer readable medium and operable when executed to perform the steps of:

detecting acceleration along a first axis using a first accelerometer;

detecting acceleration along a second axis using a second accelerometer, the second axis perpendicular to the first axis;

detecting rotation having a component around at least one of the first axis and the second axis using a tilt detection component;

tracking motion of the device in three dimensions using the first accelerometer, the second accelerometer, and the tilt detection component; and

displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

21. The logic of Claim 20, further operable when executed to perform the steps of:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

distinguishing translation within a plane formed by the first axis and the second axis from rotation having a component around at least one of the first axis and the second axis based upon the acceleration measured by the third accelerometer.

FITBIT 1002
Fitbit v. Immersion

22. The logic of Claim 20, further operable when executed to perform the steps of:

detecting acceleration along a third axis using a third accelerometer of the tilt detection component, the third axis perpendicular to the first axis and perpendicular to the second axis; and

monitoring a video stream generated by a camera of the device; and

detecting a direction of motion based on the video stream.

23. The logic of Claim 20, further operable when executed to perform the steps of:

determining distance information including a distance between the device and an object in the video stream; and

determining a magnitude of translation of the device using the distance.

24. The logic of Claim 20, further operable when executed to perform the steps of:

monitoring a first video stream generated by a first camera of the device, the first camera aligned to focus in a first direction along a third axis, the third axis perpendicular to the first axis and perpendicular to the second axis;

monitoring a second video stream generated by a second camera of the device, the second camera aligned to focus in a second direction along the third axis, the second direction opposite the first direction; and

detecting a direction of motion of the device based on the first video stream and the second video stream.

FITBIT 1002
Fitbit v. Immersion

25. The logic of Claim 24, further operable when executed to perform the steps of:

detecting first edges of objects in the first video stream;

detecting second edges of objects in the second video stream;

identifying movement of the first edges and the second edges;

determining a differential between the movement of the first edges and the movement of the second edges; and

determining tilt components and translation components based on the differential.

26. The logic of Claim 20, further operable when executed to perform the steps of:

comparing the tracked motion of the device against a gesture database, the gesture database comprising a plurality of gestures with each gesture defined by a motion of the device with respect to a first position of the device;

identifying a command mapped to the received gesture; and

executing the identified command to modify the current image.

27. A motion controlled handheld device comprising:

means for detecting acceleration along a first axis;

means for detecting acceleration along a second axis, the second axis perpendicular to the first axis;

means for detecting rotation having a component around at least one of the first axis and the second axis;

means for tracking motion of the device in three dimensions based upon the acceleration along the first axis, the acceleration along the second axis, and the rotation; and

means for displaying a current image using a display of the device and modifying the current image in response to the tracked motion of the device.

FITBIT 1002
Fitbit v. Immersion

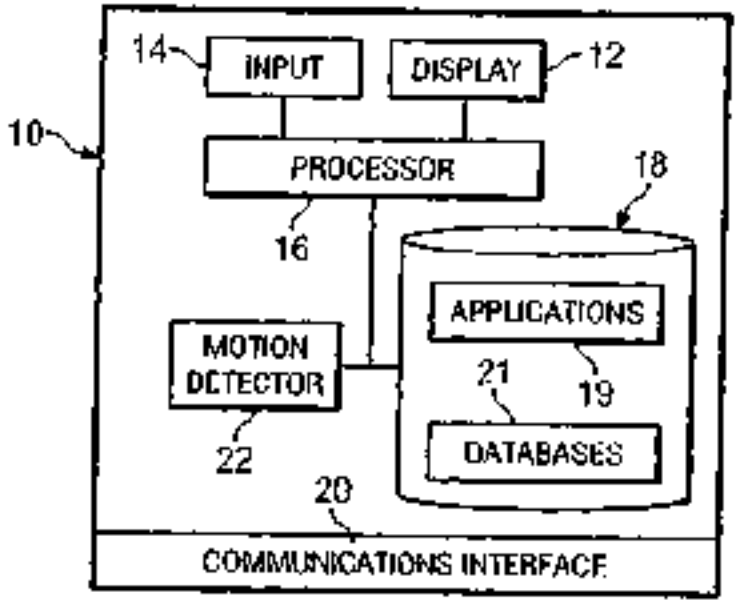


FIG. 1

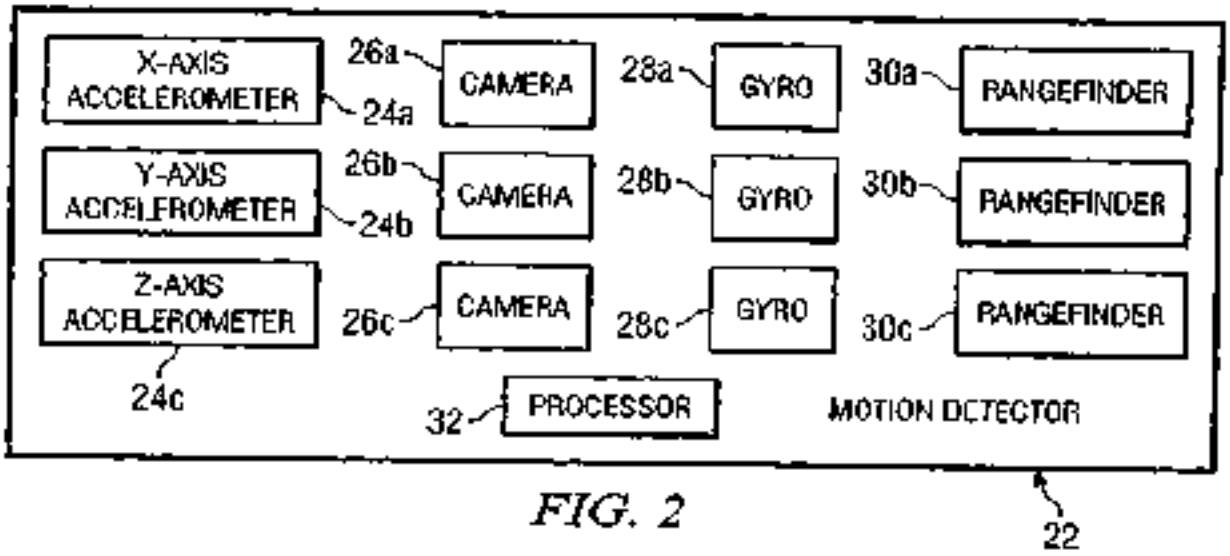


FIG. 2

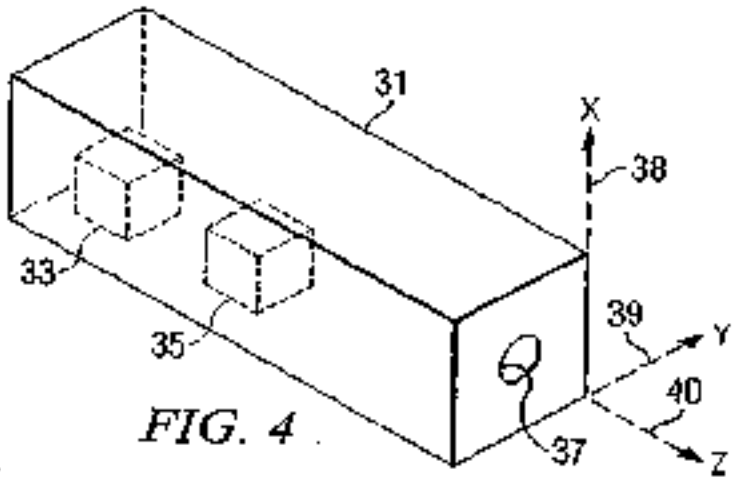


FIG. 4

FITBIT 1002
Fitbit v. Immersion

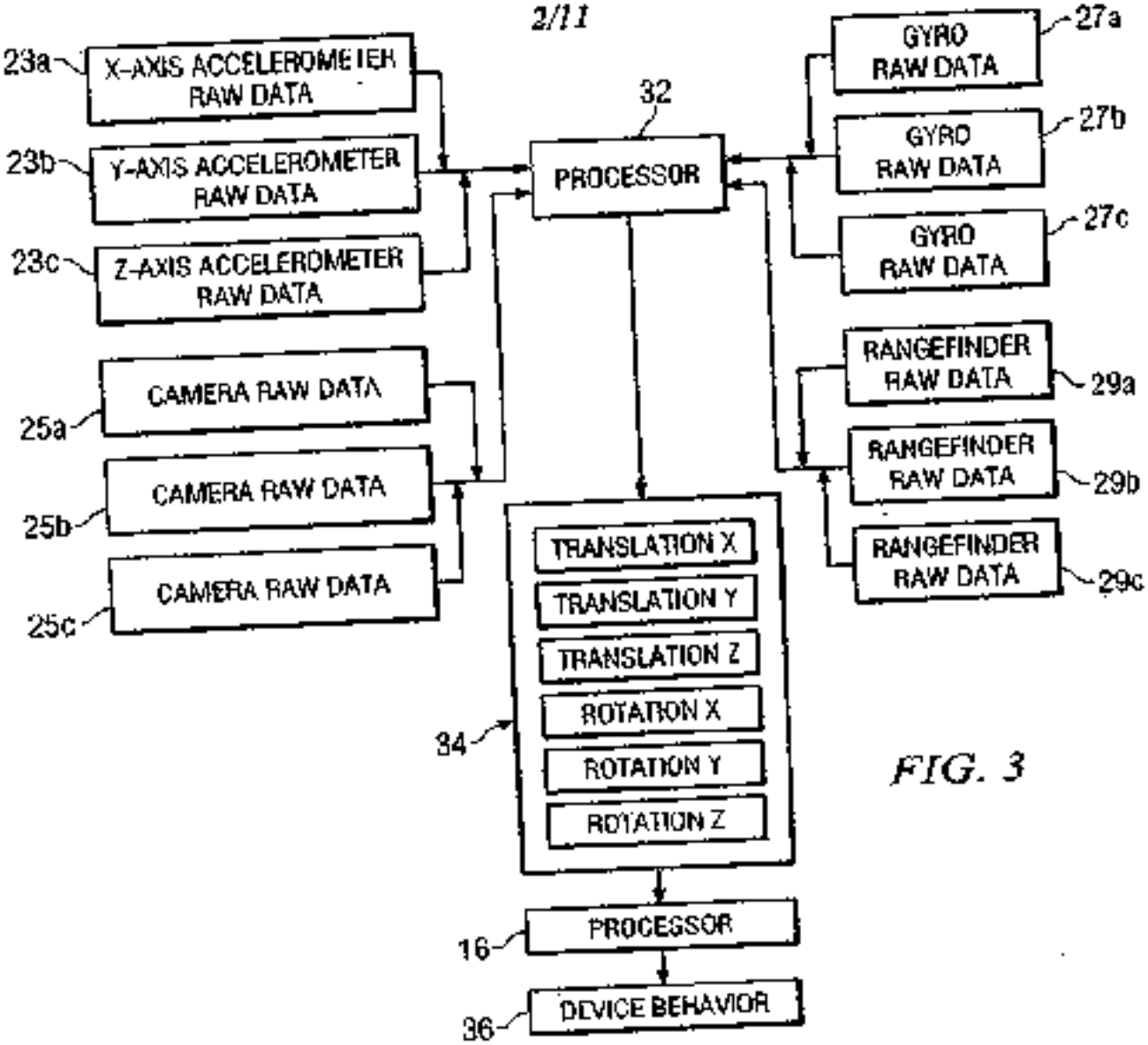


FIG. 3

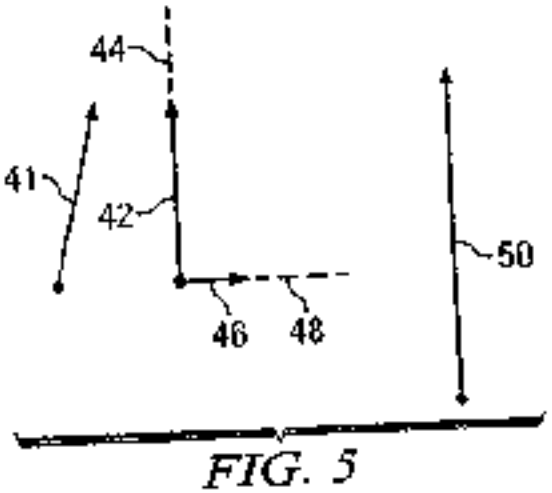


FIG. 5

FITBIT 1002
Fitbit v. Immersion

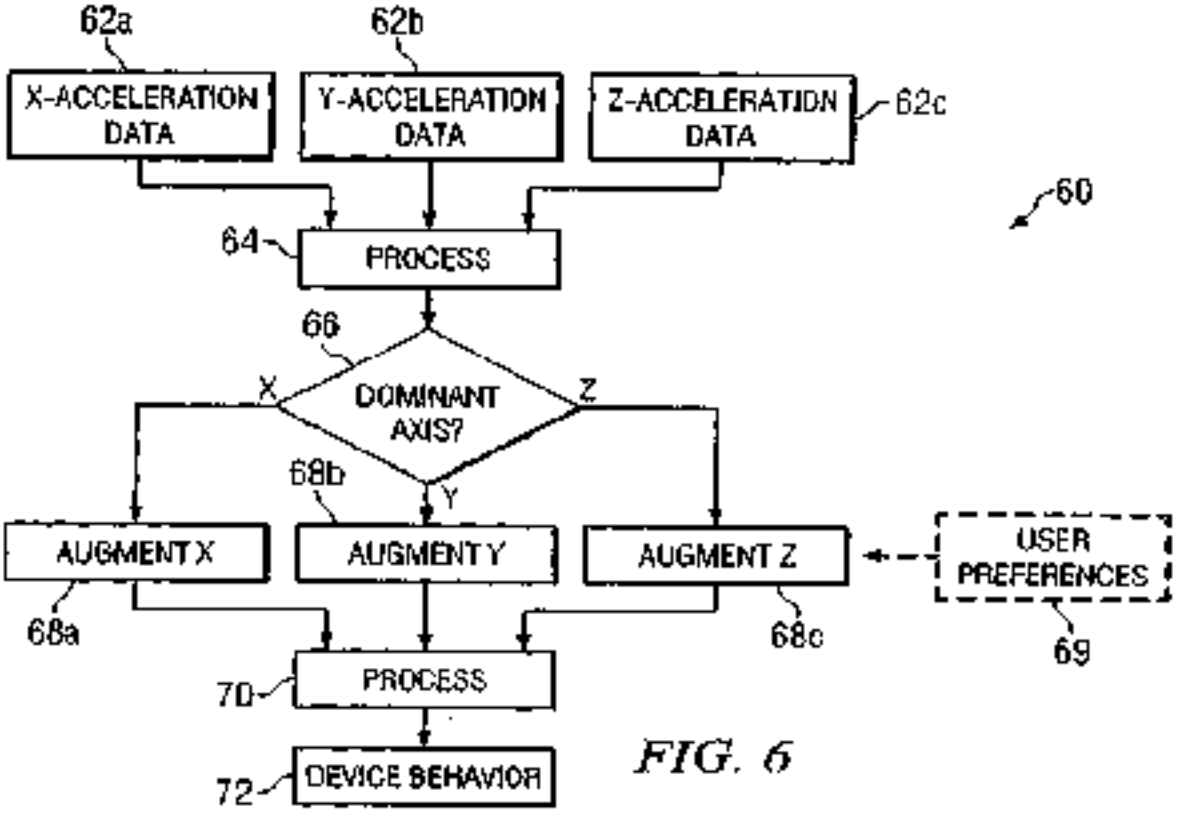


FIG. 6

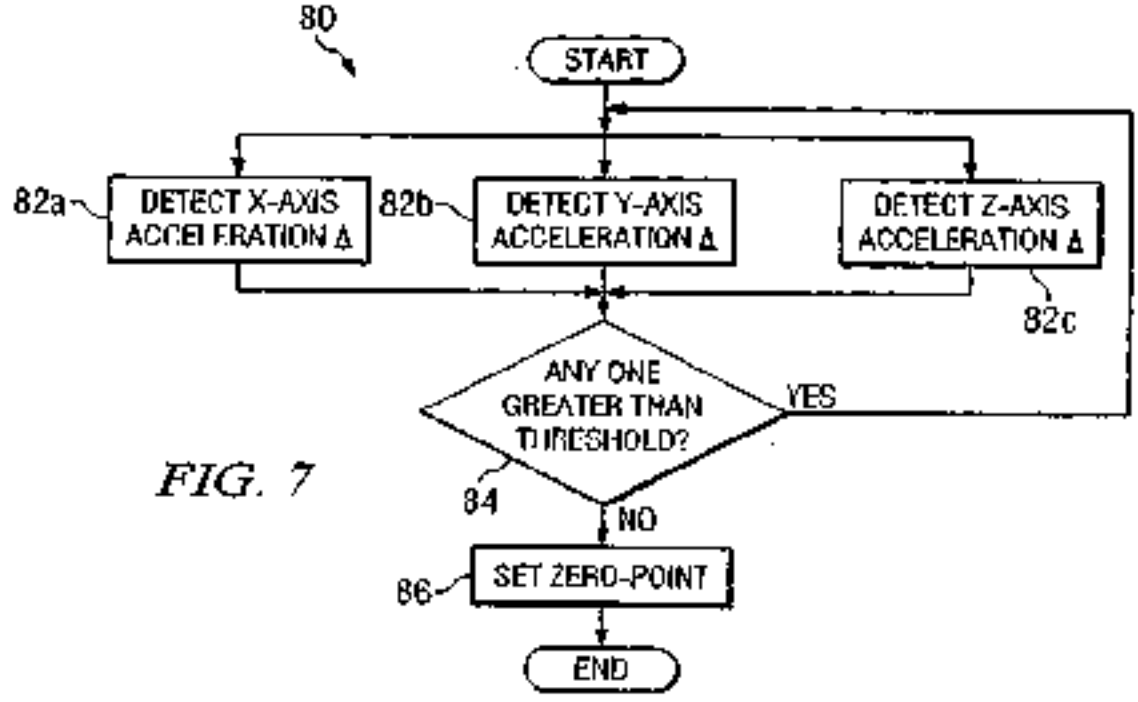


FIG. 7

FITBIT 1002
Fitbit v. Immersion

FIG. 8

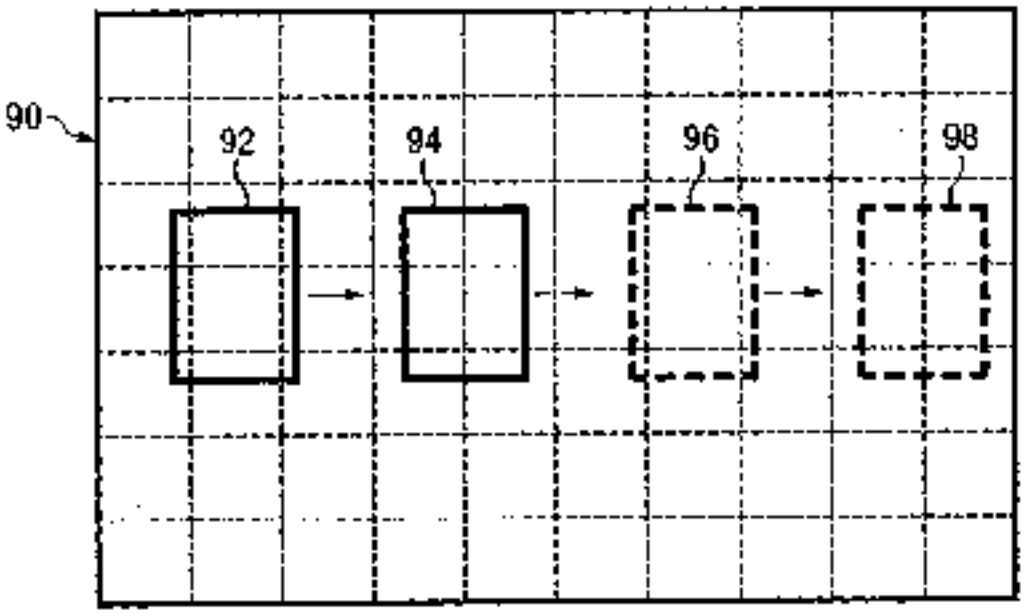
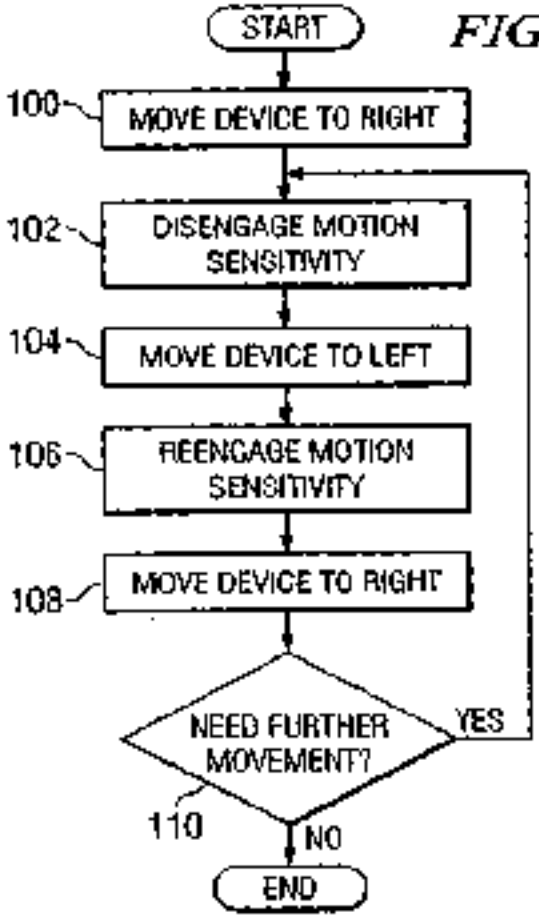


FIG. 9



FITBIT 1002
Fitbit v. Immersion

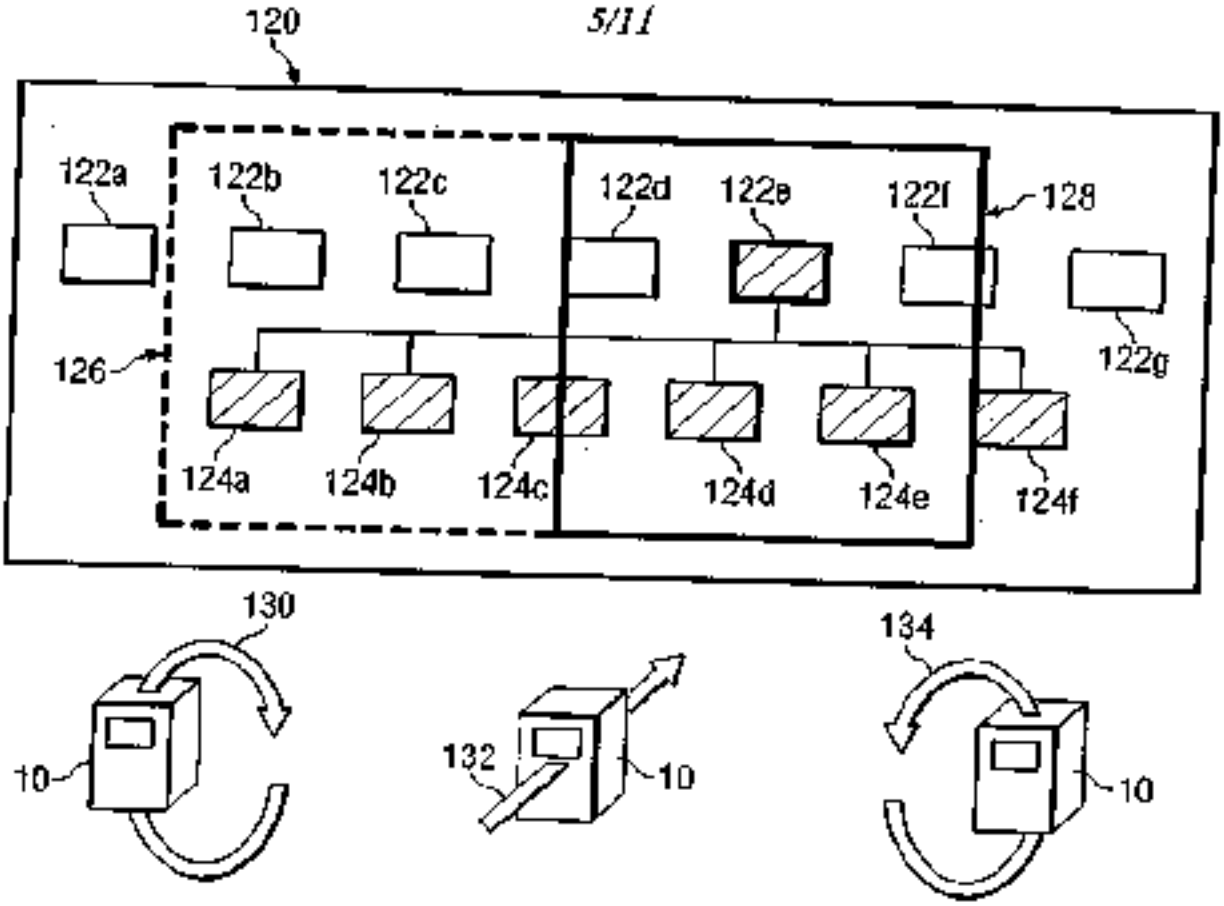


FIG. 10A

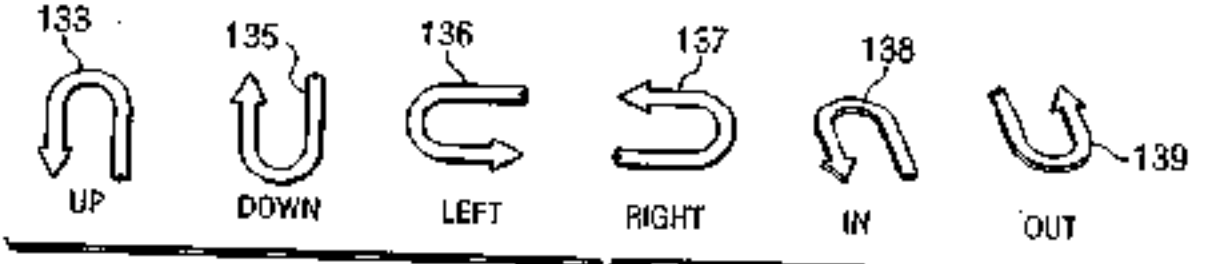


FIG. 10B

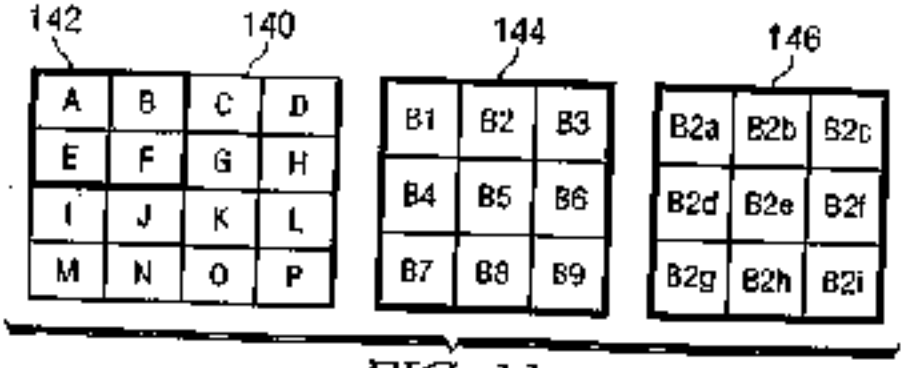


FIG. 11

FITBIT 1002
Fitbit v. Immersion

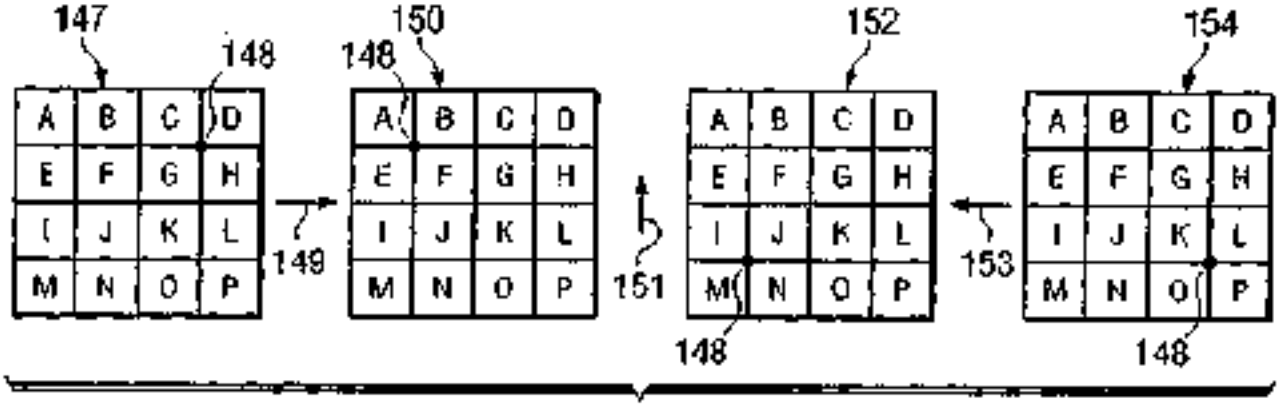
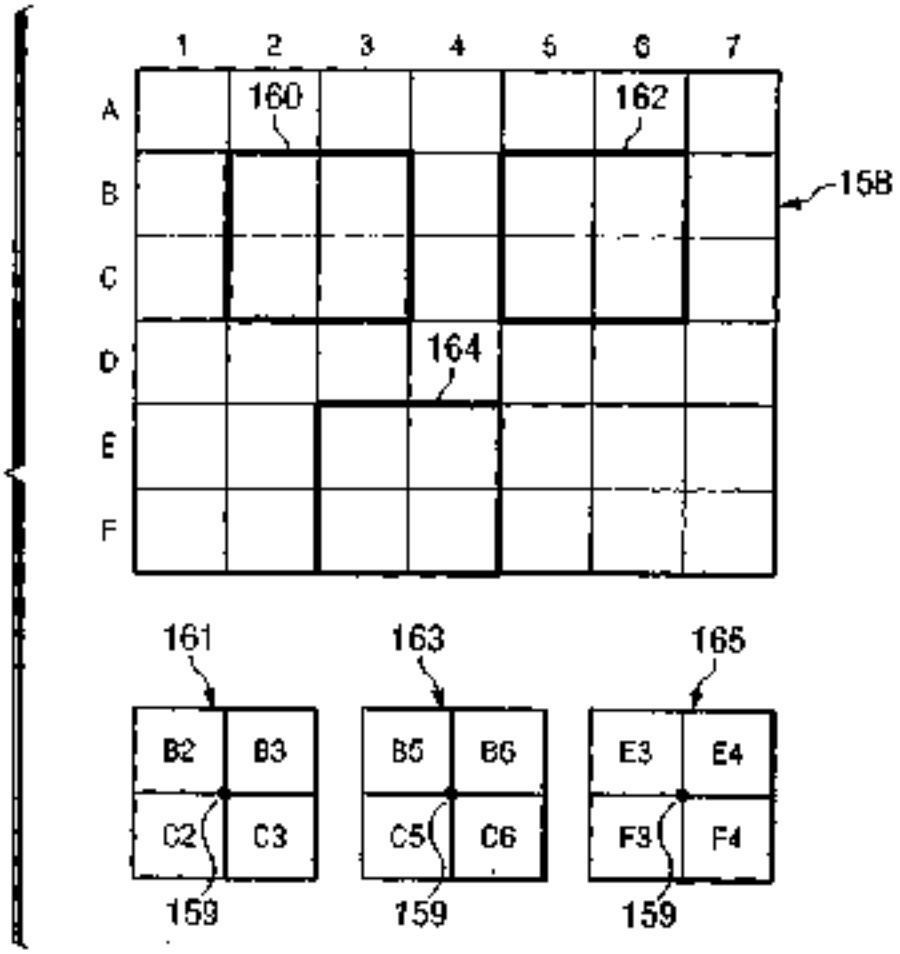


FIG. 12A

FIG. 12B



FITBIT 1002
Fitbit v. Immersion

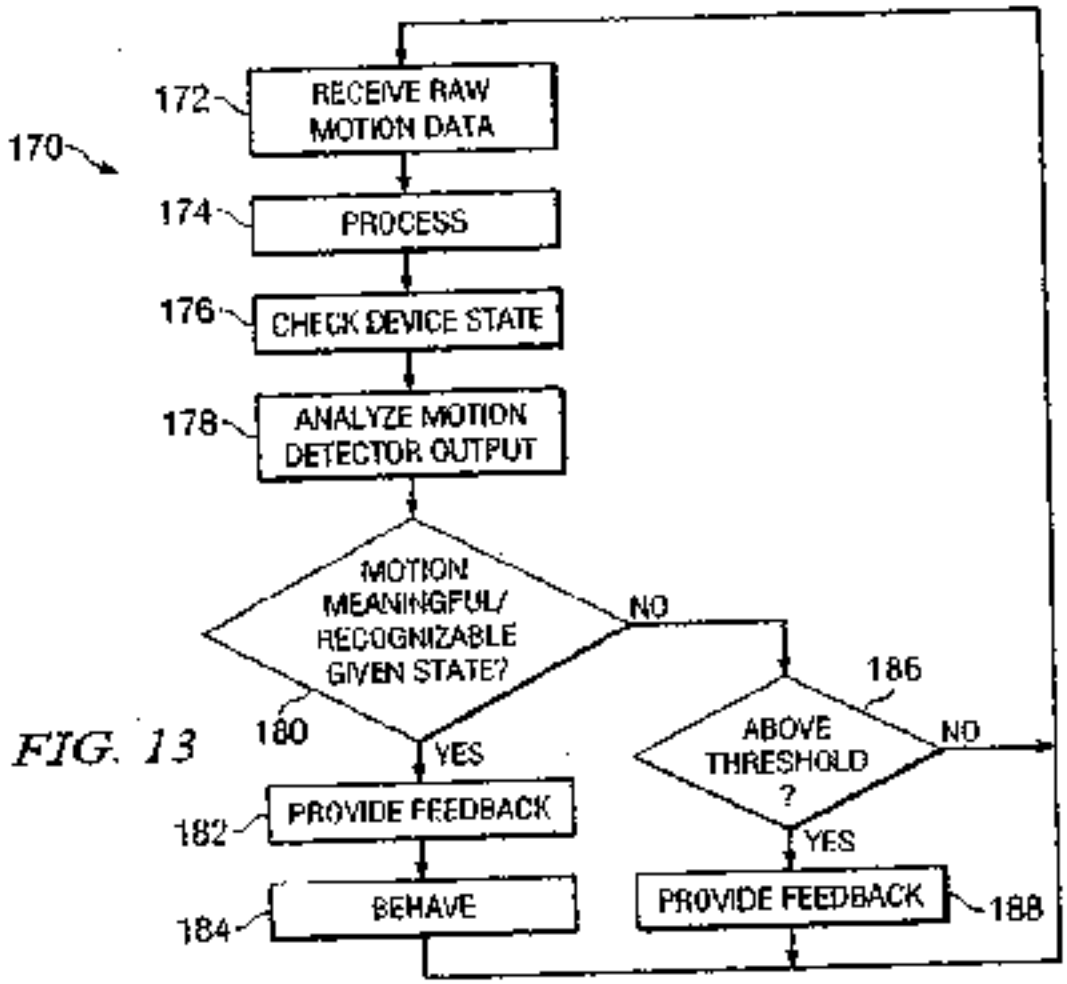


FIG. 13

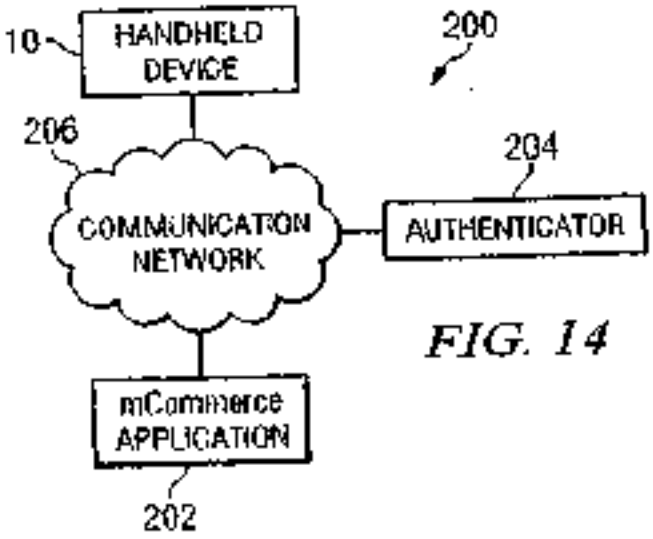


FIG. 14

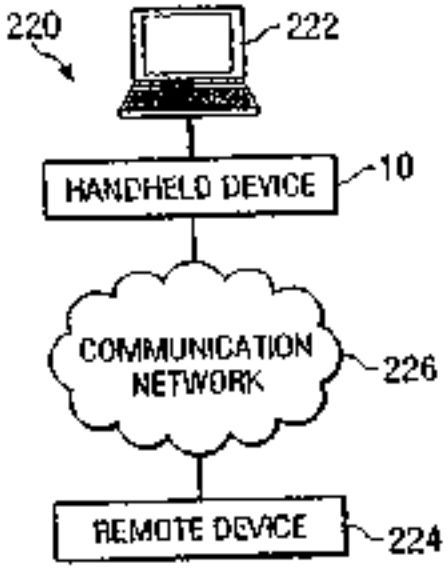


FIG. 15

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Fitbit v. Immersion

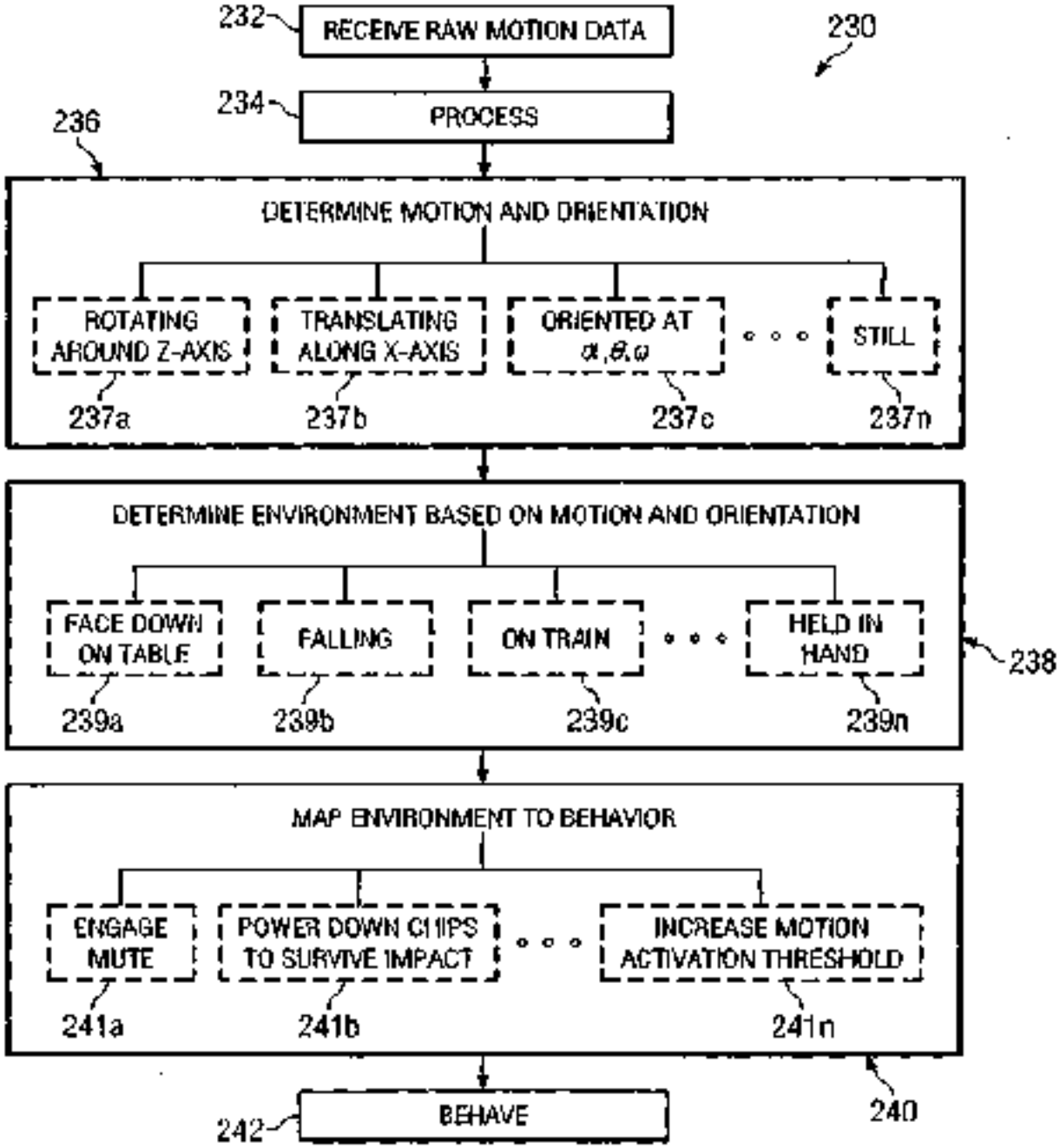


FIG. 16

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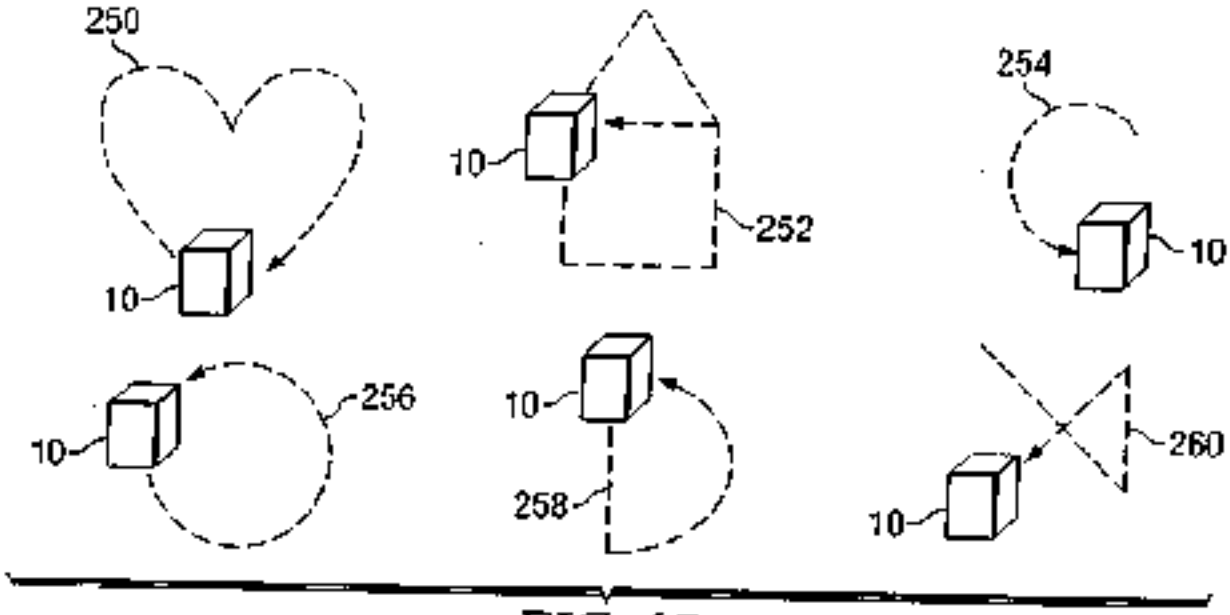


FIG. 17

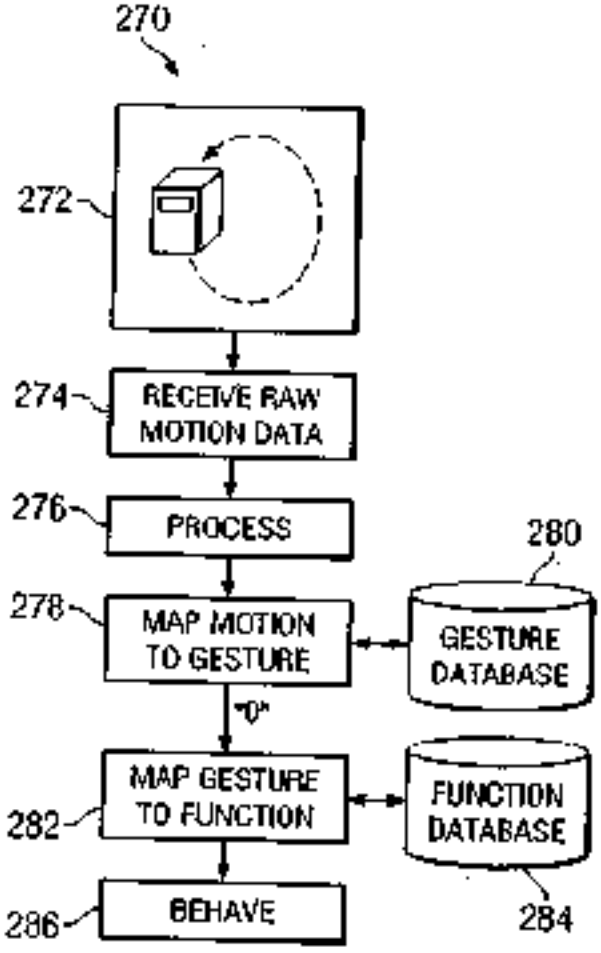


FIG. 18

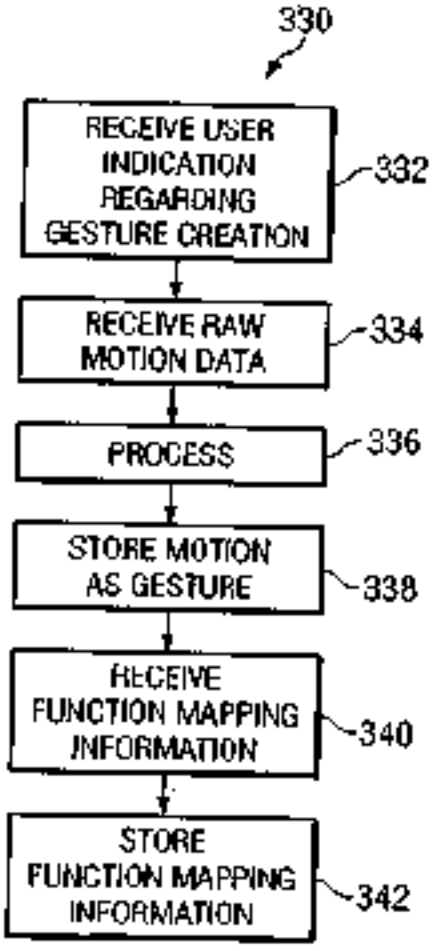


FIG. 21

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Fitbit v. Immersion

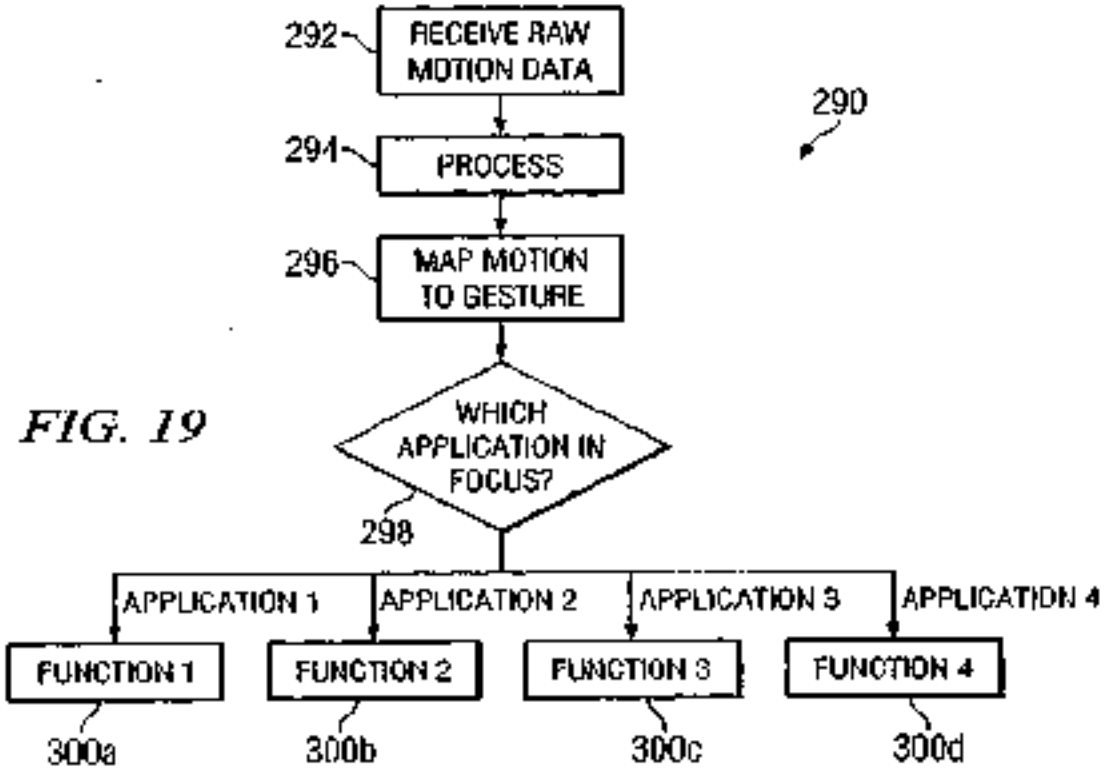


FIG. 19

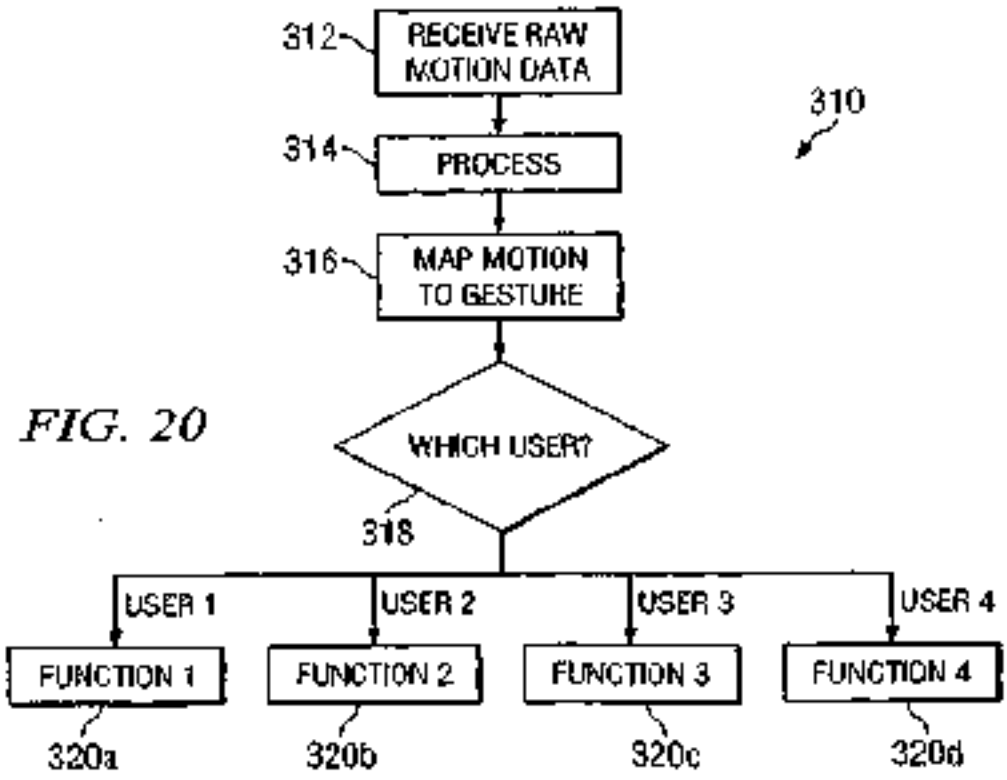


FIG. 20

FITBIT 1002
Fitbit v. Immersion

11/11

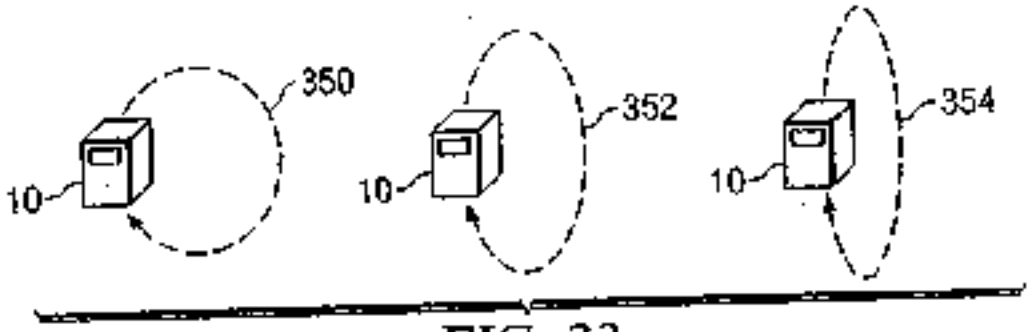


FIG. 22

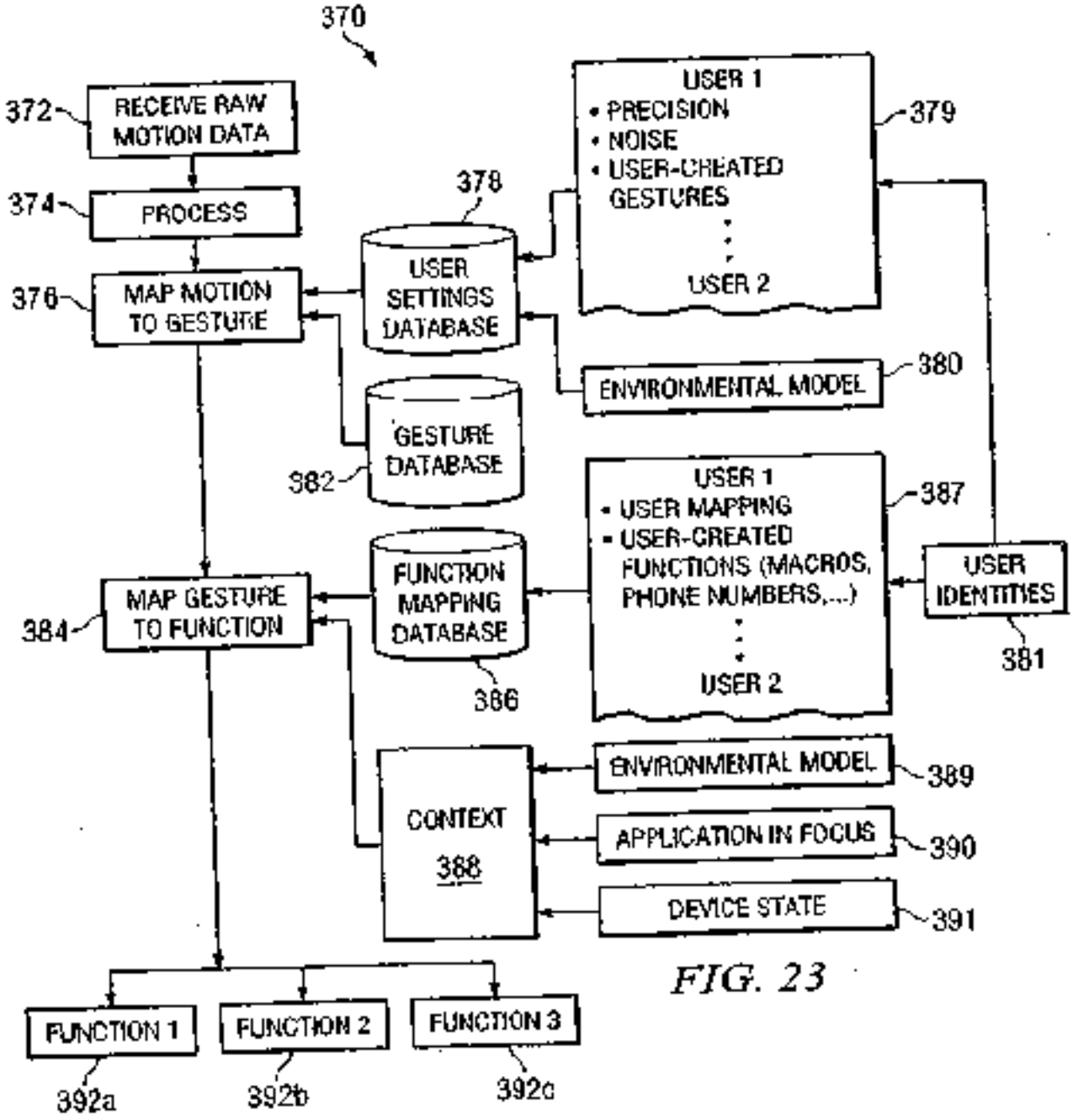


FIG. 23

FITBIT 1002
Fitbit v. Immersion

PRIOR ART REFERENCE

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2005-152054
(43)Date of publication of application : 16.06.2005

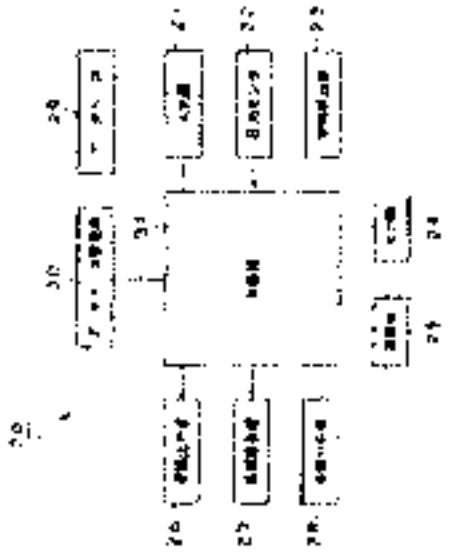
(51)Int.Cl. A61B 5/16
A63F 13/00
H04M 1/00

(21)Application number : 2003-391360
(22)Date of filing : 20.11.2003

(71)Applicant : SONY CORP
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INOUE MAKOTO
SHIRAI KATSUYA
MIYAJIMA YASUSHI
MAKINO KENICHI
TAKAI MOTOYUKI

(54) **EMOTION CALCULATING APPARATUS, EMOTION CALCULATING METHOD AND PORTABLE COMMUNICATION APPARATUS**

(57)Abstract:
PROBLEM TO BE SOLVED: To calculate emotion of a user by the pressure applied by the user on an object.
SOLUTION: A cellular phone 20 is equipped with a pressure sensor 22. The pressure sensor 22 detects the pressure which is applied when the user grips the cellular phone and the pressure which is applied when the user keys in. An emotion calculating section 23 calculates emotion data of the user on the basis of the pressure which is detected by the pressure sensor 22. The emotion data is a value for induction which is one dimension of an emotion model. The cellular phone 20 feeds back the calculated emotion to the user or to a communication partner.



FITBIT 1002
Fitbit v. Immersion

PRIOR ART REFERENCE

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 05-100809
(43)Date of publication of application : 23.04.1993

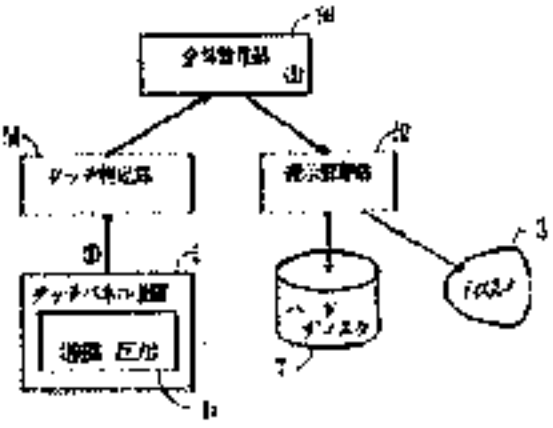
(51)Int.Cl. G06F 3/14
G06F 3/03

(21)Application number : 03-258232
(22)Date of filing : 07.10.1991

(71)Applicant : FUJITSU LTD
(72)Inventor : MIZUGUCHI TAMOTSU
OKUYAMA SATOSHI
KAWAMURA AKIKO
KAMATA HAJIME

(54) DISPLAY METHOD FOR OBJECT BY TOUCH PANEL

(57)Abstract:
PURPOSE: To provide environment where a user who does not have special knowledge on a computer can naturally display an object without using a keyboard and an icon.
CONSTITUTION: An information processor provided with a touch panel device 1 is provided with a display information table (1) consisting of the physical type of the object, display position information on a display 3, file information where the state of the object is set, the name of a regular display file storing display data of the object, the name of a file in a special state (inverted display), and with touch panel information (2) consisting of a touch position coordinate and touch pressure information. A physical operation decided by a corresponding relation between physical information which the display information table (1) shows and physical information which touch panel information (2) shows is given to the object so as to display it.



FITBIT 1002
Fitbit v. Immersion

(19)日本国特許庁（JP）　(12)公開特許公報（A）　(11)特許出願公開番号

特開平5－100809

(43)公開日　平成5年(1993)4月23日

(51)Int.Cl.⁵		識別記号	庁内整理番号	FI	技術表示箇所
G09F	3/14	340 A	7165－5B		
	3/03	380 Q	7927－5B		

審査請求　未請求　請求項の数10(全 16 頁)

(21)出願番号　特願平3－253232

(22)出願日　平成3年(1991)10月7日

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(74)代理人　弁理士　井桁　貞一

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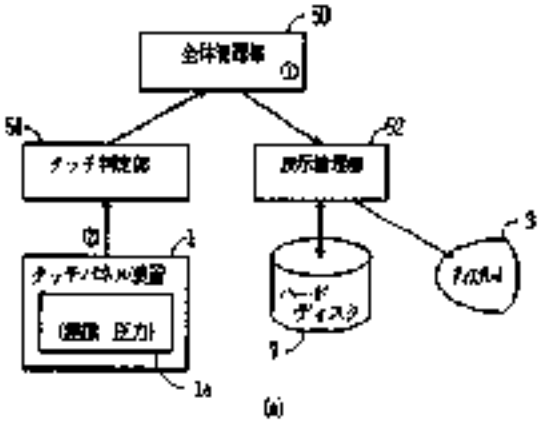
(54)【発明の名称】　タッチパネルによるオブジェクトの表示方法

(57)【要約】

【目的】　タッチパネルによるオブジェクトの表示方法に関し、キーボード，アイコンを使用することなく、コンピュータに対する特別な知識を持っていないユーザにも自然にオブジェクトの表示を行うことができる環境を提供する。

【構成】　タッチパネル装置を備えた情報処理装置において、少なくとも、オブジェクトの物理的識別と，ディスプレイ上の表示位置情報と，該オブジェクトの状態が設定されているファイル情報と，該オブジェクトの表示データが格納されている画像表示ファイルの名称と、特殊状態（反転表示）にあるファイルの名称とからなる表示制御テーブル①と、タッチ位置座標と、タッチ圧力値とからなるタッチパネル情報②とを設け、上記表示情報テーブル①が示す物理的情報と、上記タッチパネル情報②が示す物理的情報との対応関係で決まる物理操作を，該オブジェクトに与えて表示するように構成する。

本発明の原理説明図（その1）



FITBIT 1002
Fitbit v. Immersion

1

【特許請求の範囲】

【請求項1】タッチパネル装置(1)を備えた情報処理装置において、

少なくとも、オブジェクトの物理的種別と、ディスプレイ上の表示位置情報と、該オブジェクトの状態が設定されているファイル情報と、該オブジェクトの通常表示データが格納されている通常表示ファイルの名称と、該オブジェクトの特殊状態（反転表示）の表示データが格納されている特殊状態ファイルの名称とからなる表示情報テーブル（①）と、タッチ位置座標と、タッチ圧力情報とからなるタッチパネル情報（②）とを設け、

上記表示情報テーブル（①）が示す物理的情報（重心位置，重力方向，吸着力，回転体，可塑性等）と、上記タッチパネル情報が示す物理的情報（タッチ位置，タッチ方向，タッチ圧力等）との対応関係で決まる物理操作（瞬時移動，平行移動，回転，慣性移動，重力移動等）を，該オブジェクトに与えて表示することを特徴とするタッチパネルによるオブジェクトの表示方法。

【請求項2】請求項1に記載のオブジェクト表示方法で、横方向にディスプレイ画面外まで仮想的に続いているオブジェクトに対して、指をタッチパネル(1a)に触れたまま右，又は，左から左方向，又は，右方向へ移動させ，その移動速度，あるいは，移動量が，予め定めた一定値を越えたとき，該オブジェクトを右，又は，左から左，又は，右へ指の移動速度を初速としてスクロール表示させ，その後スクロール表示速度を次第に緩めて行き，初速に応じた時間を経過すると，該オブジェクトのスクロール表示速度が"0"となり停止するが，該停止する以前に再び指でタッチパネル(1a)を右，又は，左から左，又は右へ撫ると，指の移動速度に応じたスクロール表示を再び行うことを特徴する請求項1に記載のタッチパネルによるオブジェクトの表示方法。

【請求項3】上記請求項2に記載のオブジェクトのスクロール表示中において，該オブジェクトが停止する以前にオブジェクト表示上の一箇所で指を移動させずに触り続けることによって，スクロール速度を急激に緩め，停止に到らせる表示を行うことを特徴とする請求項2に記載のタッチパネルによるオブジェクトの表示方法。

【請求項4】上記請求項1に記載のオブジェクト表示方法で，画面に表示されているオブジェクトを，2本指による挟み込み動作を使ったタッチパネル操作を認識すると，該オブジェクト表示を掴めたことをユーザに示す表示（特殊状態ファイル名による表示）に変更し，その後，ユーザの2本指がタッチパネル(1a)上を移動するに従って，該オブジェクト表示を2本指間示のほぼ中央に位置するよう表示位置を変更し，該2本指の間隔がある一定値以上広がる操作（該オブジェクトを放す動作）を認識すると，表示位置変更処理は行わず，該オブジェクト表示を元の掴めていないことをユーザに示す表示（通常状態ファイルによる表示）に変更することを特徴とする請求項1に記載のタッチパネルによるオブジェクトの表示方法。

2

【請求項5】上記請求項1に記載のオブジェクト表示方法で，画面に表示されているオブジェクトの周辺を指などで触り，指をタッチパネル(1a)に触れたまま該オブジェクトの上を移動するとき，該オブジェクトをあたかも指で押して移動させているように，該指の移動に伴い，該指の移動方向で指に隣接する位置へオブジェクト表示の移動を行い，指がタッチパネルより離れるまで続けることを特徴とする請求項1に記載のタッチパネルによるオブジェクトの表示方法。

【請求項6】上記請求項5に記載のオブジェクト表示方法で，上記指の移動に伴うオブジェクトの表示移動中において，該オブジェクトの中心あるいは重心位置を大きく外れた位置を押した場合には，上記オブジェクトの移動表示に加え，該重心位置を中心とした回転表示を行い，指がタッチパネル(1a)より離れるまで続けることを特徴とする請求項5に記載のタッチパネルによるオブジェクトの表示方法。

【請求項7】上記請求項1に記載のオブジェクト表示方法で，画面に表示されているオブジェクトから少し離れた位置を指などで触り，指をタッチパネル(1a)に触れたまま該オブジェクト上まで移動するとき，該オブジェクトをあたかも指で弾いたように，初めにタッチパネルに触れた位置からオブジェクト上までの指の移動方向に，指の移動速度に比例した距離だけ，該オブジェクトの移動表示を行うことを特徴とする請求項1に記載のタッチパネルによるオブジェクトの表示方法。

【請求項8】上記請求項7に記載のオブジェクト表示方法で，該オブジェクトに対して，特定の重力がかかっている場合，該指による弾き動作に伴うオブジェクトの表示移動中において，初めにタッチパネル(1a)に触れた位置からオブジェクト上までの指の移動方向を初期移動方向として，あたかも画面の下方向に重力がかかっているかのような放物線を描きながら，指の移動速度に比例した距離だけ，該オブジェクトの移動表示を行うことを特徴とする請求項7に記載のタッチパネルによるオブジェクトの表示方法。

【請求項9】上記請求項1に記載のオブジェクト表示方法で，画面に楕形や円形形を倒した，あたかも指で転がせるような形状をしたオブジェクトが表示され，該オブジェクト上の一点を指などで触れ，指をタッチパネル(1a)に触れたまま，該オブジェクト上で移動するとき，あたかも，該オブジェクトが画面上で転がったかのように，初めに触れたオブジェクトと指との位置関係が指の移動に伴って変化するように，該指の移動方向に該オブジェクトの回転・移動表示を行い，指がタッチパネル(1a)より離れるまで続けることを特徴とする請求項1に記載のタッチパネルによるオブジェクトの表示方法。

【請求項10】上記請求項1に記載のオブジェクト表示

FITBIT 1002
Fitbit v. Immersion

方法で、画面に表示されているオブジェクト上を指などで触れると、あたかもオブジェクトが柔らかくて潰れてしまったような、該オブジェクトが歪んだ表示（特殊状態ファイル名による表示）に変更し、指がタッチパネル(1a)から離れると元の歪みのないオブジェクト表示（通常状態ファイル名による表示）に変更することを特徴とする請求項1に記載のタッチパネルによるオブジェクトの表示方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は、タッチパネルによるオブジェクトの表示方法に関する。最近のコンピュータによるデータ処理の普及に伴って、コンピュータに対する専門的な知識のないユーザによる操作が多くなる動向にあり、かかるコンピュータに対する専門的な知識のないユーザでも、使用し易いユーザインタフェースが要求される。

【０００２】

【従来の技術】図１０は、従来のコンピュータのユーザインタフェースを説明する図である。最近のワークステーションなどの情報処理装置においては、非常に多くのアプリケーションソフトウェアが整備され、複雑な処理も、幾つかのアプリケーションを組み合わせることによって実現される。

【０００３】然し、その反面、コンピュータの専門知識を持たないユーザにとって、これらの情報処理装置は扱い難いものとなっている。例えば、コンピュータの専門知識を持たないユーザは、図示されているキーボードやマウス 2といった装置すら敬遠する傾向にある。具体的には、ディスプレイ 3に表示されているオブジェクトを操作する場合、ユーザは、該キーボードやマウス 2を使用して、該ディスプレイ 3に表示されているオブジェクトを操作する為のコマンドを入力する。

【０００４】又、ディスプレイ 3上に表示されている、上記キーボード 2からの入力に対応する機能を抽象化した絵記号であるアイコンを、例えば、マウス 2等を使用して選択し、該アイコンが指示する操作を行っていた。

【０００５】

【発明が解決しようとする課題】このような、従来のコンピュータインタフェースにおいては、キーボード，マウス，アイコン等を使用して、ディスプレイ上に表示されているオブジェクトに対する表示操作を行う必要があり、コンピュータの専門知識のないユーザにとっては、該コンピュータは、極めて扱い難いものとなっていた。

【０００６】本発明は上記従来の欠点に鑑み、コンピュータインタフェースにおいて、キーボードや、単にある機能を抽象化したアイコンを使うのではなく、ディスプレイを現実の空間に見立て、すなわち，表示するオブジェクトの重量や硬軟，摩擦抵抗，引力などを表現する表示方法、及び、物理的な操作を施すことができるタッチパネルによる操作方法を用いることにより，コンピュータの特別な知識を持っていないユーザが自然に使える環境を提供することを目的とするものである。

【０００７】

【課題を解決するための手段】図１，図２は本発明の原理説明図であり、図１(a) は原理構成図を示し、図２(b1)は表示情報テーブル①の構成例を示し、図２(b2)はタッチパネル装置からのタッチパネル情報②の構成例を示している。上記の問題点は、下記のように構成したタッチパネルによるオブジェクト表示方法によって解決される。

【０００８】(1) タッチパネル装置 1を備えた情報処理装置において、少なくとも、オブジェクトの物理的属性と、ディスプレイ上の表示位置情報と，該オブジェクトの状態が設定されているファイル情報と，該オブジェクトの通常の表示データが格納されている通常表示ファイルの名称と，該オブジェクトの特殊状態（反転表示）の表示データが格納されている特殊状態ファイルの名称とからなる表示情報テーブル①と、タッチ位置座標と、タッチ圧力情報とからなるタッチパネル情報②とを設け、

上記表示情報テーブル①が示す物理的情報（重心位置，重力方向，摩擦力，回転体，可塑性等）と、上記タッチパネル情報が示す物理的情報（タッチ位置，タッチ方向，タッチ圧力等）との対応関係で決まる物理操作（瞬時移動，平行移動，回転，慣性移動，重力移動等）を、該オブジェクトに与えて表示するように構成する。

【０００９】(2) 上記(1) 項 に記載のオブジェクト表示方法で、適方向にディスプレイ画面外まで仮想的に続いているオブジェクトに対して、指をタッチパネル 1aに触れたまま右，又は、左から左方向，又は、右方向へ移動させ、その移動速度，あるいは、移動量が，予め定めた一定値を越えたとき，該オブジェクトを右，又は、左から左，又は、右へ指の移動速度を初速としてスクロール表示させ、その後スクロール表示速度を次第に緩めて行き、初速に応じた時間を経過すると、該オブジェクトのスクロール表示速度が“０”となり停止するが，該停止する以前に再び指でタッチパネル 1a を右，又は、左から左，又は右へ擦ると，指の移動速度に応じたスクロール表示を再び行うように構成する。

【００１０】(3) 上記(2) に記載のオブジェクトのスクロール表示中において、該オブジェクトが停止する以前にオブジェクト表示上の一箇所で指を移動させずに触り続けることによって、スクロール速度を急激に緩め、停止に到らせる表示を行うように構成する。

【００１１】(4) 上記(1) 項に記載のオブジェクト表示方法で、画面に表示されているオブジェクトを、２本指による挟み込み動作を使ったタッチパネル操作を認識すると，該オブジェクト表示を掴めたことをユーザに示す表示（特殊状態ファイル名による表示）に変更し、その後、ユーザの２本指がタッチパネル 1a 上を移動するに

FITBIT 1002
Fitbit v. Immersion

従って、該オブジェクト表示を2本指指示のほぼ中央に位置するよう表示位置を変更し、該2本指の間隔があまり一定値以上広がる操作（該オブジェクトを放す動作）を認識すると、表示位置変更処理は行わず、該オブジェクト表示を元の縮めていないことをユーザに示す表示（通常状態ファイルによる表示）に変更するように構成する。

【0012】(5) 上記(1)項に記載のオブジェクト表示方法で、画面に表示されているオブジェクトの周辺を指などで触り，指をタッチパネル 1a に触れたまま該オブジェクトの上を移動するとき、該オブジェクトをあたかも指で押して移動させているように、該指の移動に伴い、該指の移動方向で指に隣接する位置へオブジェクト表示の移動を行い，指がタッチパネル 1a より離れるまで続けるように構成する。

【0013】(6) 上記(5)項に記載のオブジェクト表示方法で、上記指の移動に伴うオブジェクトの表示移動中において、該オブジェクトの中心あるいは重心位置を大きく外れた位置を押した場合には、上記オブジェクトの移動表示に加え、該重心位置を中心とした回転表示を行い、指がタッチパネル1a より離れるまで続けるように構成する。

【0014】(7) 上記(1)項に記載のオブジェクト表示方法で、画面に表示されているオブジェクトから少し離れた位置を指などで触り、指をタッチパネル 1a に触れたまま該オブジェクト上まで移動するとき、該オブジェクトをあたかも指で弾いたように、初めにタッチパネル 1a に触れた位置からオブジェクト上までの指の移動方向に，指の移動速度に比例した距離だけ、該オブジェクトの移動表示を行うように構成する。

【0015】(8) 上記(7)項に記載のオブジェクト表示方法で、該オブジェクトに対して、特定の重力がかかっている場合，該指による弾き動作に伴うオブジェクトの表示移動中において、初めにタッチパネル 1a に触れた位置からオブジェクト上までの指の移動方向を初期移動方向として，あたかも画面の下方向に重力がかかっているかのような放物線を描きながら，指の移動速度に比例した距離だけ，該オブジェクトの移動表示を行うように構成する。

【0016】(9) 上記(1)項に記載のオブジェクト表示方法で、画面に球形や円筒形を模した，あたかも指で転がせるような形状をしたオブジェクトが表示され，該オブジェクト上の一点を指などで触れ，指をタッチパネル 1a に触れたまま，該オブジェクト上で移動するとき，あたかも，該オブジェクトが画面上で転がったかのように，初めに触れたオブジェクトと指との位置関係が指の移動に伴って変化するように，該指の移動方向に該オブジェクトの回転・移動表示を行い，指がタッチパネル 1a より離れるまで続けるように構成する。

【0017】(10)上記(1)項に記載のオブジェクト表示方法で、画面に表示されているオブジェクト上を指などで触れると、あたかもオブジェクトが柔らかくて潰れてしまったような、該オブジェクトが歪んだ表示（特殊状態ファイル名による表示）に変更し、指がタッチパネル 1a から離れると元の歪みのないオブジェクト表示（通常状態ファイル名による表示）に変更するように構成する。

【0018】

【作用】即ち、本発明においては、タッチパネル装置 1 を備えた情報処理装置において、少なくとも、オブジェクトの物理的属性と，ディスプレイ上の表示位置情報と，該オブジェクトの状態が設定されているファイル情報と，該オブジェクトの通常の表示データが格納されている通常表示ファイルの名称と，該オブジェクトの特殊状態（反転表示）の表示データが格納されている特殊状態ファイルの名称とからなる表示情報テーブル①と、タッチ位置座標と，タッチ圧力情報とからなるタッチパネル情報②とを設け、上記表示情報テーブル①が示す物理的情報（例えば、重心位置，重力方向，摩擦力，回転体，可塑性等）と、上記タッチパネル情報②が示す物理的情報（例えば、タッチ位置，タッチ方向，タッチ圧力等）との対応関係で決まる物理操作（例えば、瞬時移動，平行移動，回転，慣性移動，重力移動等）を、該オブジェクトに与えて表示する。

【0019】具体的には、タッチパネルを操作することで、該タッチパネルが指示する物理操作に対応した表示操作（座標変換）を、上記表示情報テーブル①上で行い、この表示情報テーブル①の表示情報と、該当のオブジェクトが格納されているファイル名を表示管理部に渡すことにより、該表示管理部は，ハードディスクから該当する表示データファイルを読み出し、表示フレームメモリの、該当の表示位置にロードして表示するようにしたものである。

【0020】つまり、ディスプレイを現実の空間に見立て、表示するオブジェクトの重量，硬軟，摩擦抵抗，引力（重力）等を、該オブジェクトの表示情報テーブル①上で設定しておき、該オブジェクトに対して、タッチパネルからの，指のタッチ位置の座標，タッチ圧力等を示すタッチパネル情報②が入力されてると、上記表示情報テーブル①上の上記物理的な情報と比較して、どのような物理操作を行うことができるかを認識して、例えば、該オブジェクトをスクロールしたり、読み込み移動を行ったり、転がし移動，慣性移動，重力（下向き）移動を行うようにしたものである。

【0021】従って、上記のような、現実の空間をまねたインタフェースを採用することにより，ワークステーションといったコンピュータの専門知識を持たないユーザでも、ディスプレイ上のオブジェクトを操作し易い使用環境を提供することができる効果が得られる。

【0022】

FITBIT 1002
Fitbit v. Immersion

【実施例】以下本発明の実施例を図面によって詳述する。前述の図1，図2は、本発明の原理説明図であり，図3は、タッチパネル付きワークステーションの構成例を示し、図4～図9は、本発明の一実施例を示した図であり、図4は、画面外まで仮想的に続いているオブジェクトに対するスクロール表示の例を示し，図5は2本指によるオブジェクト操作の例を示し、図6は指による平行移動，回転移動の例を示し、図7は指でオブジェクトを弾いた場合の慣性移動，慣性＋重力（下向き）移動の例を示し、図8は指によるオブジェクトの転がり移動の例を示し、図9は指によるオブジェクトの歪み／復元の表示例を示し、それぞれにおいて、(a)は表示画面の例を示し、(b) は表示情報テーブル①の例を示している。

【００２３】本発明においては、タッチパネル装置 1を備えた情報処理装置において，少なくとも，オブジェクトの物理的識別と，ディスプレイ上の表示位置情報と，該オブジェクトの状態が設定されているファイル情報と，該オブジェクトの通常の表示データが格納されている通常表示ファイルの名称と，該オブジェクトの特殊状態（反転表示）の表示データが格納されている特殊状態ファイルの名称とからなる表示情報テーブル①と、タッチ位置座標と，タッチ圧力情報とからなるタッチパネル情報②とを設け、上記表示情報テーブル①が示す物理的情報と、上記タッチパネル情報②が示す物理的情報との対応関係で決まる物理操作を、該オブジェクトに与えて表示する手段が、本発明を実施するのに必要な手段である。尚，全図を通して同じ符号は同じ対象物を示している。

【００２４】以下、図1，図2を参照しながら、図3，及び、図4～図9によって、本発明によるタッチパネルによるオブジェクト表示の方法を説明する。先ず，図3は、タッチパネル装置 1を装備したワークステーションのハードウェア構成を示している。本図において、中央処理装置(CPU) 4 は，メインメモリ5上の表示制御プログラムを実行することにより、図1(a) に示した表示動作を行う。

【００２５】図1(a) 中の全体管理部 50,タッチ判定部 51,表示管理部 52 が，図2のメインメモリ 5中の、上記表示制御プログラムの構成内容であり、該全体管理部 50の管理する表示情報テーブル①の構成例を図2(b1) に，さらに、タッチパネル装置 1からのタッチパネル情報②の構成例を図2(b2)に示す。

【００２６】図1(a) 中のタッチ判定部 51 は，タッチパネル装置 1から送られてくるタッチ座標と，そのタッチ座標の送信されて来る時間間隔を計測して，タッチ種別を判定する。

【００２７】該判定結果のタッチ種別は、タッチ座標と共に全体管理部 50 に送信される。全体管理部 50 は、ユーザのタッチ座標や，タッチ圧力等を示す上記タッチパネル情報②と、上記オブジェクトの表示情報テーブル①から、ユーザの意図する表示操作を理解し、表示切換え要求を表示管理部 52 に出す。

【００２８】該表示切換え要求では、上記表示情報テーブル①により、当該オブジェクトの表示位置情報（ディスプレイ上の表示領域の左上座標，サイズ，オブジェクトのサイズ，現在の表示位置座標など）と、該オブジェクトの表示データが格納されているハードディスク 7内のファイル名を渡す。

【００２９】表示管理部 52 が全体管理部 50 から表示切換え要求を受信すると、ハードディスク 7から該当するファイル名の表示データファイルを読出して、図示されていない表示用フレームメモリの表示位置へロードする。

【００３０】このようにして、ユーザの操作したタッチ操作に従って、該タッチ操作が指示する物理的な操作情報，即ち、タッチパネル情報②と、該オブジェクトの表示情報テーブル①が持っている、当該オブジェクトの物理情報に対応した物理操作が，該オブジェクトに与えられ，該物理操作に対応して、予め、定められている表示が行われる。（請求項1の実施例）尚、上記オブジェクトに対応した表示情報テーブル①の内，表示位置情報は、ディスプレイ上のオブジェクトの表示位置を示し、ファイル情報は、当該オブジェクトの情報（サイズ，表示位置）を示し、通常表示ファイル名は、該オブジェクトの通常表示データが格納されているファイル名を示し、特殊状態ファイル名は、該オブジェクトの特殊状態，例えば，表示色を反転したオブジェクトの表示データが格納されているファイル名を示している。

【００３１】（請求項2の実施例）：図4参照

タッチパネル装置 1からの情報がタッチ判定部 51 へ送信され、指がタッチパネル 1a に触れたまま移動し始めた（以下、連続タッチ開始と呼ぶ）ことを判定したとき、タッチ判定部 51 はタッチ通知（内容：連続タッチ開始，座標(800,800)）を全体管理部 50 へ通知する。

【００３２】その後のタッチパネル装置 1からのタッチパネル情報②は、タッチ通知（内容：連続タッチ中，座標(780,800)）というように、次々に、全体管理部 50 へ送信し、タッチパネル装置 1からのタッチパネル情報②が、例えば，100ms以上途絶えたとき、タッチ通知（内容：連続タッチ終了，座標(700,800)）を全体管理部 50 へ送信する。

【００３３】該全体管理部 50 は、タッチ通知の連続タッチ開始を受領した時点で、図4(a) に示したように、この領域が画面外までおよぶ大きなオブジェクトの表示領域であることを、図4(b) に示した、当該オブジェクトの表示情報テーブル①の、「オブジェクト識別」の「画面外」情報から認識（尚し、この領域が画面外までおよぶ大きなオブジェクトの表示領域であることを認識できなかったときに、該タッチパネル操作を無視する。即ち、何らの表示操作を行わない。）し、次から送信さ

FITBIT 1002
Fitbit v. Immersion

れて来るタッチ通知の連続タッチ中の座標を見て、例えば、右から左方向に、どれ程の速度で指が動いたかを認識する。

【００３４】ここでは、その速度について、１回のタッチ通知で、例えば、20ドット以上動いている場合を、高速として、最初は100m秒間隔でスクロール表示をして、それ以下を、通常速度として、最初500m秒間隔でスクロールをさせ、その後、スクロール表示間隔（表示管理部へ表示切換え要求を送信する時間間隔）を1.5 倍に落としてゆき、２秒以上になった時点でスクロールを終了するものとする。

【００３５】さらに、上記スクロールの開始は、例えば、上記の速度で、40ドット以上の距離を指が動いたことを確認してからとし、確認後、全体管理部 50 は、図4(b)に示した当該オブジェクトの表示情報テーブル①の、ファイル情報の内、ファイルの全体情報の表示位置（網掛けで示す）を、例えば、10ドット分左方向へ表示がずれるように書換え、表示管理部 52 に、表示切換え要求（内容：表示位置情報＋ファイルの全体情報＋通常表示ファイル名）を送信する。

【００３６】表示管理部 52 は、上記全体管理部 50 からの表示切換え要求の表示ファイルを一度、メインメモリ 5にロードし、ファイルの全体情報の、上記網掛けで示した表示位置(X) の部分だけを、表示位置情報で示される表示用フレームメモリ 6上へコピーする。（図3参照）その後も、全体管理部 50 は前述の時間間隔で表示切換え要求を表示管理部 52 へ送信する。

【００３７】該スクロールが停止する以前に、さらに、連続タッチ開始が通知された時には、スクロールが必要であるかどうか判定し、スクロール表示を行うものであれば、後から来た要求を優先してスクロール表示をその場所から、新速の設定で再び始める。

【００３８】《請求項３の実施例》：図４参照
上記のスクロール中に、全体管理部 50 に送信されて来るタッチ通知が、同じ場所の、あるいは、５ドット程度の近傍であれば、表示管理部 52 へ送る表示切換え要求の送信時間間隔を２倍（即ち、遅くして）として、スクロールが早く終了するようにする。

【００３９】《請求項４の実施例》：図５参照
タッチ判定部 51 から全体管理部 50 に送信されてくるタッチ通知が、図５(a) に示されるようなオブジェクトとの位置関係、即ち、該オブジェクトを挟み込む位置関係になっているかを、図５(b) に示した、当該オブジェクトの表示情報テーブル①の内容と比べ、該オブジェクトを挟み込んだ位置関係になっているとき、全体管理部 50 は、該オブジェクトの特殊拡縮ファイル（縮んだときの表示ファイルで、例えば、色反転ファイル）を現在の表示位置に表示するよう、表示切り変え要求を表示管理部 52 へ送信する。上記の位置関係になっていないときには、該タッチパネル操作は無視される。

【００４０】その後、タッチ通知を受信して、表示位置を２本指のほぼ中央に変更するように、図５(b) に示した表示情報テーブル①の表示位置情報の表示座標(X,Y)（網掛けで示す）を更新し、該更新した表示情報テーブル①に基づいた表示切り変え要求を表示管理部 52 へ送信する。

【００４１】タッチ通知で連続タッチ終了が来ると、全体管理部 50 は、該掴み表示されているオブジェクトの通常表示ファイルを、その時点での表示位置に表示するよう、表示切り変え要求を表示管理部 52 へ送信する。

【００４２】《請求項５の実施例》：図６(a1)参照
タッチ判定部 51 から全体管理部 50 に送信されてくるタッチ通知が、図６(a1)に示されるようなオブジェクトとの位置関係、即ち、該オブジェクトを指で移動させる位置関係（具体的には、オブジェクトの端を指で触り、指をタッチパネル 1a に触れたまま、該オブジェクト上を移動する関係）になっているかを、図６(b) の表示情報テーブル①の内容と比べ、該位置関係になっているとき、全体管理部 50 はタッチ通知の示すユーザの指の位置にオブジェクトの表示が接続するよう、表示切り変え要求（表示情報テーブル①の表示位置情報の左上座標(X,Y) ＋通常表示ファイル名）を表示管理部 52 へ送信する。該タッチ通知で連続タッチ終了が来るまで、該表示を続ける。

【００４３】《請求項６の実施例》：図６(a2)参照
上記請求項５の実施例で、全体管理部 50 がオブジェクトの中心を指が押しているかどうかを判定し、図６(a2)に示したように、中心からはずれていたら、図６(b) の表示情報テーブル①の回転角（表示角度）を２度ずつ増加させて、その旨の表示切り変え要求を表示管理部 52 へ送信する。

【００４４】表示管理部 52 は、該当の表示ファイルをハードディスク 7からメインメモリ5へロードし（図３参照）、オブジェクトの左上座標(X,Y) を表示切り変え要求で指示された場所で、そこを中心に回転角分回転させ、表示用フレームメモリ 6上へコピーする。

【００４５】《請求項７の実施例》：図７(a1)参照
タッチ判定部 51 から全体管理部 50 に送信されてくるタッチ通知が、図７(a1)に示されるようなオブジェクトとの位置関係、即ち、オブジェクトを指ではじくような位置関係になっているかを、図７(b)に示した表示情報テーブル①の内容と比べ、該位置関係になっているとき、全体管理部 50 はタッチ通知から指の速度を決定すると共に、上記請求項２の実施例と同様にして、オブジェクトの移動速度（表示管理部へ表示切換え要求を送信する時間間隔）を決定し、指の移動した方向に表示を移動するため、図７(b) の表示情報テーブル①の表示位置情報の左上座標(X,Y) を変更しながら、表示切換え要求を表示管理部 52 へ送信する。該表示時間間隔が、例えば、２秒以上になったらオブジェクト移動を終了する。

FITBIT 1002
Fitbit v. Immersion

【００４６】この場合のオブジェクトの移動は、指の速度を初速度とする、所謂、慣性移動となる。

《請求項８の実施例》：図７(a2)参照

上記請求項７の実施例で、オブジェクトを移動表示するとき、該オブジェクトの表示情報テーブル①のオブジェクト識別が、例えば、該オブジェクトに重力がかかっていることを指示しているとき、該オブジェクトの移動は、図７(a2)に示したように、上記慣性移動＋重力移動となるので、例えば、２の表示切換え回数乗した数（指数関数）をＹ座標に加えて、図７(b)に示した表示情報テーブル①の表示位置情報の左上座標(X,Y)を変更しながら、表示切換え要求を表示管理部52へ送信する。

【００４７】この場合も、上記請求項７の実施例と同じく、表示時間間隔が２秒以上になったら、該オブジェクト移動を終了する。

《請求項９の実施例》：図８参照

タッチ判定部51から全体管理部50に送信されてくるタッチ通知が、図８(b)に示した表示情報テーブル①のオブジェクト識別から、例えば、図９(a)に示したように、転がるオブジェクトに対するものだと確認できたとき、全体管理部50はタッチ通知での指の移動方向の、例えば、10%遅らせた位置にオブジェクトの表示を行うように、図８(b)の表示情報テーブル①の表示位置情報の左上座標(X,Y)を変更しながら、表示切換え要求を表示管理部52へ送信する。そして、該表示切換え要求を表示管理部52へ送信は、タッチ通知で連続タッチ終了が来るまで続ける。

【００４８】若し、上記において、転がるオブジェクトに対するものでなかったとき、該タッチ操作は無視される。

《請求項１０の実施例》：図９参照

タッチ判定部51から全体管理部50に送信されてくるタッチ通知が、図９(b)に示した表示情報テーブル①のオブジェクト識別から、例えば、図９(a)に示したように、歪みオブジェクト、即ち、指による圧力で変形するオブジェクトに対するものだと確認できたとき、全体管理部は図９(b)の表示情報テーブル①が指示する、当該オブジェクトの特殊状態ファイル（歪んだときの表示ファイル）を現在の表示位置に表示するよう、表示切り変え要求を表示管理部52へ送信する。

【００４９】その後のタッチ通知で連続タッチ終了が来ると、全体管理部50は、該オブジェクトの通常表示ファイルを現在の表示位置に表示するよう、表示切り変え要求を表示管理部52へ送信する。

【００５０】上記の実施例においては、オブジェクトの歪みが１つの例で説明したが、タッチパネル1aからのタッチパネル情報が指示する、例えば、指の圧力が、様々あり、それぞれに対して、オブジェクトの歪み量が変わるような場合には、上記特殊状態ファイル（歪んだときの表示ファイル）を、複数ファイル用意しておく必要がある。

【００５１】勿論、上記において、指による圧力で変形するオブジェクトに対するものだと識別できなかったときには、該タッチパネル操作を無視する。このように、本発明は、タッチパネル装置１を備えた情報処理装置において、少なくとも、オブジェクトの物理的識別と、ディスプレイ上の表示位置情報と、該オブジェクトの状態が設定されているファイル情報と、該オブジェクトの通常表示データが格納されている通常表示ファイルの名称と、該オブジェクトの特殊状態（反転表示）にある表示データが格納されている特殊状態ファイルの名称とからなる表示情報テーブル①と、タッチ位置座標と、タッチ圧力情報とからなるタッチパネル情報②とを設け、上記表示情報テーブル①が示す物理的情報と、上記タッチパネル情報②が示す物理的情報との対応関係で決まる物理操作を、該オブジェクトに与えて表示するようにしたところに特徴がある。

【００５２】

【発明の効果】以上、詳細に説明したように、本発明のタッチパネルによるオブジェクト表示方法は、タッチパネル装置を備えた情報処理装置において、少なくとも、オブジェクトの物理的識別と、ディスプレイ上の表示位置情報と、該オブジェクトの状態が設定されているファイル情報と、該オブジェクトの通常の表示データが格納されている通常表示ファイルの名称と、該オブジェクトの特殊状態（反転表示）にある表示データが格納されている特殊状態ファイルの名称とからなる表示情報テーブル①と、タッチ位置座標と、タッチ圧力情報とからなるタッチパネル情報②とを設け、上記表示情報テーブル①が示す物理的情報と、上記タッチパネル情報②が示す物理的情報との対応関係で決まる物理操作を、該オブジェクトに与えて表示するようにしたものであるので、ワークステーションなどの専門的な知識を持たないユーザにも、現実の空間をまねたインタフェースを採用することによって、親しみやすい使用環境を提供できる効果が得られる。

【図面の簡単な説明】

【図１】本発明の原理説明図（その１）

【図２】本発明の原理説明図（その２）

【図３】タッチパネル付きワークステーションの構成例を示した図

【図４】本発明の一実施例を示した図（その１）

【図５】本発明の一実施例を示した図（その２）

【図６】本発明の一実施例を示した図（その３）

【図７】本発明の一実施例を示した図（その４）

【図８】本発明の一実施例を示した図（その５）

【図９】本発明の一実施例を示した図（その６）

【図１０】従来のコンピュータのユーザインタフェースを説明する図

【符号の説明】

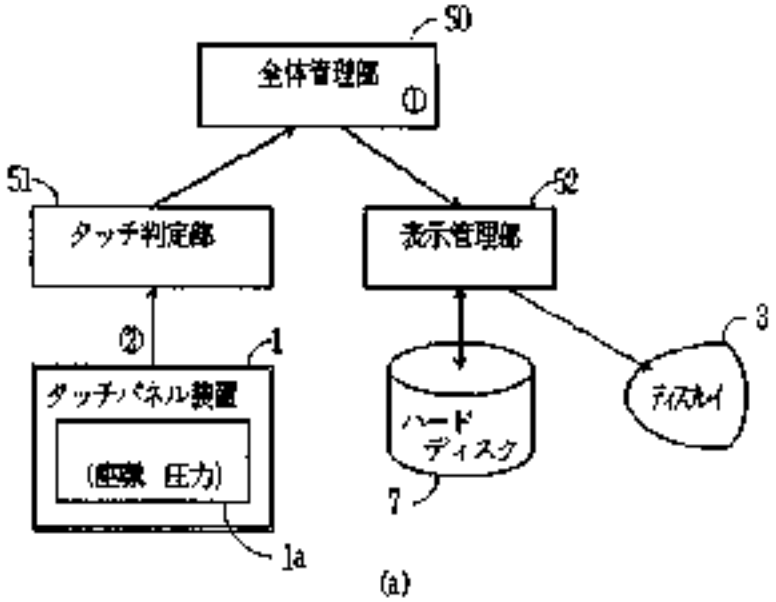
FITBIT 1002
Fitbit v. Immersion

13　　14

1 ネル	タッチパネル装置	1a	タッチパ	＊定部	52 表示管理部		
2 レイ	キーボード／マウス	3	ディスプ	6 装置，ハードディスク	表示用フレームメモリ	7	2次記憶
4 モリ	中央処理装置(CPU)	5	メインメ	① ル情報	表示制御テーブル	②	タッチパネ
50	全体管理部	51	タッチ判＊				

【図1】

本発明の原理説明図（その1）

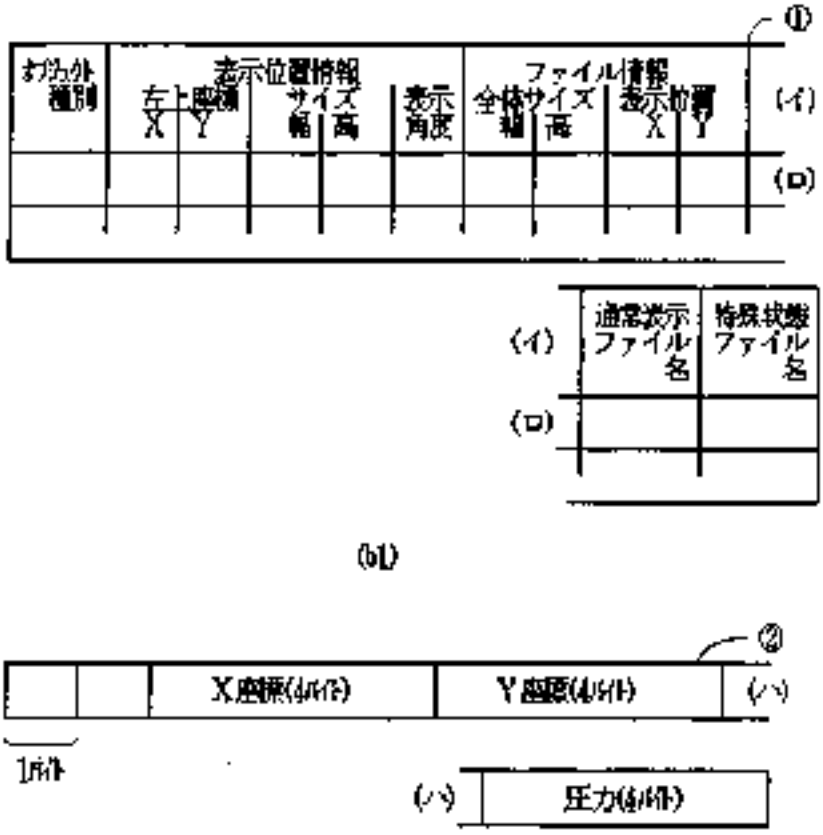


(a)

FITBIT 1002
Fitbit v. Immersion

【図2】

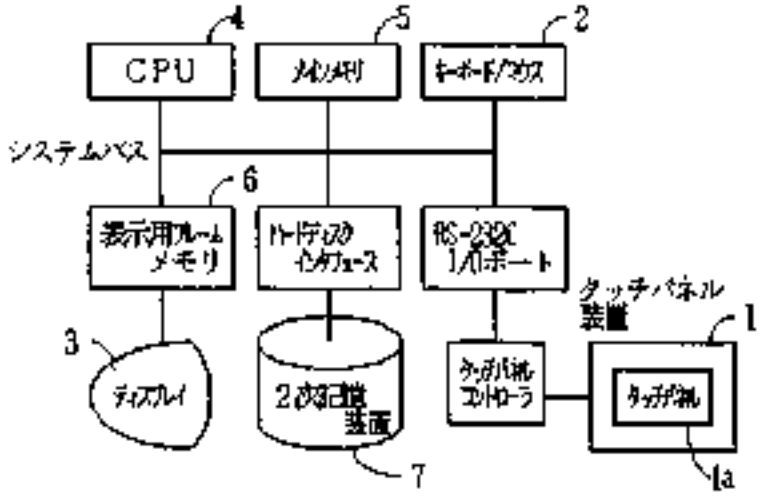
本発明の原理説明図（その2）



FITBIT 1002
Fitbit v. Immersion

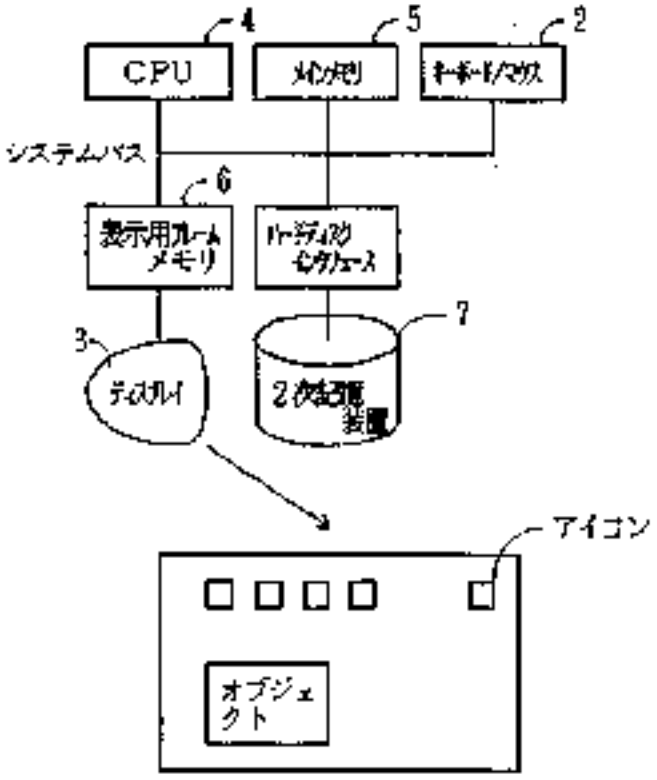
【図3】

タッチパネル付きワークステーションの構成例を示した図



【図10】

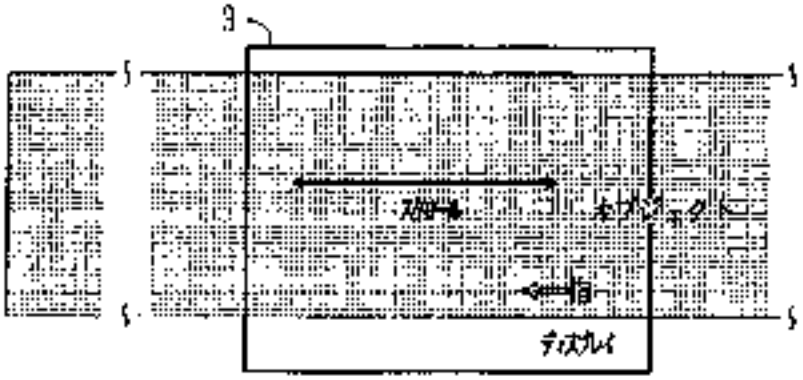
従来のコンピュータのユーザインタフェースを説明する図



FITBIT 1002
Fitbit v. Immersion

【図4】

本発明の一実施例を示した図（その1）



(a)

⑪

オブジェクト種別	表示位置情報 左上座標 X	表示位置情報 左上座標 Y	表示位置情報 サイズ 幅	表示位置情報 サイズ 高	表示角度	ファイル情報 全体サイズ 幅	ファイル情報 全体サイズ 高	ファイル情報 表示位置 X	ファイル情報 表示位置 Y	
画像A	0	100	1152	700	0	3000	700	1000	0	(ロ)

(イ)

	通常表示ファイル名	特殊状態ファイル名
(ロ)	BI6	——

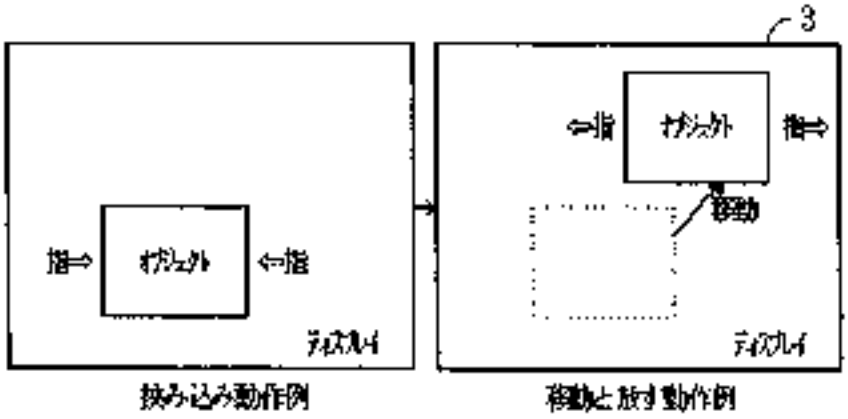
★横山吹け部分を10ドットずつ増やして行く

(b)

FITBIT 1002
Fitbit v. Immersion

【図5】

本発明の一実施例を示した図（その2）



挟み込み動作例　　移動と放す動作例

(a)

①

オブジェクト種別	表示位置情報 左上隅 X	左上隅 Y	サイズ 幅	サイズ 高	表示角度	ファイル情報 全体サイズ 幅	全体サイズ 高	表示位置 X	表示位置 Y	(イ)
通常	200	300	400	300	0	—	—	—	—	(ロ)

★細線で囲まれた部分を指の動きに合わせて変更して行く

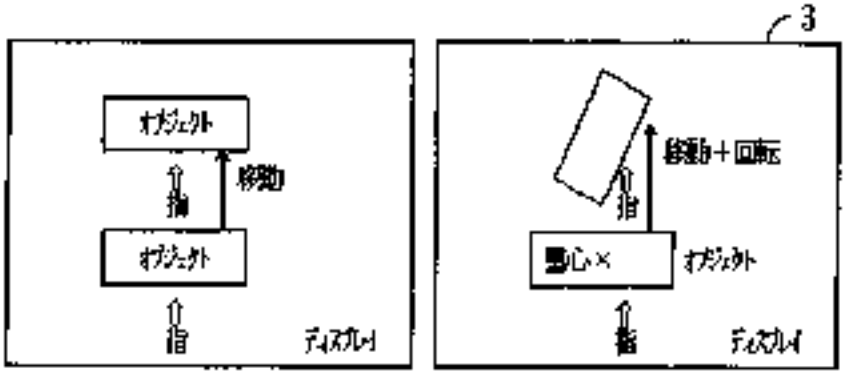
(イ)	通常表示ファイル名	特殊状態ファイル名
(ロ)	0001	0010

(b)

FITBIT 1002
Fitbit v. Immersion

【図6】

本発明の一実施例を示した図（その3）



オブジェクト平行移動例　　オブジェクト回転付き移動例

(a1)　　(a2)

①

オブジェクト種別	表示位置情報 左上座標 X	左上座標 Y	サイズ 幅	サイズ 高	表示角度	ファイル情報 全体サイズ 幅	全体サイズ 高	表示位置 X	表示位置 Y	(イ)
通常	200	500	400	100	0	—	—	—	—	(ロ)

本請求項5では表示位置情報の左上座標のみを、変更し請求項6では表示角度も変更して行く。

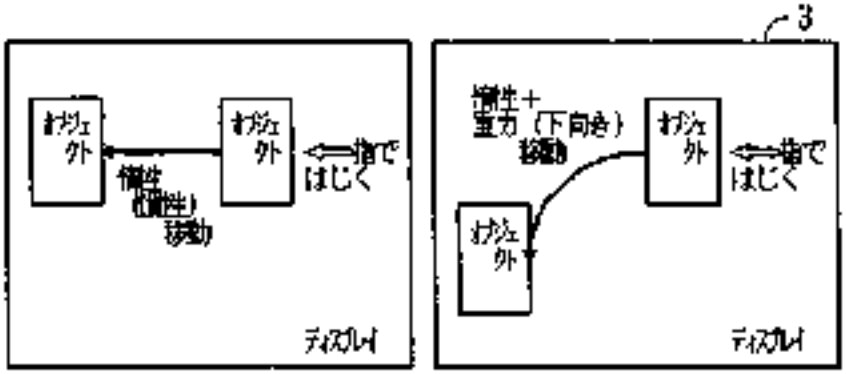
(イ)	通常表示ファイル名	特殊状態ファイル名
(ロ)	08.12	—

(b)

FITBIT 1002
Fitbit v. Immersion

【図7】

本発明の一実施例を示した図（その4）



指弾き移動例　　重力を考慮した指弾き移動例

(a1)　　(a2)

①

オブジェクト種別	表示位置情報 左上座標 X	左上座標 Y	サイズ 幅	サイズ 高	表示角度	ファイル情報 全体サイズ 幅	全体サイズ 高	表示位置 X	表示位置 Y	(イ)
通常	500	150	200	400	0	—	—	—	—	(ロ)

★網掛け部分を指の動きに合わせて変更して行く

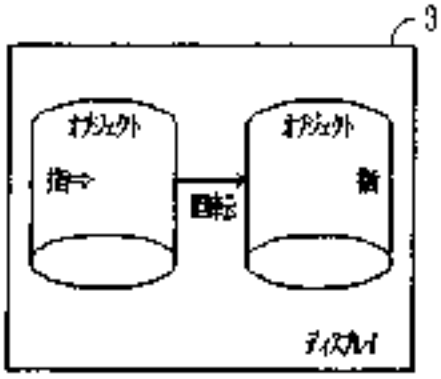
	通常表示ファイル名	特殊状態ファイル名
(イ)		
(ロ)	NORM	——

(b)

FITBIT 1002
Fitbit v. Immersion

【図5】

本発明の一実施例を示した図（その5）



(a)

①

オブジェクト種別	表示位置情報 左上隅 X	Y	サイズ 幅	高	表示角度	ファイル情報 全体サイズ 幅	高	表示位置 X	Y	
転がり	50	100	400	500	0	—	—	—	—	(ロ)

★網掛け部分を指の動きに合わせて変更して行く

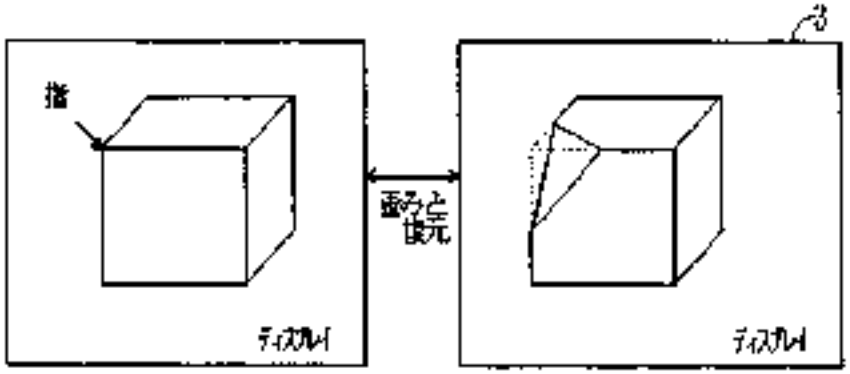
	(イ) 通常表示ファイル名	特殊状態ファイル名
(ハ)	0004	—

(b)

FITBIT 1002
Fitbit v. Immersion

【図9】

本発明の一実施例を示した図（その6）



(a)

①

オブジェクト種別	表示位置情報 左上座標 X	Y	サイズ 幅	高	表示角度	ファイル情報 体サイズ 幅	高	表示位置 X	Y	(イ)
歪み	200	200	400	400	0	—	—	—	—	(ロ)

★変更箇所は斜し

(イ)	通常表示ファイル名	特殊状態ファイル名
(ロ)	0805	0850

(b)

フロントページの続き

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FITBIT 1002
Fitbit v. Immersion

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【手続補正1】
【補正対象書類名】明細書
【補正対象項目名】全文
【補正方法】変更
【補正内容】
【書類名】　明細書
【発明の名称】　タッチパネル装置およびタッチパネル装置におけるオブジェクトの表示方法。
【特許請求の範囲】
【請求項1】　タッチ操作入力を検出するタッチパネルと、オブジェクトを表示する表示画面とを備えたタッチパネル装置において、
上記表示画面に表示されるオブジェクトの表示情報を有する表示情報テーブルと、
上記タッチパネルが検出した操作入力情報と、上記表示情報テーブル上のオブジェクトの表示情報とを基に、該オブジェクトに加えられたタッチ入力操作の種別を判定するタッチ判定手段と、
上記判定されたタッチ入力操作種別に基づいて定められた表示態様の変更操作を該オブジェクトに与えて表示画面に表示する制御を行う表示制御手段とを設けたことを特徴とするタッチパネル装置。
【請求項2】　画面上に表示されるオブジェクトの通常表示状態の表示データと、該オブジェクトの通常表示状態とは異なる特殊表示状態の表示データとを設けると共に、
上記タッチ判定手段が上記タッチ入力が特殊表示を行うべきタッチ入力操作種別であると判定した場合には、上記表示制御手段は特殊表示状態の表示データを読み出して表示することを特徴とする請求項1に記載のタッチパネル装置。
【請求項3】　上記表示情報テーブルに表示画面外まで仮想的に連続していることが登録されたオブジェクトに対して、上記タッチ判定手段がある一方向に移動速度または移動量が予め定めた一定値を超えるタッチ入力がなされたことを判定したときは、上記表示制御手段は該オブジェクトを上記一方向に上記タッチ入力の移動速度を初速としてスクロール表示させ、
上記タッチ判定手段がタッチ入力が終了したことを検出したときは、上記表示制御手段は上記スクロール表示のスクロール速度を減少させて停止に至らせる表示制御を行うことを特徴とする請求項1に記載のタッチパネル装置。
【請求項4】　上記タッチ判定手段が、上記オブジェクトのスクロール表示中において該オブジェクトが停止する以前に該オブジェクト表示上の一箇所で静止したタッチ入力を検出した場合は、上記表示制御手段は上記スクロール速度の減少速度よりも急激にスクロール速度を減少させて、停止に至らせる表示を行うことを特徴とする請求項3に記載のタッチパネル装置。
【請求項5】　上記タッチ判定手段が、画面に表示されているオブジェクトに対して、オブジェクトを挟みこむ2箇所のタッチ指示による挟み込み動作を使ったタッチ入力操作を検知し、その時で該2箇所のタッチ指示がタッチパネルを移動する動作を行っていることを認識した場合は、
上記表示制御手段が該オブジェクト表示を該2箇所のタッチ指示位置の略中央に位置するように表示位置を変更していくように表示制御を行うことを特徴とする請求項1に記載のタッチパネル装置。
【請求項6】　上記タッチ判定手段が上記2箇所のタッチ指示による挟み込み動作を使ったタッチ入力操作を認識した時には、上記表示制御手段は該オブジェクトを通常の表示状態とは異なる特殊表示状態に変更して表示する制御を行うことを特徴とする請求項2および請求項5に記載のタッチパネル装置。
【請求項7】　上記タッチ判定手段が上記2箇所のタッ

FITBIT 1002
Fitbit v. Immersion

チ指示による挟み込み動作を使ったタッチ入力操作を認識した後で、該タッチ入力操作が終了したことを認識した時には、上記表示制御手段が該オブジェクトを上記特殊表示状態から上記通常表示状態に変更して表示する制御を行うことを特徴とする請求項6に記載のタッチパネル装置。

【請求項8】 上記タッチ判定手段が画面に表示されているオブジェクトの周辺でのタッチ入力を検出した後でタッチパネルに接触したまま該オブジェクト上を移動するタッチ入力を検出した時は、上記表示制御手段が該タッチ入力の継続中には該オブジェクトを該タッチ入力の移動方向で入力指示位置に隣接する位置へオブジェクトの移動を行う処理を繰り返す表示制御を行うことを特徴とする請求項1に記載のタッチパネル装置。

【請求項9】 上記タッチ判定手段は上記オブジェクト上を移動するタッチ入力が該オブジェクトの中心または重心位置を押す入力操作であるか否かを判定し、該オブジェクトの中心または重心位置を押す入力操作ではないと判定した場合には、上記表示制御手段は該オブジェクトの中心あるいは重心位置を中心として該オブジェクトを回転させる表示を行う表示制御を行うことを特徴とする請求項1に記載のタッチパネル装置。

【請求項10】 上記タッチ判定手段が画面に表示されたオブジェクトの周辺から該オブジェクト上に向かって移動するタッチ入力を検出した時は、上記表示制御手段は始めにタッチパネルに触れた位置からオブジェクト上までの操作入力の移動方向に、操作入力の移動速度に比例した距離だけ該オブジェクトの移動表示を行う表示制御を行うことを特徴とする請求項1に記載のタッチパネル装置。

【請求項11】 上記表示制御手段は表示画面上の特定方向を重力方向として定義すると共に、始めにタッチパネルに触れた位置からオブジェクト上までの操作入力の移動方向を初期移動方向として、上記重力方向に向かう前物理を働かせながら、操作入力の移動速度に比例した距離だけ該オブジェクトの移動表示を行う表示制御を行うことを特徴とする請求項10に記載のタッチパネル装置。

【請求項12】 上記表示情報テーブルに回転移動が可能であると登録されたオブジェクトを対してオブジェクトを画面に表示したときに、上記タッチ判定手段が該オブジェクト上の一点をタッチした後で接触したまま移動させるタッチ入力を検出したときは、上記表示制御手段は該タッチ入力の移動方向に沿って該オブジェクトが転がるようにした回転・移動表示を行う表示制御を行うことを特徴とする請求項1に記載のタッチパネル装置。

【請求項13】 上記通常表示状態の形状が歪んだ形状をした上記特殊表示状態の表示データを設けると共に、上記タッチ判定手段が画面に上記通常表示状態で表示された該オブジェクト上を触れるタッチ入力を検出すると、上記表示制御手段が該オブジェクトの表示を上記特殊表示状態に変更する表示制御を行うことを特徴とする請求項2に記載のタッチパネル装置。

【請求項14】 上記タッチパネルにはタッチ接触の圧力を感知する手段を有し、上記特殊表示状態の表示データは表示形状が異なる複数データを設けたものであり、上記タッチ判定手段は上記タッチパネルが検出したタッチ圧力を基にオブジェクト上に与えられる変形量を判定し、上記表示制御手段は該判定した変形量を基に表示すべき特殊表示状態の表示データを選択して表示する制御を行うことを特徴とする請求項13に記載のタッチパネル装置。

【請求項15】 タッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示制御を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、
表示画面外まで仮想的に連続しているオブジェクトに対して、ある一方向に移動速度または移動量が予め定めた一定値を超えるタッチ入力がなされたことを検出したときは、該オブジェクトを上記一方向に上記タッチ入力の移動速度を初速としてスクロール表示させ、タッチ入力が終了したことを検出したときは、上記スクロール表示のスクロール速度を減少させて、停止に至らせる表示を行うことを特徴とするタッチパネル装置によるオブジェクトの表示方法。

【請求項16】 上記オブジェクトのスクロール表示中において、該オブジェクトが停止する以前に該オブジェクト表示上の一箇所で静止したタッチ入力を検出した場合は、上記スクロール速度の減少速度よりも急激にスクロール速度を減少させて、停止に至らせる表示を行うことを特徴とするタッチパネル装置によるオブジェクトの表示方法。

【請求項17】 タッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、
画面に表示されているオブジェクトに対して、オブジェクトを挟みこむ2箇所のタッチ指示による挟み込み動作を使ったタッチ入力操作を認識し、その後で該2箇所のタッチ指示がタッチパネル上を移動する動作を行っていることを認識した場合は、該オブジェクト表示を該2箇所のタッチ指示位置の略中央に位置するように表示位置を変更していくことを特徴とするタッチパネルによるオブジェクトの表示方法。

【請求項18】 上記2箇所のタッチ指示による挟み込み動作を使ったタッチ入力操作を認識した時には、該オブジェクトを通常の表示状態とは異なる特殊表示状態に変更することを特徴とする請求項17に記載のタッチパネル装置によるオブジェクトの表示方法。

【請求項19】 上記2箇所のタッチ指示による挟み込

FITBIT 1002
Fitbit v. Immersion

み動作を伴ったタッチ入力操作を検出した後で、該タッチ入力操作が終了したことを認識した時には、該オブジェクトを上記特殊表示状態から上記通常表示状態に変更することを特徴とする請求項18に記載のタッチパネル装置によるオブジェクトの表示方法。

【請求項20】 タッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクト上の表示方法であって、

画面に表示されているオブジェクトの周辺でのタッチ入力を検出した後でタッチパネルに接触したまま該オブジェクト上を移動するタッチ入力を検出した時は、該タッチ入力の継続中には該オブジェクトを該タッチ入力の移動方向で入力指示位置に隣接する位置へオブジェクトの移動を行う処理を続けることを特徴とするタッチパネル装置によるオブジェクトの表示方法。

【請求項21】 上記オブジェクト上を移動するタッチ入力が、該オブジェクトの中心または重心位置を押す入力操作であるか否かを判定し、該オブジェクトの中心または重心位置を押す入力操作ではないと判定した場合には、該オブジェクトの中心あるいは重心位置を中心として該オブジェクトを回転させる表示を行うことを特徴とする請求項20に記載のタッチパネル装置によるオブジェクトの表示方法。

【請求項22】 タッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、

画面に表示されたオブジェクトの周辺から該オブジェクト上に向かって移動するタッチ入力を検出した時は、始めにタッチパネルに触れた位置からオブジェクト上までの操作入力の移動方向に、操作入力の移動速度に比例した距離だけ該オブジェクトの移動表示を行うことを特徴とするタッチパネル装置によるオブジェクトの表示方法。

【請求項23】 画面上の鉛直方向を重力方向として定義すると共に、

始めにタッチパネルに触れた位置からオブジェクト上までの操作入力の移動方向を初期移動方向として、上記重力方向に向かう放物線を描きながら、操作入力の移動速度に比例した距離だけ該オブジェクトの移動表示を行うことを特徴とする請求項22に記載のタッチパネル装置によるオブジェクトの表示方法。

【請求項24】 タッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、

回転移動し得る形状を有するオブジェクトを画面に表示したときに、該オブジェクト上の一点をタッチした後で接触したまま移動させるタッチ入力を検出したときは、該タッチ入力の移動方向に沿って該オブジェクトが転がるようにした回転・移動表示を行うことを特徴とするタッチパネル装置におけるオブジェクトの表示方法。

【請求項25】 タッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、

該オブジェクトについて、通常表示態様と、該通常表示態様の形状が歪んだ形状をした特殊表示態様とを設けると共に、

画面に上記通常表示態様で表示された該オブジェクト上を触れるタッチ入力を検出すると、該オブジェクトの表示を上記特殊表示態様に変更することを特徴とするタッチパネル装置におけるオブジェクトの表示方法。

【請求項26】 タッチ接触圧力を検出し得るタッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、

該オブジェクトについて、通常表示態様と、該通常表示態様の形状が歪んだ形状をした複数の特殊表示態様とを設けると共に、

画面に上記通常表示態様で表示された該オブジェクト上を触れるタッチ入力を検出すると、検出されたタッチ入力圧力に基づいて選択される上記特殊表示態様に該オブジェクトの表示を変更することを特徴とするタッチパネル装置におけるオブジェクトの表示方法。

【発明の詳細な説明】

【産業上の利用分野】本発明は、タッチパネル装置およびタッチパネル装置によるオブジェクトの表示方法に関する。最近のコンピュータによるデータ処理の普及に伴って、コンピュータに対する専門的な知識のないユーザによる操作が多くなる動向にあり、かかるコンピュータに対する専門的な知識のないユーザでも、使用し易いユーザインタフェースが要求される。

【従来の技術】図10は、従来のコンピュータのユーザインタフェースを説明する図である。最近のワークステーションなどの情報処理装置においては、非常に多くのアプリケーションソフトウェアが整備され、複雑な処理も、幾つかのアプリケーションを組み合わせることによって実現される。然し、その反面、コンピュータの専門知識を持たないユーザにとって、これらの情報処理装置は扱い難いものとなっている。例えば、コンピュータの専門知識を持たないユーザは、図示されているキーボードやマウス 2といった装置すら敬遠する傾向にある。具体的には、ディスプレイ 3に表示されているオブジェクトを操作する場合、ユーザは、該キーボードやマウス 2を使用して、該ディスプレイ 3に表示されているオブジェクトを操作する為のコマンドを入力する。又、ディスプレイ 3上に表示されている、上記キーボード 2からの入力に対応する機能を抽象化した絵記号であるアイコン

FITBIT 1002
Fitbit v. Immersion

を、例えば、マウス 2等を使用して選択し、該アイコンが指示する操作を行っていた。

【発明が解決しようとする課題】このような、従来のコンピュータインタフェースにおいては、キーボード，マウス，アイコン等を使用して，ディスプレイ上に表示されているオブジェクトに対する表示操作を行う必要があり、コンピュータの専門知識のないユーザにとっては、該コンピュータは、極めて扱い難いものとなっていた。本発明は上記従来の欠点に鑑み、コンピュータインタフェースにおいて、キーボードや，単にある機能を抽象化したアイコンを使うのではなく，ディスプレイを現実の空間に見立て、すなわち、表示するオブジェクトの重量や硬軟，摩擦抵抗，引力などを表現する表示方法、及び、物理的な操作を行うことができるタッチパネルによる操作方法を用いることにより，コンピュータの特別な知識を持っていないユーザが自然に使える環境を提供することを目的とするものである。

【課題を解決するための手段】上記の課題は、下記のように構成したタッチパネル装置およびタッチパネル装置によるオブジェクト表示方法によって解決される。

〔請求項1，2に係わる発明〕タッチ操作入力を検出するタッチパネルと、オブジェクトを表示する表示画面とを備えたタッチパネル装置において、上記表示画面に表示されるオブジェクトの表示情報を有する表示情報テーブルと、上記タッチパネルが検出した操作入力情報と、上記表示情報テーブル上のオブジェクトの表示情報とを基に、該オブジェクトに加えられたタッチ入力操作の種別を判定するタッチ判定手段と、上記判定されたタッチ入力操作種別に基づいてあらかじめ定められた表示情報の変更操作を該オブジェクトに与えて表示画面に表示する制御を行う表示制御手段とを設けて構成する。このような構成において、画面上に表示されるオブジェクトの通常表示状態の表示データと，該オブジェクトの通常表示状態とは異なる特殊表示状態の表示データとを設けると共に、上記タッチ判定手段が上記タッチ入力が特殊表示を行うべきタッチ入力操作種別であると判定した場合には、上記表示制御手段は特殊表示状態の表示データを読み出して表示するようにしても良い。また、下記のようなタッチパネル装置におけるオブジェクトの表示方法を採用しても良い。（それぞれの表示方法は上記のタッチパネル装置の構成を用いて実現し得る。）

〔請求項3，4および請求項15，16に係わる発明〕タッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、表示画面外までに仮想的に連続しているオブジェクトに対して、ある一方向に移動速度または移動量があらかじめ定めた一定値を超えるタッチ入力がなされたことを検出したときは、該オブジェクトを上記一方向に上記タッチ入力の移動速度を初速としてスクロール表示させ、タッチ入力が終了したことを検出したときは、上記スクロール表示のスクロール速度を減少させて、停止に至らせる表示を行うようにする。このような表示方法において、上記オブジェクトのスクロール表示中において、該オブジェクトが停止する以前に該オブジェクト表示上の一箇所で静止したタッチ入力を検出した場合は、上記スクロール速度の減少速度よりも急激にスクロール速度を減少させて、停止に至らせる表示を行うようにしても良い。

〔請求項5，6，7および請求項17，18，19に係わる発明〕タッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、画面に表示されているオブジェクトに対して、オブジェクトを挟みこむ2箇所のタッチ指示による挟み込み動作を使ったタッチ入力操作を認識し、その後で該2箇所のタッチ指示がタッチパネル上を移動する動作を行っていることを認識した場合は、該オブジェクト表示を該2箇所のタッチ指示位置の略中央に位置するように表示位置を変更していくようにする。このような表示方法において、上記2箇所のタッチ指示による挟み込み動作を使ったタッチ入力操作を認識した時には、該オブジェクトを通常の表示状態とは異なる特殊表示状態に変更するようにしても良い。また、上記2箇所のタッチ指示による挟み込み動作を使ったタッチ入力操作を認識した後で、該タッチ入力操作が終了したことを認識した時には、該オブジェクトを上記特殊表示状態から上記通常表示状態に変更するようにしても良い。

〔請求項8，9および請求項20，21に係わる発明〕タッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、画面に表示されているオブジェクトの周辺でのタッチ入力を検出した後でタッチパネルに接触したまま該オブジェクトを移動するタッチ入力を検出した時は、該タッチ入力の継続中には該オブジェクトを該タッチ入力の移動方向で入力指示位置に隣接する位置へオブジェクトの移動を行う処理を続けるようにする。このような表示方法において、上記オブジェクト上を移動するタッチ入力が、該オブジェクトの中心または重心位置を押す入力操作であるか否かを判定し、該オブジェクトの中心または重心位置を押す入力操作ではないと判定した場合には、該オブジェクトの中心あるいは重心位置を中心として該オブジェクトを回転させる表示を行うようにしても良い。

〔請求項10，11および請求項22，23に係わる発明〕タッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、画面に表示されたオブジェクトの周辺から該オブジェクト上に向かって移動するタッチ入力を検出し

FITBIT 1002
Fitbit v. Immersion

な時は、指先にタッチパネルに触れた位置からオブジェクト上までの操作入力の移動方向に、操作入力の移動速度に比例した距離だけ該オブジェクトの移動表示を行うようにする。このような表示方法において、画面上の特定方向を重力方向として定義すると共に、始めにタッチパネルに触れた位置からオブジェクト上までの操作入力の移動方向を初期移動方向として、上記重力方向に向かう放物線を描きながら、操作入力の移動速度に比例した距離だけ該オブジェクトの移動表示を行うようにしても良い。

【請求項12および請求項24に係わる発明】タッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、回転移動し得る形状を有するオブジェクトを画面に表示したときに、該オブジェクト上の一点をタッチした後で接触したまま移動させるタッチ入力を検出したときは、該タッチ入力の移動方向に沿って該オブジェクトが転がるようにした回転・移動表示を行うようにする。

【請求項13，14および請求項25，26に係わる発明】タッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、該オブジェクトについて、通常表示態様と、該通常表示態様の形状が歪んだ形状をした特殊表示態様とを設けると共に、画面に上記通常表示態様で表示された該オブジェクト上を触れるタッチ入力を検出すると、該オブジェクトの表示を上記特殊表示態様に変更するようにする。このような表示方法において、タッチ接触圧力を検出し得るタッチパネルに対する操作入力に基づいて、画面上のオブジェクトの表示態様を変更する操作を行うようにしたタッチパネル装置におけるオブジェクトの表示方法であって、該オブジェクトについて、通常表示態様と、該通常表示態様の形状が歪んだ形状をした複数の特殊表示態様とを設けると共に、画面に上記通常表示態様で表示された該オブジェクト上を触れるタッチ入力を検出すると、検出されたタッチ入力圧力に基づいて、選択された上記特殊表示態様に該オブジェクトの表示を変更するようにしても良い。

【作用】本発明におけるタッチパネル装置では、タッチパネル装置のディスプレイを現実の空間に見立て、タッチパネルが検出するタッチ入力操作をあたかも表示されたオブジェクトに対する物理的な操作がなされたようにみなして、オブジェクトに対応する物理的な操作を与えて表示できるようにしたことに特徴がある。このような表示を実現するために、タッチパネルが検出した操作入力情報と、上記表示情報テーブル上のオブジェクトの表示情報とを基に、該オブジェクトに加えられたタッチ入力操作の種別をタッチ判定手段が判定する。そしてこのタッチ入力操作の種別の判定結果に基づいて、表示制御手段が入力操作種別に対応する定められた表示態様の変更操作を該オブジェクトに与えて表示画面に表示する処理を行う。この定められた表示態様の変更操作とは、タッチ入力に対応するオブジェクトに仮想的な物理的操作を与える表示操作である。更にオブジェクトの（仮想的な）物理的属性の情報を該オブジェクトの表示情報テーブル上に定義しておくことにより、該オブジェクトの属性に基づいた物理的操作を該オブジェクトに与えて表示することができる。この仮想的な物理的属性としては、例えばオブジェクトの重量、反転、摩擦抵抗、引力（重力）等がある。このようなオブジェクトの物理的属性と判定したタッチ入力操作の種別とを比較して、該オブジェクトにどのような物理的操作がなされたかを認識して、例えば該オブジェクトをスクロールしたり、滑り込み移動を行ったり、転がし移動、慣性移動、重力（下向き）移動を行うようにしたものである。またこのような構成において、画面上に表示されるオブジェクトの通常表示状態の表示データと、該オブジェクトの通常表示状態とは異なる特殊表示状態の表示データとを設けると共に、上記タッチ判定手段が上記タッチ入力が特殊表示を行うべきタッチ入力操作種別であると判定した場合には、上記表示制御手段は特殊表示状態の表示データを読み出して表示するようにしても良い。例えばタッチ入力操作が滑り込み動作を行ったこと認識した場合は特殊表示状態として反転表示等を行い、またタッチ操作によりオブジェクトが押圧されたことを認識した場合は、特殊表示状態として歪み形状のオブジェクトを表示することができる。従って、本発明によれば現実の空間をまねたインターフェースを実現することができ、ワークステーションといったコンピュータの専門知識を持たないユーザでも、ディスプレイ上のオブジェクトを操作し易い使用環境を提供することができる効果が得られる。

【実施例】以下本発明の実施例を図面によって詳述する。図1は本発明の構成例を示すブロック図であり、図2は本発明における表示情報テーブルおよびタッチパネル情報の一例を示す図であり、図3はタッチパネル付きワークステーションの構成例を示す図である。また図4は画面外まで仮想的に続いているオブジェクトに対するスクロール表示の例を示し、図5は2本指によるオブジェクト操作の例を示し、図6は指による平行移動、回転移動の例を示し、図7は指でオブジェクトを弾いた場合の慣性移動、慣性＋重力（下向き）移動の例を示し、図8は指によるオブジェクトの転がり移動の例を示し、図9は指によるオブジェクトの歪み／復元の表示例を示す。なお図4～図9のそれぞれにおいて、(A) は表示画面の例を示し、(B) は表示情報テーブル①の例を示している。以下、図1，図2を参照しながら、更に、図3，及び、図4～図9によって、本発明によるタッチパネルによるオブジェクト表示の方法を説明する。先ず、図3は、タッチパネル装置 1を装備したワークステーションのハー

FITBIT 1002
Fitbit v. Immersion

ドウェア構成を示している。本図において、中央処理装置(CPU) 4は、メインメモリ5上の表示制御プログラムを実行することにより、図1(A)に示した表示動作を行う。図1(A)中の全体管理部 50, タッチ判定部 51, 表示管理部 52が、図2のメインメモリ 5中の、上記表示制御プログラムの構成内容であり、該全体管理部 50の管理する表示情報テーブル①の構成例を図2(B1)に、さらに、タッチパネル装置 1からのタッチパネル情報②の構成例を図2(B2)に示す。なお、本実施例における全体管理部50（の機能の一部）とタッチ判定部51は本発明の請求項1におけるタッチ判定手段に対応し、全体管理部50（の機能の一部）表示管理部52は、本発明の請求項1における表示制御手段に対応する。図1(A)中のタッチ判定部 51は、タッチパネル装置 1から送られてくるタッチ座標と、そのタッチ座標の送信されて来る時間情報を計測して、タッチ種別を判定する。該判定結果のタッチ種別は、タッチ座標と共に全体管理部 50に送信される。全体管理部 50は、ユーザのタッチ座標や、タッチ圧力等を示す上記タッチパネル情報②と、上記オブジェクトの表示情報テーブルから、ユーザの意図する表示操作を理解し、表示切換え要求を表示管理部 52に出す。該表示切換え要求では、上記表示情報テーブル①より、当該オブジェクトの表示位置情報（ディスプレイ上の表示領域の左上座標、サイズ、オブジェクトのサイズ、現在の表示位置座標など）と、該オブジェクトの表示データが格納されているハードディスク 7内のファイル名を渡す。表示管理部 52が全体管理部 50から表示切換え要求を受信すると、ハードディスク 7から該当するファイル名の表示データファイルを読出して、図示されていない表示用フレームメモリの表示位置へロードする。このようにして、ユーザの操作したタッチ操作に従って、該タッチ操作が指示する物理的な操作情報、即ち、タッチパネル情報②と、該オブジェクトの表示情報テーブル①が持っている、当該オブジェクトの物理情報に対応した物理操作が、該オブジェクトに与えられ、該物理操作に対応して、予め、定められている表示が行われる。尚、上記オブジェクトに対応した表示情報テーブル1の内、表示位置情報は、ディスプレイ上のオブジェクトの表示位置を示し、ファイル情報は、当該オブジェクトの情報（サイズ、表示位置）を示し、通常表示ファイル名は、該オブジェクトの通常表示データが格納されているファイル名を示し、特殊状態ファイル名は、該オブジェクトの特殊状態、例えば、表示色を反転したオブジェクトの表示データが格納されているファイル名を示している。

《請求項3および請求項15の実施例》：図4参照

タッチパネル装置 1からの情報がタッチ判定部 51へ送信され、指がタッチパネル 1Aに触れたまま移動し始めた（以下、連続タッチ開始と呼ぶ）ことを判定したとき、タッチ判定部 51はタッチ通知（内容：連続タッチ開始，座標(800,300)）を全体管理部 50へ送信する。その後のタッチパネル装置 1からのタッチパネル情報②は、タッチ通知（内容：連続タッチ中，座標(730,300)）というように、次々に、全体管理部 50へ送信し、タッチパネル装置 1からのタッチパネル情報②が、例えば、100秒以上途絶えたとき、タッチ通知（内容：連続タッチ終了，座標(700,300)）を全体管理部 50へ送信する。該全体管理部 50は、タッチ通知の連続タッチ開始を受信した時点で、図4(A)に示したように、この領域が画面外までおよぶ大きなオブジェクトの表示領域であることを、図4(B)に示した、当該オブジェクトの表示情報テーブル1の、「オブジェクト識別」の「画面外」情報から認識（若し、この領域が画面外までおよぶ大きなオブジェクトの表示領域であることを認識できなかったときに、該タッチパネル操作を無視する。即ち、何らの表示操作を行わない。）し、次から送信されて来るタッチ通知の連続タッチ中の座標を見て、例えば、右から左方向に、どれ程の速度で指が動いたかを認識する。ここでは、その速度について、1回のタッチ通知で、例えば、20ドット以上動いている場合を、高速として、最初は100秒間隔でスクロール表示をして、それ以下を、通常速度として、最初5000秒間隔でスクロールをさせ、その後、スクロール表示間隔（表示管理部へ表示切換え要求を送信する時間間隔）を1.5倍に延ばしてゆき、2秒以上になった時点でスクロールを終了するものとする。さらに、上記スクロールの終了は、例えば、上記の速度で、40ドット以上の距離を指が動いたことを確認してから、上記後、全体管理部 50は、図4(B)に示した当該オブジェクトの表示情報テーブル1の、ファイル情報の内、ファイルの全体情報の表示位置（網掛けで示す）を、例えば、10ドット分左方向へ表示がずれるように書換え、表示管理部 52に、表示切換え要求（内容：表示位置情報＋ファイルの全体情報＋通常表示ファイル名）を送信する。表示管理部 52は、上記全体管理部 50からの表示切換え要求の表示ファイルを一度、メインメモリ 5にロードし、ファイルの全体情報の、上記網掛けで示した表示位置(X)の部分だけを、表示位置情報で示される表示用フレームメモリ 6上へコピーする。（図3参照）その後も、全体管理部 50は前述の時間間隔で表示切換え要求を表示管理部 52へ送信する。該スクロールが停止する以前に、さらに、連続タッチ開始が通知された時には、スクロールが必要であるかどうか判定し、スクロール表示を行うものであれば、後から来た要求を優先してスクロール表示をその場所から、前述の初速で再び始める。

《請求項4および請求項16の実施例》：図4参照

上記のスクロール中に、全体管理部 50に送信されて来るタッチ通知が、同じ場所の、あるいは、5ドット程度の近傍であれば、表示管理部 52へ送る表示切換え要求の送信時間間隔を2倍（即ち、遅くして）として、スク

FITBIT 1002
Fitbit v. Immersion

ロールが早く終了するようにする。

《請求項5，6，7および請求項17，18，19の実施例》：図5参照

タッチ判定部 51 から全体管理部 50 に送信されてくるタッチ通知が，図5(A) に示されるようなオブジェクトとの位置関係，即ち，該オブジェクトを挟み込む位置関係になっているかを，図5(B) に示した，当該オブジェクトの表示情報テーブル①の内容と比べ，該オブジェクトを挟み込んだ位置関係になっているとき，全体管理部 50 は、該オブジェクトの特殊状態ファイル（挟んだときの表示ファイルで，例えば，色反転ファイル）を現在の表示位置に表示するよう，表示切り変え要求を表示管理部 52 へ送信する。上記の位置関係になっていないときには、該タッチパネル操作は無視される。その後、タッチ通知を受信して、表示位置を2本指のほぼ中央に変更するように、図5(B) に示した表示情報テーブル①の表示位置情報の表示座標(X,Y)(図面中で示す) を更新し、該更新した表示情報テーブル1に基づいた表示切り変え要求を表示管理部 52 へ送信する。タッチ通知で連続タッチ終了が来ると、全体管理部 50 は、該挟み表示されているオブジェクトの通常表示ファイルを、その時点での表示位置に表示するよう、表示切り変え要求を表示管理部 52 へ送信する。

《請求項8および請求項20の実施例》：図6(A1)参照

タッチ判定部 51 から全体管理部 50 に送信されてくるタッチ通知が、図6(A1)に示されるようなオブジェクトとの位置関係、即ち、該オブジェクトを指で移動させる位置関係（具体的には、オブジェクトの端を指で触り、指をタッチパネル 1A に触れたまま、該オブジェクト上を移動する関係）になっているかを、図6(B) の表示情報テーブル①の内容と比べ、該位置関係になっているとき、全体管理部 50 はタッチ通知の示すユーザの指の位置にオブジェクトの表示が追従するよう、表示切り変え要求（表示情報テーブル①の表示位置情報の左上座標(X,Y) ＋通常表示ファイル名）を表示管理部 52 へ送信する。該タッチ通知で連続タッチ終了が来るまで、該表示を続ける。

《請求項9および請求項21の実施例》：図6(A2)参照

上記の実施例で、全体管理部 50 がオブジェクトの中心を指が押しているかどうかを判定し、図6(A2)に示したように、中心からはずれていたら、図5(B) の表示情報テーブル①の回転角（表示角度）を2度ずつ増加させて，その度の表示切り変え要求を表示管理部 52 へ送信する。表示管理部 52 は、該当の表示ファイルをハードディスク 7からメインメモリ5へロードし（図3参照）、オブジェクトの左上座標(X,Y) を表示切り変え要求で指示された場所で、そこを中心に回転角分回転させ、表示用フレームメモリ 6上へコピーする。

《請求項10および請求項22の実施例》：図7(A1)参照

タッチ判定部 51 から全体管理部 50 に送信されてくるタッチ通知が、図7(A1)に示されるようなオブジェクトとの位置関係、即ち、オブジェクトを指ではじくような位置関係になっているかを、図7(B) に示した表示情報テーブル1の内容と比べ、該位置関係になっているとき、全体管理部 50 はタッチ通知から指の速度を決定すると共に、上記請求項3等の実施例と同様にして、オブジェクトの移動速度（表示管理部へ表示切換え要求を送信する時間間隔）を決定し、指の移動した方向に表示を移動するため、図7(B) の表示情報テーブル1の表示位置情報の左上座標(X,Y) を変更しながら、表示切換え要求を表示管理部 52 へ送信する。該表示時間間隔が、例えば，2秒以上になったらオブジェクト移動を終了する。この場合のオブジェクトの移動は、指の速度を初速度とする、所謂、慣性移動となる。

《請求項11および請求項23の実施例》：図7(A2)参照

上記の実施例で、オブジェクトを移動表示するとき、該オブジェクトの表示情報テーブル1のオブジェクト種別が，例えば，該オブジェクトに重力がかかっていることを指示しているとき、該オブジェクトの移動は、図7(A2)に示したように、上記慣性移動＋重力移動となるので、例えば、2の表示切換え回数単位の数（指数関数）をY座標に加えて，図7(B) に示した表示情報テーブル1の表示位置情報の左上座標(X,Y) を変更しながら、表示切換え要求を表示管理部 52 へ送信する。この場合も、上記請求項10等の実施例と同じく、表示時間間隔が2秒以上になったら、該オブジェクト移動を終了する。

《請求項12および請求項24の実施例》：図8参照

タッチ判定部 51 から全体管理部 50 に送信されてくるタッチ通知が、図8(B) に示した表示情報テーブル①のオブジェクト種別から、例えば，図6(A) に示したように、転がるオブジェクトに対するものだと確認できたとき、全体管理部50 はタッチ通知での指の移動方向の、例えば，10%遅らせた位置にオブジェクトの表示を行うように、図8(B) の表示情報テーブル1の表示位置情報の左上座標(X,Y) を変更しながら、表示切換え要求を表示管理部 52 へ送信する。そして、該表示切換え要求を表示管理部 52 へ送信は、タッチ通知で連続タッチ終了が来るまで続ける。若し、上記において、転がるオブジェクトに対するものでなかったとき、該タッチ操作は無視される。

《請求項13，14および請求項25，26の実施例》：図9参照

タッチ判定部 51 から全体管理部 50 に送信されてくるタッチ通知が、図9(B) に示した表示情報テーブル①のオブジェクト種別から、例えば，図9(A) に示したように，歪みオブジェクト、即ち，指による圧力で変形するオブジェクトに対するものだと確認できたとき、全体管

FITBIT 1002
Fitbit v. Immersion

理部は図9(b)の表示情報テーブルが指示する、当該オブジェクトの特殊状態ファイル（歪んだときの表示ファイル）を現在の表示位置に表示するよう、表示切り変え要求を表示管理部52へ送信する。その後のタッチ通知で連続タッチ終了が来ると、全体管理部50は、該オブジェクトの通常表示ファイルを現在の表示位置に表示するよう、表示切り変え要求を表示管理部52へ送信する。上記の実施例においては、オブジェクトの歪みが1つの例で説明したが、タッチパネル1Aからのタッチパネル情報が指示する、例えば、指の圧力が、種々あり、それぞれに対して、オブジェクトの歪み量が変わるような場合には、上記特殊状態ファイル（歪んだときの表示ファイル）を、複数ファイル用意しておく必要がある。勿論、上記において、指による圧力で変形するオブジェクトに対するものだと確認できなかったときには、該タッチパネル操作を無視する。

【発明の効果】以上、詳細に説明したように、本発明のタッチパネル装置およびタッチパネル装置によるオブジェクト表示方法は、ユーザが画面表示されたオブジェクトに対して行ったタッチ入力操作を認識して、この認識結果と表示情報テーブルが示す情報との対応関係に基づいてオブジェクトの表示制御を行うことにより、該タッチ入力操作に基づいた物理的運動がオブジェクトに与えられたように表示することが可能となる。このように現実の空間をまねたインターフェースが実現できるので、ワークステーションなどの専門的な知識を持たないユーザにも、馴染みやすい使用環境を提供できる効果が得られる。

【図面の簡単な説明】

【図1】本発明の構成例を示すブロック図

【図2】本発明における表示情報テーブルとタッチパネル情報の一例を示す図

【図3】タッチパネル付きワークステーションの構成例を示した図

【図4】本発明の一実施例を示した図（その1）

【図5】本発明の一実施例を示した図（その2）

【図6】本発明の一実施例を示した図（その3）

【図7】本発明の一実施例を示した図（その4）

【図8】本発明の一実施例を示した図（その5）

【図9】本発明の一実施例を示した図（その6）

【図10】従来のコンピュータのユーザインタフェースを説明する図

【符号の説明】

1	タッチパネル装置	1A	タッチパネル
2	キーボード／マウス	3	ディスプレイ
4	中央処理装置(CPU)	5	メインメモリ
50	全体管理部	51	タッチ判定部
52	表示管理部		
6	表示用フレームメモリ	7	2次記憶装置、ハードディスク
①	表示制御テーブル	②	タッチパネル情報

【手続補正2】

【補正対象書類名】図面

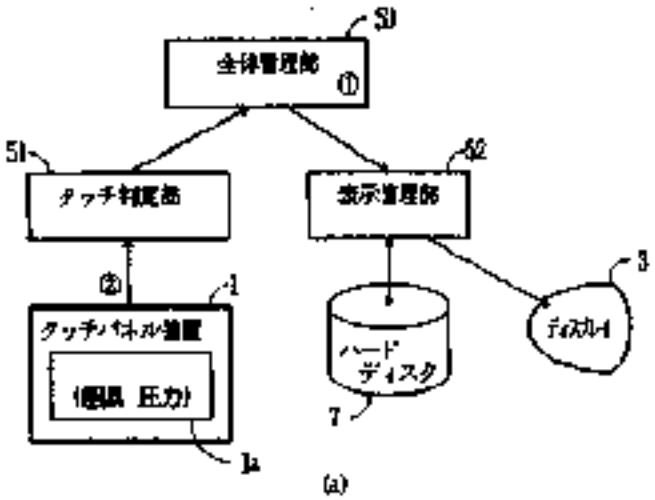
【補正対象項目名】図1

【補正方法】変更

【補正内容】

【図1】

本発明の構成例を示すブロック図



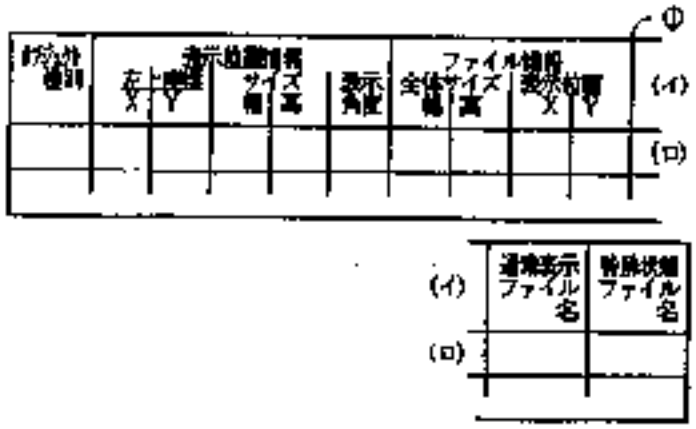
【手続補正3】

【補正対象書類名】図面

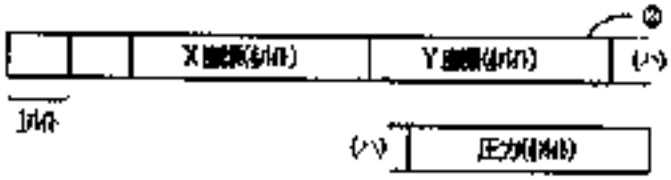
FITBIT 1002
Fitbit v. Immersion

【補正対象項目名】図2　　＊【補正内容】
【補正方法】変更　　＊　【図2】

表示情報テーブルとタッチパネル情報の一例を示す図



(b1)



(b2)

FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Renee Prevette
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
		Total in USD ($)		**180**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	17452157
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	20-NOV-2013
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Time Stamp:	12:15:19
Application Type:	Utility under 35 USC 111(a)

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Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$180
RAM confirmation Number	10434
Deposit Account	201430
Authorized User	KILPATRICK TOWNSEND & STOCKTON, LLP

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FITBIT 1002
Fitbit v. Immersion

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Transmittal Letter	IDSLetter.pdf	211094	no	5
Warnings:					
Information:					
2	Information Disclosure Statement (IDS) Form (SB08)	PTOSB08.pdf	706700	no	1
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
3	Foreign Reference	WO02057885A2.pdf	2331532	no	41
Warnings:					
Information:					
4	Foreign Reference	EP1728142A2.pdf	4272944	no	78
Warnings:					
Information:					
5	Foreign Reference	JP2005-152054SonyCorp.pdf	43363	no	1
Warnings:					
Information:					
6	Foreign Reference	JP05-100809FujitsuLtd.pdf	1990623	no	26
Warnings:					
Information:					
7	Non Patent Literature	ImmersionIMM313EPApplicationNoEP09790406 4OfficeAction10-14-2013.pdf	9476394	no	9
Warnings:					
Information:					
8	Non Patent Literature	ImmersionIMM312EPApplicationNo09790403 1OfficeAction10-14-2013.pdf	8157334	no	8
Warnings:					
Information:					

FITBIT 1002
Fitbit v. Immersion

9	Non Patent Literature	ImmersionIMM351EPApplnNo09790404 9OfficeAction10-14-2013.pdf	393994	no	8
Warnings:					
Information:					
10	Non Patent Literature	CSCW2002.pdf	1332811	no	1
Warnings:					
Information:					
11	Non Patent Literature	ImmersionIMM314EPApplicationNoEP09790414 8OfficeAction10-14-2013.pdf	300265	no	7
Warnings:					
Information:					
12	Non Patent Literature	ImmersionIMM310JPApplicationNo2011-518852 0OfficeAction8-20-2013.pdf	8194062	no	9
Warnings:					
Information:					
13	Non Patent Literature	ImmersionIMM314JPApplicationNo2011-518856 0OfficeAction10-22-2013.pdf	16433137	no	15
Warnings:					
Information:					
14	Non Patent Literature	IMM313CNApplnNo200980127923 0OfficeAction10-17-2013.pdf	7474489	no	10
Warnings:					
Information:					
15	Fee Worksheet (SB06)	fee-info.pdf	30651	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	61409288		

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Fitbit v. Immersion

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: David Birnbaum et al.	)	
	)	Conf. No.: 6699
Serial No. 12/502,702	)	
	)	Art Unit: 2688
Filed: July 14, 2009	)	
	)	Examiner: Wong, Kin C.
For: **SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**	)	
	)	
Attorney Ref. IMM351 (51851-378586)	)	

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Pursuant to 37 C.F.R. §§ 1.97 and 1.98, applicant(s) hereby submit(s) an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS OR OTHER INFORMATION

The patents, publications, or other information submitted for consideration by the Office are listed on the PTO/SB/08 forms attached hereto.

II. COPIES (check at least one box)

a. ☐ This application was filed before June 30, 2003. Accordingly, submitted herewith is a legible copy of (i) each U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; and (iii) all other information or that portion which caused it to be listed.

b. ☒ This application was filed on or after June 30, 2003. Accordingly, copies of cited U.S. patents and patent application publications therefore are not included. Copies of foreign patent documents and non-patent literature are included.

FITBIT 1002
Fitbit v. Immersion

c. ☐ Some or all of the documents listed on the PTO/SB/08 forms are not enclosed because they were cited in the International Search Report and copies should already be in the PTO file. If copies are needed, please contact the undersigned.

III. CONCISE EXPLANATION OF THE RELEVANCE
(check at least one box)

a. ☒ **DOCUMENTS IN THE ENGLISH LANGUAGE**
The patents, publications, or other information listed on the attached PTO/SB/08 forms are in the English language and therefore, do not require a statement of relevancy.

b. ☒ **DOCUMENTS NOT IN THE ENGLISH LANGUAGE**

A concise explanation of the relevance of all patents, publications, or other information listed that is not in the English language is as follows:

Office Action dated August 20, 2013 for Japanese Patent Application 2011-518852– English translation provided.
Office Action dated October 22, 2013 for Japanese Patent Application 2011-528856 – English translation not available.
JP 2005-152054 dated June 16, 2005 English Abstract provided.
JP 05-100809 dated April 23, 1993 – English Abstract provided.
Office Action dated October 17, 2013 for Chinese Patent Application 200980127923.0 – English translation provided.

c. ☐ **ENGLISH LANGUAGE SEARCH REPORT**
An English language version of the search report or action that indicates the degree of relevance found by the foreign office is attached, thereby satisfying the requirement for a concise explanation. See MPEP 609(III)(A)(3).

d. ☐ **OTHER**
The following additional information is provided for the Examiner's consideration.

FEES

IV. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(b):
(check one box)

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Fitbit v. Immersion

a. ☐ within three months of the filing date of a national application (37 C.F.R. § 1.97(b)(1)). No fee or statement is required. *(This section is not to be used with RCE's.)*

b. ☐ within three months of the date of entry of the national stage as set forth in § 1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or statement is required.

c. ☐ before the mailing of a first Office action after the filing of or concurrently with a Request for Continued Examination under § 1.114 (37 C.F.R. § 1.97(b)(4)). No fee or statement is required.

d. ☐ before the mailing date of a first Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or statement is required.

In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the statement under 37 C.F.R. § 1.97(e) below, or, if no statement has been made, charge our deposit account in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

V. ☐ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(c):
(check one box)

before the mailing date of a Final Office Action under 37 C.F.R. § 1.113 (See 37 C.F.R. § 1.97(e)(1)) or before the mailing date of a Notice of Allowance under 37 C.F.R. § 1.311 (See 37 C.F.R. § 1.97(c)(2)).

a. | | No statement: therefore, a fee in the amount of $180.00 as required by 37 C.F.R. § 1.17(p).

b. ☐ See the statement below. No fee is required.

VI. ☒ THIS IDS IS BEING FILED UNDER 37 C.F.R. § 1.97(d)
after the period specified in 37 C.F.R. 1.97(c) but before payment of the issue fee; see statement and payment of fees below.

VII. STATEMENT UNDER 37 C.F.R. § 1.97(e) (check only one box)
The undersigned hereby states that

FITBIT 1002
Fitbit v. Immersion

a. ☒ each item of information contained in the IDS was first cited in any communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS;

b. ☐ no item of information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of the IDS.

c. ☐ Some of the items of information were cited in a communication from a foreign Patent Office. As to this information, the undersigned states that each item of information contained in the IDS was first cited in a communication from a foreign Patent Office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby states that no item of this remaining information contained in the IDS was cited in a communication from a foreign Patent Office in a counterpart foreign application and, to the best of my knowledge after making reasonable inquiry, was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this statement.

VIII. ☐ PATENT TERM ADJUSTMENT

Each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 C.F.R. § 1.704(d).

IX. PAYMENT OF FEES (check one box)

☒ Payment by credit card Form PTO-2038 in the amount of $180 required by 37 C.F.R. § 1.17(p) is enclosed for the above-identified fee.

☐ Please charge Deposit Account No. 20-1430 in the amount required by 37 C.F.R. § 1.17(p) for the above-indicated fee. A triplicate copy of this paper is attached.

☐ No fee is required.

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Fitbit v. Immersion

If the Examiner has any questions concerning this IDS, he/she is requested to contact the undersigned. If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule and charge the appropriate fee to Deposit Account No. 20-1430.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 20-1430 for any additional fees required under 37 C.F.R. § 1.16 or under § 1.17.

Respectfully submitted,

Date: 11/20/2013

By: _____
Michael T. Morlock (Reg. No. 62,245)

Attachment(s):
- [x] PTO/SB/08
- [x] Documents
- [x] Fee
- [ ] Other

FITBIT 1002
Fitbit v. Immersion

XT B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

34360 7590 09/17/2013
PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission
I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/502,702	07/14/2009	David Birnbaum	IMM351 (51851/278586)	6699

TITLE OF INVENTION: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	$1760	$300	$0	$2060	12/17/2013

EXAMINER	ART UNIT	CLASS-SUBCLASS
WONG, KIN C	2628	345-173000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363)
- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed

1 Kilpatrick Townsend & Stockton LLP
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE: Immersion Corporation

(B) RESIDENCE: (CITY and STATE OR COUNTRY): San Jose, CA

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:
- ☒ Issue Fee
- ☒ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)
- ☐ A check is enclosed.
- ☒ Payment by credit card. Form PTO-2038 is attached.
- ☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 20-1430 (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

☐ Applicant certifying micro entity status. See 37 CFR 1.29

NOTE: Absent a valid certification of Micro Entity Status (see form PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

☐ Applicant asserting small entity status. See 37 CFR 1.27

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

☐ Applicant changing to regular undiscounted fee status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /M M/ Date 12/13/2013

Typed or printed name Michael Morlock Registration No. 62,245

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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FITBIT 1002
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Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Laura Smith
Attorney Docket Number:	IMM351 (51851/378586)
Filed as Large Entity	

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	1780	1780
Publ Fee- Early, Voluntary, or Normal	1504	1	300	300

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Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension-of-Time:				
Miscellaneous:				
			Total in USD ($)	2080

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Electronic Acknowledgement Receipt

EFS ID:	17651095
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Laura Smith
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	13-DEC-2013
Filing Date:	14-JUL-2009
Time Stamp:	11:36:05
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$2080
RAM confirmation Number	11541
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

EXHIBIT 1002
Fitbit v. Immersion

1	Transmittal Letter	Transmittal378586.pdf	38068 d4e189722c1c23faa58681453 4f6a6b8d43022e0	no	1
Warnings:					
Information:					
2	Amendment after Notice of Allowance (Rule 312)	AmendmentUnder37CFR378586.pdf	218454 6086c9d1d5c3c55f0ae48f2c6ed3d04d0d700bf1	no	8
Warnings:					
Information:					
3	Issue Fee Payment (PTO-85B)	PartB378586.pdf	127672 e192fc19f5ca9911528b1e973b9edf46b6156cbb	no	2
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32377 3f823bb0b35ee13eeac3c40a980503a3306561a4	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	416571		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

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New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	)	
	)	Conf No.: 6699
David M. Birnbaum et al.	)	
	)	Art Unit: 2688
Serial No. 12/502,702	)	
	)	Examiner: Wong, Kin C.
Filed: July 14, 2009	)	
	)	

For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Commissioner:

Transmitted herewith are the following documents for filing in the above-identified application:

1. Transmittal;
2. Amendment Under 37 C.F.R. 1.312;
3. Part B – Fees Transmittal; and
4. EFS-Web Payment in the amount of $2,080.00

The Commissioner is hereby authorized to charge any additional fees required by this action, or credit any overpayment, to Deposit Account Number 20-1430.

Date: 12/13/2013

Respectfully submitted,

Michael T. Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing
I hereby certify that this correspondence is being electronically filed with the United States Patent Office via EFS-Web on December 13, 2013.

Laura J. Smith

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	David Birnbaum
Application No.	:	12/502,702
For	:	**SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES**
Filed	:	July 14, 2009
Examiner	:	Kin C. Wong
Art Unit	:	2627
Confirmation No.	:	6699

Mail Stop Issue Fee
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

AMENDMENT UNDER 37 C.F.R. § 1.312

Sir:

The following Amendment and Remarks are submitted pursuant to 37 C.F.R. § 1.312.

Listing of the Claims begins on page 2 of this paper.

Remarks begin on page 8 of this papet.

FITBIT 1002
Fitbit v. Immersion

LISTING OF THE CLAIMS

1. (Currently Amended) A method comprising:

receiving at least one sensor signal from at least one sensor of a mobile device, the at least one sensor signal associated with a movement of the mobile device;

determining a message to be displayed in a user interface based at least in part on the at least one sensor signal;

determining a haptic effect based in part on the at least one ~~first~~ sensor signal; and

causing the message to be displayed and the haptic effect to be output.

2. (Original) The method of claim 1, wherein the at least one sensor comprises one or more of: an accelerometer, a gyroscope, a touch-sensitive input device, a camera, or a GPS sensor.

3. (Original) The method of claim 1, wherein the at least one sensor comprises a plurality of sensors.

4. (Original) The method of claim 3, wherein a first sensor of the plurality of sensors comprises an accelerometer and a second sensor of the plurality of sensors comprises a touch-screen.

5. (Original) The method of claim 1, wherein the message comprises predefined characteristics.

FITBIT 1002
Fitbit v. Immersion

6. (Original) The method of claim 5, wherein the predefined characteristics comprise: a shape and a haptic effect.

7. (Original) The method of claim 1, wherein:

the movement of the mobile device comprises a movement approximating the shape of a heart; and

the message is in the form of a heart.

8. (Original) The method of claim 1, wherein:

the movement of the mobile device comprises a movement approximating a hammering motion; and

the message is in the form of a nail.

9. (Original) The method of claim 1, further comprising detecting a user interaction associated with the message.

10. (Currently Amended) The method of claim 9, wherein the user interaction comprises an input on a touch-sensitive input device of the mobile device.

11. (Currently Amended) The method of claim 9, wherein the user interaction comprises tilting the mobile device.

12. (Currently Amended) The method of claim 9, wherein the user interaction comprises an input detected by a microphone of the mobile device.

FITBIT 1002
Fitbit v. Immersion

13. (Currently Amended) The method of claim 12, wherein the user interaction comprises blowing on the microphone.

14. (Original) The method of claim 9, further comprising transmitting a signal associated with the message to a recipient.

15. (Previously Presented) A method comprising:

receiving a first sensor signal from a first sensor, the first sensor signal associated with a movement of a first mobile device;

receiving a second sensor signal from a touch-sensitive interface of the first mobile device, the second sensor signal associated with a user interaction;

determining a change in a display of the first mobile device based at least in part on the second sensor signal;

transmitting a first data signal to a second mobile device, the first data signal comprising data associated with the user interaction and the movement of the first mobile device; and

determining a haptic effect based at least in part on the first data signal and outputting the haptic effect.

16. (Original) The method of claim 15, wherein the touch-sensitive interface comprises a touch-screen display.

FITBIT 1002
Fitbit v. Immersion

17. (Original) The method of claim 15, wherein the determining a change in the display of the first mobile device and the transmitting a data signal to a second mobile device occur substantially simultaneously.

18. (Original) The method of claim 15, wherein the change in the display of the first mobile device comprises displaying a trail substantially following the location of a point of contact between the user and the device.

19. (Original) The method of claim 15, wherein the movement of the first mobile device comprises a movement substantially approximating a pouring gesture.

20. (Original) The method of claim 19, wherein the change in the display comprises displaying a champagne bottle.

21. (Original) The method of claim 15, further comprising:

receiving a second data signal from the second mobile device;

determining a second change in the display of the first mobile device based at least in part on the second data signal.

22. (Original) The method of claim 21, wherein the second data signal comprises data corresponding to a display of the second mobile device.

FITBIT 1002
Fitbit v. Immersion

23. (Original) The method of claim 21, wherein the change in the display of the first mobile device comprises outputting an image substantially the same as the display of the second mobile device.

24. (Currently Amended) The method of claim 21, further comprising:

determining a second haptic effect based at least in part on the second data signal; and

transmitting a second haptic signal associated with the second haptic effect to an actuator configured to output the second haptic effect.

25. (Currently Amended) The method of claim 24, wherein the second haptic effect comprises a haptic effect approximating a champagne cork popping.

26. (Currently Amended) The method of claim 24, wherein the second haptic effect comprises a haptic effect approximating a collision between a user of the first mobile device and a user of the second mobile device.

27. (Previously Presented) A system comprising:

a processor configured to:

receive a first sensor signal from a first sensor, the first sensor configured to detect a movement of a first mobile device;

receive a second sensor signal from a second sensor, the second sensor configured to detect an interaction with the first mobile device;

receive a first data signal from a network interface, the network interface configured to receive signals transmitted by a second mobile device;

FITBIT 1002
Fitbit v. Immersion

determine a change in a display signal based at least in part on the first data signal and the second sensor signal;

determine a haptic effect based at least in part on the first data signal; and

outputting the haptic effect.

28. (Original) The system of claim 27, wherein the first sensor and the second sensor are each configured to detect one or more of: contact, pressure, acceleration, inclination, inertia, or location.

29. (Original) The system of claim 27, wherein the second sensor comprises a touch-screen.

30. (Original) The system of claim 27, wherein the mobile device further comprises a speaker configured to generate a sound effect coordinated with the haptic effect.

31. (Original) The system of claim 27, wherein the processor is further configured to transmit a second data signal to the network interface, and the network interface is further configured to transmit the second data signal to the second mobile device.

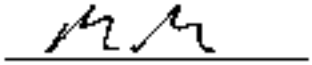
FITBIT 1002
Fitbit v. Immersion

REMARKS

Applicant submits this amendment pursuant to 37 C.F.R. § 1.312. Applicant has amended claims 1, 10-13, and 24-26 to correct minor typographical errors. These amendments do not add any new matter, and embody merely the correction of formal matters. Applicant respectfully requests the Examiner enter these amendments to the claims prior to their issuance.

Respectfully submitted,

Date: 12/13/2013



Michael Morlock
Reg. No. 62,245

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101
(336) 607-7391 (voice)
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FITBIT 1002
Fitbit v. Immersion

Substitute for form 1449A/PTO

INFORMATION DISCLOSURE STATEMENT BY APPLICANT

(Use as many sheets as necessary)

Sheet 1 of 1

Complete if Known	
Application Number	12/502,702
Filing Date	July 14, 2009
First Named Inventor	David Birnbaum
Art Unit	2688
Examiner Name	Kin C. Wong
Attorney Docket Number	IMM351 (51851/376566)

U.S. PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Document Number - Kind Code[2] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		US -			
		US-			

FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No.[1]	Foreign Patent Document: Country Code[2] - number[3] - Kind Code[4] (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear	T*
	1	WO 2002057885 A2	07-25-2002	Immersion Corp.		
	2	EP 1728142 A2	12-06-2006	Fujitsu Ltd		
	3	JP 2005-352924	00-00-2005	Sony Corp		
	4	JP 06-100900	04-22-1993	Fujitsu Ltd.		

NON PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No.[1]	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T*
	5	Office Action dated October 14, 2013 for corresponding European Patent Application 09790491.4	
	6	Office Action dated October 14, 2013 for corresponding European Patent Application 09790492.2	
	7	Office Action dated October 14, 2013 for corresponding European Patent Application 09790493.0	
	8	Anonymous: "USCW 2002 - Interactive Posters", 26 June 2002, pages 1-1, XP55302201, Retrieved from the Internet: URL: http://www.sem.org/pdf/Interact/Posters2002-03-posters.html [retrieved on 2013-10-03]	
	9	Office Action dated October 14, 2013 for corresponding European Patent Application 09790419.0	
	10	Notice of Reasons for Rejection dated August 20, 2013 for corresponding Japanese Patent Application 2011-518852	
	11	Office Action dated October 22, 2013 for corresponding Japanese Patent Application 2011-518849	
	12	Office Action dated October 17, 2013 for corresponding Chinese Patent Application 200980127925.0	

Examiner Signature	/K. Wong/	Date Considered	12/29/2013

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /K.W./

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
12/502,702	07/14/2009	David Birnbaum	IMM351 (51851/P7836US0)	6619

3430 1596 12/31/2013

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER	
WONG, KIN C	

ART UNIT	PAPER NUMBER
2628	

MAIL DATE	DELIVERY MODE
12/31/2013	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Response to Rule 312 Communication	Application No.	Applicant(s)
	12/502,702	BIRNBAUM ET AL.
	Examiner	Art Unit
	K. Wong	2688

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

1. ☒ The amendment filed on *19 December 2013* under 37 CFR 1.312 has been considered, and has been:

a) ☐ entered.

b) ☐ entered as directed to matters of form not affecting the scope of the invention.

c) ☐ disapproved because the amendment was filed after the payment of the issue fee.
Any amendment filed after the date the issue fee is paid must be accompanied by a petition under 37 CFR 1.313(c)(1) and the required fee to withdraw the application from issue.

d) ☐ disapproved. See explanation below.

e) ☒ entered in part. See explanation below.

IDS filed on 11/20/13 entered. Claims 10-13 entered as directed to matters of form not affecting the scope of the invention.

Claims 1 and claims 24-26 are not entered because of following:

claim 1- proposed amendment "at least one" sensor was not presented earlier that requires further considerations and searches;

claims 24, 25 and 26 - proposed amendment "second" haptic effect was not presented earlier that require further considerations and searches. Furthermore, the propose amended claims 1 and 24-26 are more than a merely a corrections of the typographical error(s) when the read of limitations of the claim can be changed. Thus, these proposed typographical corrections could not be entered as dicated.

/K. Wong/
Primary Examiner
Art Unit: 2688

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO	ISSUE DATE	PATENT NO	ATTORNEY DOCKET NO	CONFIRMATION NO
12/032,702	01/28/2014	8,638,301	IMMJ51 (51851/378580)	6699

24309 7590 01/08/2014

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)
(application filed on or after May 29, 2000)

The Patent Term Adjustment is 974 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (http://pair.uspto.gov).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(S) (Please see PAIR WEB site http://pair.uspto.gov for additional applicants).

David Birnbaum, Oakland, CA;
Chris Ullrich, Ventura, CA;
Peter Rubin, Berkeley, CA;
Phong David Ngo, San Francisco, CA;
Lao kopelow, San Francisco, CA;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	David Birnbaum et al.
U.S. Patent No.	:	8,638,301
Issue Date	:	January 28, 2014
Application No.	:	12/502,702
For	:	**Systems and Methods for Transmitting Haptic Messages**
Filed	:	July 14, 2009
Examiner	:	Kin C. Wong
Art Unit	:	2688
Confirmation No.	:	6699

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REQUEST FOR RECONSIDERATION OF PATENT TERM ADJUSTMENT DETERMINATION

Commissioner:

Applicant submits this petition pursuant to 37 C.F.R. § 1.705(b) seeking a correction of the Patent Term Adjustment ("PTA") set forth on the face of U.S. Patent No. 8,638,301 (the "'301 Patent"). In support of the petition, Applicant submits herewith the following:

(1) Payment of the fee set forth in 37 C.F.R. § 1.18(e); and

(2) The statements required under 37 C.F.R. § 1.705(b)(2)(i-iv).

I. Statements under 37 C.F.R. § 1.705(b)(2)(i)

The correct PTA for the '301 patent is believed to be 1087 days, based on a total of 1203 days of PTO delay and 116 days of Applicant delay as set forth below.

FITBIT 1002
Fitbit v. Immersion

II. Statements under 37 C.F.R. § 1.705(b)(2)(ii)

The following actions and time frames are grounds for adjustment of PTA under 37 C.F.R. § 1.703 based on examination delay by the PTO:

Basis	Start Date	End Date	PTO Delay
§ 1.703(a)(1)	July 14, 2009 - Application Filed	June 15, 2012 - Non-Final Rejection Mailed	640 days
§ 1.703(b)	July 14, 2012 - 3 years from application filing date	January 28, 2014 - Issuance of Patent	563 days
Total			1203 days

Thus, Applicant believes that the total PTO delay for the '301 Patent is 1203 days.

III. Statements under 37 C.F.R. § 1.705(b)(2)(iii)

The '301 patent is not subject to a Terminal Disclaimer.

IV. Statements under 37 C.F.R. § 1.705(b)(2)(iv)(A)

The following actions and time frames are grounds for adjustment of PTA under 37 C.F.R. § 1.704 due to Applicant's delay:

Basis	Start Date	End Date	Applicant Delay
§ 1.704(b)	June 15, 2012 - Non-Final Rejection Mailed	September 17, 2012 - Response to Non-Final Rejection Filed	0 days
§ 1.704(c)(8)	September 17, 2012 - Response to Non-Final Rejection Filed	October 22, 2012 - IDS Filed	35 days
§ 1.704(c)(8)	January 8, 2013 - Response to Final Action Filed	February 5, 2013 - IDS Filed	28 days
§ 1.704(c)(8)	August 5, 2013 - Response to Non-Final Rejection	August 16, 2013 - IDS Filed	11 days

FITBIT 1002
Fitbit v. Immersion

	Filed		
§ 1.704(c)(10)	November 20, 2013 - IDS Filed December 13, 2013 - Amendment under Rule 1.312	December 31, 2013 - Examiner mailed 1449 indicating references considered December 31, 2013 - Response to 312 Amendment	42 days
Total			116 days

With regard to the response to Office Action filed on September 17, 2012, this was a Monday. The response to Office Action was due on Saturday, September 15, 2012. However, if the last day of the three-month time period from the Office communication notifying the applicant of the rejection, objection, argument, or other request falls on a Saturday, Sunday, or Federal holiday with the District of Colombia, then action may be taken on the next succeeding secular or business day without loss of any patent term adjustment under 37 CFR § 1.704(b). *See* decision, *ArQule, Inc. v. Kappos*, 793 F.Supp.2d 214 (D.D.C. 2011). Applicant files this petition seeking to recoup its patent term for that period of time, which totals a period of 2 days.

With regard to the Information Disclosure Statement filed on November 20, 2013, and the Amendment under Rule 1.312 filed on December 13, 2013, the period determined under 37 CFR § 1.704(c)(10) for submission of an amendment under § 1.312 or other paper after a notice of allowance is the number of days beginning on the date the amendment under § 1.312 or other paper was filed and ends on the mailing date of the notice in response to the amendment under § 1.312 or such other paper. Further, the period of patent term adjustment is reduced only "to the extent that the periods are not overlapping." 37 CFR § 1.704(c).

Here, Applicant filed an Information Disclosure Statement on November 20, 2013 and later filed an Amendment under Rule 1.312 filed on December 13, 2013. The Examiner responded to both on December 31, 2013. Thus, the period for both overlaps and the total applicant delay should be calculated as November 20, 2013 until December 31, 2013, which is 42 days. Applicant files this petition seeking to correct the calculation of two independent periods of Applicant delay of 19 days and 51 days. This period should instead be a total of 42 days.

FITBIT 1002
Fitbit v. Immersion

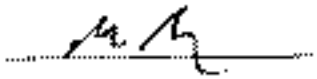
Thus, the total Applicant delay under § 1.704 is believed to be 116 days.

V. Conclusion

Applicant respectfully requests the PTA determined by the U.S. Patent and Trademark Office be reconsidered in light of the foregoing. Based on the total PTA credits and debits set forth above, the correct PTA for the present patent is 1087 days.

Respectfully submitted,

Date: 4/26/2014



Michael T. Morlock
Reg. No. 62,245

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FITBIT 1002
Fitbit v. Immersion

PTO/SB/22 (09-12)
Approved for use through 3/31/2013. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a)

Docket Number (Optional): IMM351(51851/378586)

Application Number: 12/502,702 | Filed: July 14, 2009

For: SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES

Art Unit: 2688 | Examiner: Kin C. Wong

This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application.

The requested extension and fee are as follows (check time period desired and enter the appropriate fee below):

		Fee	Small Entity Fee	Micro Entity Fee	
[x]	One month (37 CFR 1.17(a)(1))	$200	$100	$50	$ 200
[ ]	Two months (37 CFR 1.17(a)(2))	$600	$300	$150	$
[ ]	Three months (37 CFR 1.17(a)(3))	$1,400	$700	$350	$
[ ]	Four months (37 CFR 1.17(a)(4))	$2,200	$1,100	$550	$
[ ]	Five months (37 CFR 1.17(a)(5))	$3,000	$1,500	$750	$

[ ] Applicant asserts small entity status. See 37 CFR 1.27.

[ ] Applicant certifies micro entity status. See 37 CFR 1.29.
Form PTO/SB/15A or B or equivalent must either be enclosed or have been submitted previously.

[ ] A check in the amount of the fee is enclosed.

[x] Payment by credit card. Form PTO-2038 is attached.

[ ] The Director has already been authorized to charge fees in this application to a Deposit Account.

[x] The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to
Deposit Account Number: 23-1430

[ ] Payment made via EFS-Web.

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

I am the

[ ] applicant/inventor.

[ ] assignee of record of the entire interest. See 37 CFR 3.71. 37 CFR 3.73(b) statement is enclosed (Form PTO/SB/96).

[x] attorney or agent of record. Registration number: 62,245

[ ] attorney or agent acting under 37 CFR 1.34. Registration number

Signature | Date: 4/26/2014

Michael T. Morlock | 336-607-7300

Typed or printed name | Telephone Number

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications. Submit multiple forms if more than one signature is required, see below*.

[ ] * Total of forms are submitted.

This collection of information is required by 37 CFR 1.136(a). The information is required to obtain or retain a benefit by the public which is to be filed by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 6 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.
If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

FITBIT 1002
Fitbit v. Immersion

Electronic Patent Application Fee Transmittal

Application Number:	12502702
Filing Date:	14-Jul-2009
Title of Invention:	SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES
First Named Inventor/Applicant Name:	David Birnbaum
Filer:	Michael T. Morlock/Renee Prevette
Attorney Docket Number:	IMM351 (51851/378586)

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Application for patent term adjustment	1455	1	200	200
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				

FITBIT 1002
Fitbit v. Immersion

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Extension - 1 month with $0 paid	1251	1	200	200
Miscellaneous:				
		Total in USD ($)		**400**

FITBIT 1002
Fitbit v. Immersion

Electronic Acknowledgement Receipt

EFS ID:	18869757
Application Number:	12502702
International Application Number:	
Confirmation Number:	6699
Title of Invention:	SYSTEMS AND METHODS FOR TRANSMITTING HAPTIC MESSAGES
First Named Inventor/Applicant Name:	David Birnbaum
Customer Number:	34300
Filer:	Michael T. Morlock/Renee Prevelle
Filer Authorized By:	Michael T. Morlock
Attorney Docket Number:	IMM351 (51851/378586)
Receipt Date:	28-APR-2014
Filing Date:	14-JUL-2009
Time Stamp:	08:16:05
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$400
RAM confirmation Number	6959
Deposit Account	201430
Authorized User	KILPATRICK TOWNSEND & STOCKTON, LLP

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

Charge any Additional Fees required under 37 C.F.R. Section 1.20 (Post Issuance fees)

Charge any Additional Fees required under 37 C.F.R. Section 1.21 (Miscellaneous fees and charges)

FITBIT 1002
Fitbit v. Immersion

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	Transmittal.pdf	41547 a50ae4812110e9ae162378e6738e4b3fa80c7238	no	1
Warnings:					
Information:					
2	Patent Term Adjustment Petition	RequestReconsiderationPTADetermination.pdf	562161 8192d3da73887d7339ae33846dd2fbaa0b3e4726	no	4
Warnings:					
Information:					
3	Extension of Time	ExtensionOfTime.pdf	939446 c36e11b9b704eabef3abe5a650b17cf708303771	no	1
Warnings:					
Information:					
4	Fee Worksheet (SB06)	fee-info.pdf	32772 5ea468c0b40bc00524bf61f4443f50b9b984ed78	no	2
Warnings:					
Information:					
		Total Files Size (in bytes):	1575926		

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111

If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371

If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office

If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

FITBIT 1002
Fitbit v. Immersion

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	:	David Birnbaum et al.
U.S. Patent No.	:	8,638,301
Issue Date	:	January 28, 2014
Application No.	:	12/502,702
For	:	**Systems and Methods for Transmitting Haptic Messages**
Filed	:	July 14, 2009
Examiner	:	Kin C. Wong
Art Unit	:	2688
Confirmation No.	:	6699

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL

Commissioner:

Transmitted herewith are copies of the following documents for filing in the above-identified application:

1. Transmittal;
2. Request For Reconsideration Of Patent Term Adjustment Determination;
3. Petition for 1 Month Extension of Time; and
4. EFS-Web Payment in the amount of $400.00

The Commissioner is hereby authorized to charge any additional fees required by this action, or credit any overpayment, to Deposit Account Number 20-1430.

Respectfully submitted,

Date: 4/26/2014

By: _____
Michael T. Morlock (Reg. No. 62,245)

KILPATRICK TOWNSEND & STOCKTON LLP
1001 West Fourth Street
Winston-Salem, NC 27101-2400
(336) 607-7300

Certificate of Electronic Filing

I hereby certify that this correspondence is being electronically filed with the United States Patent Office via EFS-Web, on April 28, 2014.

_____
Renee S. Prevette

US2008 5572945 1

FITBIT 1002
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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO
12/502,702	07/14/2009	David Birnbaum	IMMR1.518US1/76586	6694

3430 1595 03/26/2015

PATENT DEPARTMENT (51851)
KILPATRICK TOWNSEND & STOCKTON LLP
1001 WEST FOURTH STREET
WINSTON-SALEM, NC 27101

EXAMINER
WONG, XIN C

ART UNIT	PAPER NUMBER
2638	

MAIL DATE	DELIVERY MODE
03/26/2015	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

Commissioner for Patents
United States Patent and Trademark Office
P.O. Box 1450
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In re Application of:	:	
Birnbaum et al.	:	
Application No. 12/502702	:	ON PETITION
Filing or 371(c) Date: 07/14/2009	:	AND
Patent No.: 8,638,301	:	NOTICE OF INTENT TO ISSUE
Issue Date: 01/28/2014	:	CERTIFICATE OF CORRECTION
Atty. Docket No.	:	
IMM351 (51851/378586)	:	

This is a redetermination of the patent term adjustment in response to the "REQUEST FOR RECONSIDERATION OF PATENT TERM ADJUSTMENT DETERMINATION", requesting that the patent term adjustment determination for the above-identified patent be changed from 974 days to 1087 days.

This redetermination of patent term adjustment is not the Director's decision on the applicant's request for reconsideration within the meaning of 35 U.S.C. 154(b)(4) that triggers a 180-day period for applicant disagreeing with the Office redetermination to commence a civil action in the District Court for the Eastern District of Virginia.

Relevant Procedural History

On January 28, 2014, the above-identified application matured into U.S. Patent No. 8,638,301. The patent issued with a PTA of 974 days. Patentee requests redetermination of the Patent Term Adjustment.

Discussion

Patents' arguments have been carefully considered. Upon review, the USPTO finds that patentee is entitled to **1087** days of PTA. Patentee and the Office are in agreement regarding the amount of of "B" delay under 35 U.S.C. § 154(b)(1)(B); the amount of overlapping days under 35 U.S.C. § 154(b)(2)(A) pursuant to the Federal Circuit's decision in Novartis AG v. Lee, 740 F.3d 593 (Fed. Cir. 2014); the amount of "A" delay under 35 U.S.C. § 154(b)(1)(A) and 37 CFR 1.702(a), and as to the amount of "applicant delay" under 35 U.S.C. § 154(b)(2)(C) and 1.704(b).

Overall PTA Calculation

Formula:

"A" delay + "B" delay + "C" delay - Overlap - applicant delay = X

FITBIT 1002
Fitbit v. Immersion

USPTO's Calculation:

640 + 563 + 0 – 0 – 116 = 1087

Patentee's Calculation

640 + 563 + 0 – 0 – 116 = 1087

Conclusion

Patentee is entitled to PTA of one thousand eighty-seven (1087) days. Using the formula "A" delay + "B" delay + "C" delay - overlap - applicant delay = X, the amount of PTA is calculated as following: 640 + 563 + 0 – 0 – 116 = 1087 days.

Patentee has two (2) months from the date of the Office's redetermination of patent term adjustment to request reconsideration of the patent term adjustment if patentee continues to disagree with this determination (no petition fee). This two month period is extendible under 37 CFR 1.136(a). The new/renewed request for reconsideration may be filed without any additional fee. However, a patentee who responds more than two months after the mail date of the redetermination is required to pay the extension of time fee. After the period of time to respond has expired, the Office will *sua sponte* issue a certificate of correction adjusting the PTA to **one thousand eighty-seven (1087) days.**

Telephone inquiries specific to this matter should be directed to the undersigned at (571) 272-3232.

/DW/

Derek Woods
Attorney Advisor
Office of Petitions

Enclosure: Draft Certificate of Correction

FITBIT 1002
Fitbit v. Immersion

DRAFT

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT : 8,638,301

DATED : January 28, 2014

INVENTOR(S) : Birnbaum et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the cover page.

[*] Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 USC 154(b) by 974 days.

Delete the phrase "by 974 days" and insert – by 1087 days--

FITBIT 1002
Fitbit v. Immersion

Office of Petitions: Decision Count Sheet

Mailing Month

Application No. **12502702**

12502702

For US serial numbers: enter number only, no slashes or commas. Ex: 10123456
For PCT: enter "51+single digit of year of filing+last 5 numbers", Ex. for PCT/US05/12345, enter 51512345

Deciding Official: WOODS, DEREK

Count (1) - Palm Credit 12/502,702

Decision: GRANT — FINANCE WORK NEEDED ☐ Select Check Box for YES

GRANT

Decision Type: 547 - PTA Recalculation - Novartis Decision (2014)

547

Notes

Count (2)

Decision: n/a — FINANCE WORK NEEDED ☐ Select Check Box for YES

Decision Type: NONE

Notes:

Count (3)

Decision: n/a — FINANCE WORK NEEDED ☐ Select Check Box for YES

Decision Type: NONE

Notes:

Initials of Approving Official (if required)

If more than 3 decisions, attach 2nd count sheet & mark this box ☐

Printed on: 3/24/2015

Office of Petitions Internal Document - Ver 5.0

FITBIT 1002
Fitbit v. Immersion

Office of Petitions: Routing Sheet



Application No. 12502702

This application is being forwarded to your office for further processing. A decision has been rendered on a petition filed in this application, as indicated below. For details of this decision, please see the document PET.OP.DEC filed on the same date as this document.

[X] **GRANTED**

[ ] **DISMISSED**

[ ] **DENIED**

FITBIT 1002
Fitbit v. Immersion

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 8,638,301 B2
APPLICATION NO : 12/502702
DATED : January 28, 2014
INVENTOR(S) : Birnbaum et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the Title Page:

The first or sole Notice should read —

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 974 days.

Signed and Sealed this
Thirtieth Day of May, 2017

Michelle K. Lee

Michelle K. Lee
Director of the United States Patent and Trademark Office

FITBIT 1002
Fitbit v. Immersion