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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/428,670	07/05/2006	Luben Hristov	3050.015US1

76287
SCHWEGMAN, LUNDBERG & WOESSNER / ATMEL
P.O. BOX 2938
MINNEAPOLIS, MN 55402

CONFIRMATION NO. 4355
POWER OF ATTORNEY NOTICE



Date Mailed: 04/15/2011

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/07/2011.

- The Power of Attorney to you in this application has been revoked by the assignee who has intervened as provided by 37 CFR 3.71. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/hchristian/

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



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/428,670	07/05/2006	Luben Hristov	3050.015US1

12323
Baker Botts L.L.P.
2001 Ross Avenue, 6th Floor
Dallas, TX 75201

CONFIRMATION NO. 4355
POA ACCEPTANCE LETTER



Date Mailed: 04/15/2011

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/07/2011.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/hchristian/

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

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:

12323

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:

12323

OR

<input type="checkbox"/> Firm or Individual Name			
Address			
City	State	Zip	
Country			
Telephone	Email		

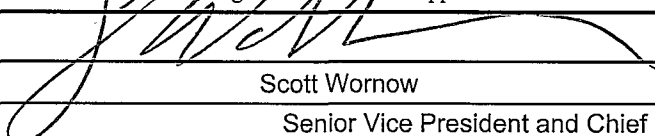
Assignee Name and Address:

Atmel Corporation
2325 Orchard Parkway
San Jose, CA 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	1/15/11
Name	Scott Wornow	Telephone	408-436-4229
Title	Senior Vice President and Chief Legal Officer		

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.

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

STATEMENT UNDER 37 CFR 3.73(b)Applicant/Patent Owner: Luben Hristov080900.0466Application No./Patent No.: 11/428,670 Patent No. 7,821,502 Filed/Issue Date: July 5, 2006/October 26, 2010Titled: Two-Dimensional Position Sensor

Atmel Corporation, a Delaware 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 _____, Frame _____, 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: Inventors To: ORG Limited

The document was recorded in the United States Patent and Trademark Office at
Reel 024009, Frame 0990, or for which a copy thereof is attached.

2. From: ORG Limited To: Atmel Corporation

The document was recorded in the United States Patent and Trademark Office at
Reel 024029, Frame 0122, 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.

/Travis W. Thomas/ REG. NO. 48667

April 7, 2011

Signature

Date

Travis W. Thomas

Attorney of Record

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.

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.

Electronic Acknowledgement Receipt

EFS ID:	9830146
Application Number:	11428670
International Application Number:	
Confirmation Number:	4355
Title of Invention:	TWO-DIMENSIONAL POSITION SENSOR
First Named Inventor/Applicant Name:	Luben Hristov
Customer Number:	76287
Filer:	Michelle Lecointe/Tracy Perez
Filer Authorized By:	Michelle Lecointe
Attorney Docket Number:	3050.015US1
Receipt Date:	07-APR-2011
Filing Date:	05-JUL-2006
Time Stamp:	13:36:43
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	ATMELPOA.pdf	65759 556bd811f23aeada75670a5ff14ec42da47e5cae	no	1

Warnings:

Information:

2	Assignee showing of ownership per 37 CFR 3.73(b).	0466Statement.pdf	994395 0b85545ae1635e19da5f72c56bf89793cf3b8229	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			1060154		
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>					

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.

TRANSMITTAL FORM (to be used for all correspondence after initial filing)	Application Number	11/428,670
	Filing Date	July 5, 2006
	First Named Inventor	Luben Hristov
	Art Unit	2629
	Examiner Name	Kumar, Srilakshmi
Total Number of Pages in This Submission	Attorney Docket Number	085111-0179 (P023423QRG)

ENCLOSURES (Check all that apply)		
<input type="checkbox"/> Fee Transmittal Form <input type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment/Reply <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Reply to Missing Parts/ Incomplete Application <input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition <input type="checkbox"/> Petition to Convert to a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Request for Refund <input type="checkbox"/> CD, Number of CD(s) _____ <input type="checkbox"/> Landscape Table on CD	<input type="checkbox"/> After Allowance Communication to TC <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Other Enclosure(s) (please identify below): Statement Under 37 CFR 3.73(b)
Remarks This statement was previously submitted by previous counsel. Kindly, issue a Notice to Accept (or Deny) the Revocation Prior Power of Attorney/ New Power of Attorney submitted September 24, 2010.		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT			
Firm Name	McDermott Will & Emery, LLP		
Signature	/Leigh J. Martinson/		
Printed name	Leigh J. Martinson		
Date	December 30, 2010	Reg. No.	50749

CERTIFICATE OF TRANSMISSION/MAILING			
I hereby certify that this correspondence is being facsimile 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 on the date shown below:			
Signature			
Typed or printed name		Date	

This collection of information is required by 37 CFR 1.5. 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 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.

Privacy Act Statement

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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.

Electronic Acknowledgement Receipt

EFS ID:	9144813
Application Number:	11428670
International Application Number:	
Confirmation Number:	4355
Title of Invention:	TWO-DIMENSIONAL POSITION SENSOR
First Named Inventor/Applicant Name:	Luben Hristov
Customer Number:	76287
Filer:	Leigh John Martinson/Kelly Ciarmataro
Filer Authorized By:	Leigh John Martinson
Attorney Docket Number:	3050.015US1
Receipt Date:	30-DEC-2010
Filing Date:	05-JUL-2006
Time Stamp:	18:34:34
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Assignee showing of ownership per 37 CFR 3.73(b).	Statement.pdf	73736 cd995df15c84057b6dcbf1e98ebc5a0f6cea b4f7	no	2

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:

2	Transmittal Letter	Trans.pdf	262985	no	2
			1de2c4b1a89e56fe20825bc77f9e2b6f92448b3d		

Warnings:

Information:

Total Files Size (in bytes):			336721
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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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

REVOCATION AND POWER OF ATTORNEY
CERTIFICATE UNDER 37 CFR § 3.73(b)
&
CHANGE OF CORRESPONDENCE ADDRESS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In accordance with 37 C.F.R. Section 1.36, M.P.E.P. Section 402.05 and 402.07, please revoke any existing Powers of Attorney, if any, for the below listed applications, and appoint the following attorneys and/or patent agents to prosecute these applications and to transact all business in the Patent and Trademark Office in connection therewith:

Customer Number: 76287

<u>Appl. Serial No.</u>	<u>Filing Date</u>	<u>Attorney</u> <u>Docket No.</u>	<u>Applicant</u>	<u>Reel / Frame</u>	<u>Recordation</u> <u>Date(s)</u>
11/428,670	07/05/2006	3050.015US1	Hristov	024009 / 0990 024029 / 0122	03/01/2010 03/04/2010
11/752,615	05/23/2007	3050.018US1	Philipp et al.	024009 / 0638 024029 / 0122	03/01/2010 03/04/2010
12/114,709	05/02/2008	3050.019US1	Philipp et al.	023959 / 0729 023980 / 0113 024017 / 0870	02/18/2010 02/23/2010 03/02/2010
11/737,934	04/20/2007	3050.021US1	Philipp et al.	024009 / 0627 024029 / 0122	03/01/2010 03/04/2010
12/029,497	02/12/2008	3050.032US1	Philipp et al.	023959 / 0516 024017 / 0870	02/18/2010 03/02/2010

CERTIFICATE UNDER 37 CFR § 3.73(b)

Atmel Corporation hereby certifies that it is the assignee of the entire right, title and interest in the patent applications identified above by virtue of assignments recorded for the patent applications identified above. To the best of my knowledge and belief, titles are in Atmel Corporation, the assignee.

Pursuant to 37 C.F.R. § 3.73(b) I hereby declare that I am empowered to sign this certificate on behalf of Atmel Corporation, the assignee.

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.

Please direct all correspondence in the above cases to:

Schwegman, Lundberg & Woessner, P.A.
Customer No. 76287

Date 3/10/10

By 
Name: Patrick Reutens
Title: Chief Legal Officer



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.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/428,670	10/26/2010	7821502	3050.015US1	4355

76287 7590 10/06/2010
SCHWEGMAN, LUNDBERG & WOESSNER / ATMEL
P.O. BOX 2938
MINNEAPOLIS, MN 55402

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 912 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):

Luben Hristov, Southampton, UNITED KINGDOM;

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.

**POWER OF ATTORNEY
OR
REVOCATION OF POWER OF ATTORNEY
WITH A NEW POWER OF ATTORNEY
AND
CHANGE OF CORRESPONDENCE ADDRESS**

Application Number	11/428,670
Filing Date	July 5, 2006
First Named Inventor	Luben Hristov
Title	Two-Dimensional Position Sensor
Art Unit	2629
Examiner Name	Kumar, Srilakshmi
Attorney Docket Number	P023423QRG

I hereby revoke all previous powers of attorney given in the above-identified application.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

20277

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

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I am the:

☐ Applicant/Inventor.

OR

☒ Assignee of record of the entire interest. See 37 CFR 3.71.Statement under 37 CFR 3.73(b) (Form PTO/SB/96) submitted herewith or filed on March 10, 2010.

SIGNATURE of Applicant or Assignee of Record

Signature

Name

Leo Merken

Date

Telephone

(408) 441-0311

Title and Company

Director of Intellectual Property, Atmel Corporation

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 1 forms are submitted.

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 Acknowledgement Receipt

EFS ID:	8492589
Application Number:	11428670
International Application Number:	
Confirmation Number:	4355
Title of Invention:	TWO-DIMENSIONAL POSITION SENSOR
First Named Inventor/Applicant Name:	Luben Hristov
Customer Number:	76287
Filer:	Leigh John Martinson/Kelly Ciarmataro
Filer Authorized By:	Leigh John Martinson
Attorney Docket Number:	3050.015US1
Receipt Date:	24-SEP-2010
Filing Date:	05-JUL-2006
Time Stamp:	14:04:57
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	RevPOA_NewPOA.pdf	61278 a336b7c4041000f9d061876f151e269bf65c4cb0	no	1

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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.

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Bib Data Sheet

CONFIRMATION NO. 4355

SERIAL NUMBER 11/428,670	FILING OR 371(c) DATE 07/05/2006 RULE	CLASS 345	GROUP ART UNIT 2629	ATTORNEY DOCKET NO. 3050.015US1	
APPLICANTS Luben Hristov, Southampton, UNITED KINGDOM; ** CONTINUING DATA ***** This appln claims benefit of 60/697,613 07/08/2005 ** FOREIGN APPLICATIONS ***** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 07/18/2006					
Foreign Priority claimed <input type="checkbox"/> yes <input type="checkbox"/> no 35 USC 119 (a-d) conditions <input type="checkbox"/> yes <input type="checkbox"/> no <input type="checkbox"/> Met after met Allowance Verified and Acknowledged		STATE OR COUNTRY UNITED KINGDOM	SHEETS DRAWING 8	TOTAL CLAIMS 27	INDEPENDENT CLAIMS 3
ADDRESS 76287					
TITLE TWO-DIMENSIONAL POSITION SENSOR					
FILING FEE RECEIVED 900	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit		

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Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

76287

7590

06/18/2010

SCHWEGMAN, LUNDBERG & WOESSNER / ATMEL
P.O. BOX 2938
MINNEAPOLIS, MN 55402

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.

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Frederik Struve

(Depositor's name)

/F8/

(Signature)

September 20, 2010

(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

11/428,670

07/05/2006

Luben Hristov

3050.015US1

4355

TITLE OF INVENTION: TWO-DIMENSIONAL POSITION SENSOR

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional

YES

~~\$755~~ \$1510

\$300

\$0

~~\$1055~~
\$1810

09/20/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
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KUMAR, SRILAKSHMI K

2629

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 Schwegman, Lundberg

2 & Woessner, P.A.

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

Atmel Corporation

(B) RESIDENCE: (CITY AND STATE OR COUNTRY)

San Jose, California

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)

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5. Change in Entity Status (from status indicated above)

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.☒ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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

Paul D. Kegley
Paul G. Kegley

Date September 20, 2010

Typed or printed name

Registration No. 60,336

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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S/N 11/428,670

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Luben Hristov

Examiner: Srilakshimi Kumar

Serial No.: 11/428,670

Group Art Unit: 2629

Filed: July 5, 2006

Docket No.: 3050.015US1

Customer No.: 76287

Confirmation No.: 4355

Title: Two-Dimensional Position Sensor

COMMUNICATION RE: FEE ADDRESS

Mail Stop Issue Fee
Commissioner for Patents
P.O.Box 1450
Alexandria, VA 22313-1450

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Customer Number 76287

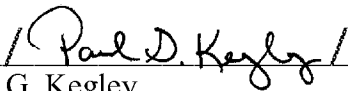
which is associated with Atmel Corporation.

Please direct any inquiries to the undersigned attorney at (612) 371-2138.

Respectfully submitted,

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 371-2138

Date September 20, 2010

By 
Paul G. Kegley
Reg. No. 60,336

PGK:CMG:fws

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Frederik Struve
Name


Signature

Electronic Patent Application Fee Transmittal

Application Number:	11428670			
Filing Date:	05-Jul-2006			
Title of Invention:	TWO-DIMENSIONAL POSITION SENSOR			
First Named Inventor/Applicant Name:	Luben Hristov			
Filer:	Viet V Tong/Frederik Struve			
Attorney Docket Number:	3050.015US1			
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:				
Publ. Fee- early, voluntary, or normal	1504	1	300	300
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl issue fee	1501	1	1510	1510

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1810

Electronic Acknowledgement Receipt

EFS ID:	8452830
Application Number:	11428670
International Application Number:	
Confirmation Number:	4355
Title of Invention:	TWO-DIMENSIONAL POSITION SENSOR
First Named Inventor/Applicant Name:	Luben Hristov
Customer Number:	76287
Filer:	Viet V Tong/Frederik Struve
Filer Authorized By:	Viet V Tong
Attorney Docket Number:	3050.015US1
Receipt Date:	20-SEP-2010
Filing Date:	05-JUL-2006
Time Stamp:	14:49:37
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 1810
RAM confirmation Number	1063
Deposit Account	190743
Authorized User	

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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		3050015US1IssueFee.pdf	260571 e5e97ffad31e515887fbd1b78e02feca9928d6a	yes	3

Multipart Description/PDF files in .zip description

Document Description	Start	End
Miscellaneous Incoming Letter	1	1
Issue Fee Payment (PTO-85B)	2	2
Miscellaneous Incoming Letter	3	3

Warnings:

Information:

2	Fee Worksheet (PTO-875)	fee-info.pdf	31848 01b4287d59e844123a3b4c558de333b7ac82a7b0	no	2
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Warnings:

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Total Files Size (in bytes):	292419
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New International Application Filed with the USPTO as a Receiving Office

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Luben Hristov
Title: Two-Dimensional Position Sensor

Docket No.:	3050.015US1	Serial No.:	11/428,670
Filed:	July 5, 2006	Due Date:	September 18, 2010
Examiner:	Srilakshimi Kumar	Group Art Unit:	2629
Customer No.:	76287	Confirmation No.:	4355

Notice of Allowance Date: June 18, 2010

Mail Stop Issue Fee

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

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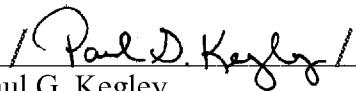
- ☒ Authorization to charge Deposit 19-0743 in the amount of \$1510.00 to cover the Large Entity Issue Fee Payment.
- ☒ Authorization to charge Deposit 19-0743 in the amount of \$300.00 to cover the Publication Fee Payment.
- ☒ Issue Fee Transmittal (Form PTOL-85).
- ☒ Communication Re: Fee Address (1 page).

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SCHWEGMAN, LUNDBERG & WOESSNER, P.A.

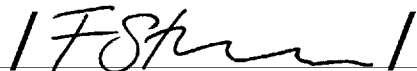
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By 
Paul G. Kegley
Reg. No. 60,336

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Frederik Struve
Name


Signature

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number		11/428,670
Filing Date		2006-07-05
First Named Inventor	Hristov	
Art Unit		
Examiner Name		
Attorney Docket Number	P2E	

U.S. PATENTS

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear
/SKK/	1	4954823	A1	1990-09-04	Binstead	
/SKK/	2	5463388	A1	1995-10-31	Boie et al.	Fig. 1 & associated text
/SKK/	3	5,730,145 5430165	A1	1998-03-24	Philipp	
/SKK/	4	5844506	A1	1998-12-01	Binstead	Figs. 4 & 6
/SKK/	5	6466036	B1	2002-10-15	Philipp	

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76287 7590 06/18/2010

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MINNEAPOLIS, MN 55402

EXAMINER

KUMAR, SRILAKSHMI K

ART UNIT

PAPER NUMBER

2629

DATE MAILED: 06/18/2010

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

11/428,670

07/05/2006

Luben Hristov

3050.015US1

4355

TITLE OF INVENTION: TWO-DIMENSIONAL POSITION SENSOR

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$755	\$300	\$0	\$1055	09/20/2010

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.

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I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

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B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

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CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

76287 7590 06/18/2010

SCHWEGMAN, LUNDBERG & WOESSNER / ATMEL
P.O. BOX 2938
MINNEAPOLIS, MN 55402

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.
-----------------	-------------	----------------------	---------------------	------------------

11/428,670 07/05/2006 Luben Hristov 3050.015US1 4355

TITLE OF INVENTION: TWO-DIMENSIONAL POSITION SENSOR

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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nonprovisional YES \$755 \$300 \$0 \$1055 09/20/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
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KUMAR, SRILAKSHMI K 2629 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, 1 _____
- (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. 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 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 _____ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

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.

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www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/428,670	07/05/2006	Luben Hristov	3050.015US1	4355
76287	7590	06/18/2010	EXAMINER	
SCHWEGMAN, LUNDBERG & WOESSNER / ATMEL P.O. BOX 2938 MINNEAPOLIS, MN 55402			KUMAR, SRILAKSHMI K	
			ART UNIT	PAPER NUMBER
			2629	
DATE MAILED: 06/18/2010				

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 597 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 597 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.

Notice of Allowability	Application No.	Applicant(s)	
	11/428,670	HRISTOV, LUBEN	
	Examiner	Art Unit	
	SRILAKSHMI K. KUMAR	2629	

-- 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 5/19/2010.
2. ☒ The allowed claim(s) is/are 1-4, 7-15, 17-27, renumbered 1-17.
3. ☐ 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 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.


4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ 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. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 7. <input type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

/Srilakshmi K Kumar/
Primary Examiner
Art Unit: 2629

<i>Index of Claims</i> 	Application/Control No. 11428670	Applicant(s)/Patent Under Reexamination HRISTOV, LUBEN
	Examiner SRILAKSHMI K KUMAR	Art Unit 2629

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

<input checked="" type="checkbox"/> Claims renumbered in the same order as presented by applicant					<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47	
CLAIM		DATE								
Final	Original	06/19/2009	02/15/2010	06/07/2010						
	1	✓	✓	=						
	2	✓	✓	=						
	3	✓	✓	=						
	4	✓	✓	=						
	5	-	-	-						
	6	-	-	-						
	7	✓	✓	=						
	8	✓	✓	=						
	9	✓	✓	=						
	10	✓	✓	=						
	11	✓	✓	=						
	12	✓	✓	=						
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	14	✓	✓	=						
	15	✓	✓	=						
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	24	✓	✓	=						
	25	=	=	=						
	26	=	=	=						
	27	=	=	=						

Search Notes 	Application/Control No. 11428670	Applicant(s)/Patent Under Reexamination HRISTOV, LUBEN
	Examiner SRILAKSHMI K KUMAR	Art Unit 2629

SEARCHED			
Class	Subclass	Date	Examiner
345	156, 173-178	6/5/2010	skk
178	18.01, 18.06	6/5/2010	skk

SEARCH NOTES		
Search Notes	Date	Examiner
East Search	6/17/2009	skk
East search and IDS	2/11/2010	skk
east search	6/5/2010	skk

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
	see attached interference search	6/5/2010	skk

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EAST Search History**EAST Search History (Interference)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L4	1	(capacitive and position and sens \$3 and determin \$3 and object and substrate and arrangement and conductive and electrode and column and row and coupled and electrically and continuous and spine).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2010/06/07 01:27
L5	1	(position and sens \$3 and substrate and surface and arrangement and electrode and array and column and row and capacitive and area and oppos\$3 and wrap and around and connection).clm.	US-PGPUB; USPAT; UPAD	OR	ON	2010/06/07 01:30

6/ 7/ 10 1:31:35 AM
**C:\ Documents and Settings\ KSrilakshmi\ My Documents\ EAST\ Workspaces
 \ june2010.wsp**



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UNITED STATES DEPARTMENT OF COMMERCE
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BIB DATA SHEET

CONFIRMATION NO. 4355

SERIAL NUMBER 11/428,670	FILING or 371(c) DATE 07/05/2006 RULE	CLASS 345	GROUP ART UNIT 2629	ATTORNEY DOCKET NO. 3050.015US1		
APPLICANTS Luben Hristov, Southampton, UNITED KINGDOM; ** CONTINUING DATA ***** This appln claims benefit of 60/697,613 07/08/2005 ** FOREIGN APPLICATIONS ***** ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** ** SMALL ENTITY ** 07/18/2006						
Foreign Priority claimed <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 35 USC 119(a-d) conditions met <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Verified and /SRILAKSHMI K KUMAR/ Acknowledged Examiner's Signature		<input type="checkbox"/> Met after Allowance Initials	STATE OR COUNTRY UNITED KINGDOM	SHEETS DRAWINGS 8	TOTAL CLAIMS 27	INDEPENDENT CLAIMS 3
ADDRESS SCHWEGMAN, LUNDBERG & WOESSNER / ATMEL P.O. BOX 2938 MINNEAPOLIS, MN 55402 UNITED STATES						
TITLE Two-Dimensional Position Sensor						
FILING FEE RECEIVED 600	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees (Filing) <input type="checkbox"/> 1.17 Fees (Processing Ext. of time) <input type="checkbox"/> 1.18 Fees (Issue) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit			

<p style="text-align: center;">REQUEST FOR CONTINUED EXAMINATION (RCE) TRANSMITTAL</p> <p>Subsection (b) of 35 U.S.C. § 132, effective on May 29, 2000, provides for continued examination of an utility or plant application filed on or after June 8, 1995. See The American Inventors Protection Act of 1999 (AIPA).</p>	<i>Application Number</i>	11/428,670
	<i>Filing Date</i>	July 5, 2006
	<i>First Named Inventor</i>	Luben Hristov
	<i>Confirmation Number</i>	4355
	<i>Group Art Unit</i>	2629
	<i>Examiner Name</i>	Srilakshmi Kumar
	<i>Attorney Docket Number</i>	3050.015US1
	<i>Customer No.</i>	76287

This is a Request for Continued Examination (RCE) under 37 C.F.R § 1.114 of the above-identified application
entitled
Two-Dimensional Position Sensor

1. Submission required under 37 C.F.R. § 1.114:

☒ Amendment Under 37 C.F.R § 1.116 (7 pages) is enclosed.

2. Fees

☒ Authorization to charge deposit account 19-0743 in the amount of \$810.00 to pay the RCE filing fee required
under 37 C.F.R. § 1.17(e).

☒ **The Commissioner is hereby authorized to charge any additional fees or credit overpayment to
Deposit Account No. 19-0743.**

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.

By: _____

Paul G. Kegley
Paul G. Kegley
Reg. No. 60,336

CERTIFICATE UNDER 37 C.F.R 1.8: The undersigned hereby certifies that this correspondence is being filed using the
USPTO's electronic filing system EFS-Web, and is addressed to: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450,
Alexandria, VA 22313-1450 on this 19 day of May, 2010.

Nicole Jack

Name

Signature

EXPEDITED PROCEDURE-EXAMINING GROUP 2629

S/N 11/428,670

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Luben Hristov

Examiner: Srilakshimi Kumar

Serial No.: 11/428,670

Group Art Unit: 2629

Filed: July 5, 2006

Docket No.: 3050.015US1

Customer No.: 76287

Confirmation No.: 4355

Title: Two-Dimensional Position Sensor

AMENDMENT AND RESPONSE UNDER 37 C.F.R. 1.116

Mail Stop RCE

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

In response to the Final Office Action dated February 19, 2010 and the Advisory Action dated May 14, 2010, please consider the amended claims below and the remarks that follow.

REMARKS

This responds to the Final Office Action dated February 19, 2010 and the Advisory Action dated May 14, 2010.

Claim 20 is amended, no claims are canceled, and no claims are added. Thus, claims 1-4, 7-15, and 17-27 remain pending in this application.

The Rejection of Claims Under § 102

Claims 20-24 are rejected under 35 U.S.C. § 102(b) over Mabusth (U.S. Patent No. 4,550,221). Claim 20 is amended to clarify the recited subject matter.

Amended claim 20 recites, in part, “connecting a first broken segment at a first end of one of the at least one row or column to a second broken segment at a second end of the one of the at least one row or column using a wrap-around connection lying outside of the active sensing region”. The amendment does not add new matter and is supported in the specification at least at paragraph [0009] and FIG. 2 of the application as-filed. FIG. 4 of Mabusth shows electrode plates forming column electrodes. “The plates of each column X1 through X12 are connected together by means of plated-through holes 44 and conductors 46 which are located on the bottom surface of substrate 28 (as shown in FIG. 4).” (Mabusth; col. 4, lines 50-54). Thus, Mabusth shows plates at one end of several columns coupled together using conductors within the sensing area of the sensor in contrast to the elements of claim 20 quoted above. Therefore, Mabusth does not show or suggest all the elements of claim 20. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection and allowance of claim 20.

Claims 21-24 depend either directly or indirectly on independent claim 20 and are believed to be in condition for allowance at least for the reasons provided above with respect to claim 20.

Allowable Subject Matter

The Advisory Action indicates the rejection of claims 1-4, 7-15, and 17-19 of the Final Office Action are withdrawn, therefore, claims 1-4, 7-15, 17-19 and 25-27 are allowed. Applicant gratefully acknowledges the allowed subject matter.

CONCLUSION

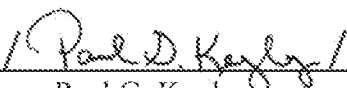
Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (612) 371-2138 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402--0938
(612) 371-2138

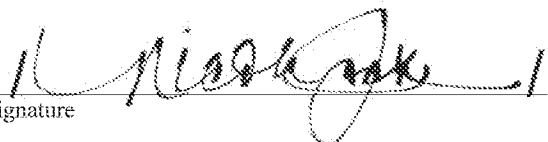
Date May 19, 2010

By 
Paul G. Kegley
Reg. No. 60,336

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 19th day of May, 2010.

Nicole Jack

Name


Signature

Electronic Patent Application Fee Transmittal

Application Number:	11428670			
Filing Date:	05-Jul-2006			
Title of Invention:	Two-Dimensional Position Sensor			
First Named Inventor/Applicant Name:	Luben Hristov			
Filer:	David W. Black/Nicole Jack			
Attorney Docket Number:	3050.015US1			
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:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Request for continued examination	1801	1	810	810
Total in USD (\$)				810

Electronic Acknowledgement Receipt

EFS ID:	7647193
Application Number:	11428670
International Application Number:	
Confirmation Number:	4355
Title of Invention:	Two-Dimensional Position Sensor
First Named Inventor/Applicant Name:	Luben Hristov
Customer Number:	76287
Filer:	David W. Black/Nicole Jack
Filer Authorized By:	David W. Black
Attorney Docket Number:	3050.015US1
Receipt Date:	19-MAY-2010
Filing Date:	05-JUL-2006
Time Stamp:	17:55:20
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$810
RAM confirmation Number	4407
Deposit Account	190743
Authorized User	

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)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Petitioner Samsung and HP Ex.-1008, 0042

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

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)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		3050015US1RCE.pdf	74104	yes	8
			104ece68854ac164dc1e04fc03c1f56ebdda7fe1		

Multipart Description/PDF files in .zip description

	Document Description	Start	End
	Request for Continued Examination (RCE)	1	1
	Amendment Submitted/Entered with Filing of CPA/RCE	2	2
	Claims	3	6
	Applicant Arguments/Remarks Made in an Amendment	7	8

Warnings:

Information:

2	Fee Worksheet (PTO-875)	fee-info.pdf	30304	no	2
			a7a433b98bca22291c9fa349f677ae45bdfd31bf		

Warnings:

Information:

Total Files Size (in bytes):			104408
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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.

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 11/428,670		Filing Date 07/05/2006		<input type="checkbox"/> To be Mailed	
APPLICATION AS FILED – PART I										
(Column 1)			(Column 2)		SMALL ENTITY <input checked="" type="checkbox"/> OR			OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A			N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A			N/A	
<input type="checkbox"/> EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$	=		X \$	=		X \$	=
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$	=		X \$	=		X \$	=
<input type="checkbox"/> 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).									
<input type="checkbox"/> MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.										
APPLICATION AS AMENDED – PART II										
(Column 1)			(Column 2)		SMALL ENTITY OR			OTHER THAN SMALL ENTITY		
AMENDMENT	05/19/2010	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
Total (37 CFR 1.16(i))	*	24	Minus	** 27	=	0		X \$	=	
Independent (37 CFR 1.16(h))	*	3	Minus	*** 3	=	0		X \$	=	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE	0	OR	TOTAL ADD'L FEE		
(Column 1)			(Column 2)		SMALL ENTITY OR			OTHER THAN SMALL ENTITY		
AMENDMENT	Total (37 CFR 1.16(i))	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
Total (37 CFR 1.16(i))	*	Minus	**	=	X \$	=		X \$	=	
Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$	=		X \$	=	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE		OR	TOTAL ADD'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:
/DAVINA G. BUTLER/

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.**

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 11/428,670		Filing Date 07/05/2006		<input type="checkbox"/> To be Mailed	
APPLICATION AS FILED – PART I										
(Column 1)			(Column 2)		SMALL ENTITY <input checked="" type="checkbox"/> OR			OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> 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 \$	=		X \$	=			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$	=		X \$	=			
<input type="checkbox"/> 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).									
<input type="checkbox"/> 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)		SMALL ENTITY OR			OTHER THAN SMALL ENTITY		
AMENDMENT	05/19/2010	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 24	Minus	** 27	=	0		X \$	=	
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	=	0		X \$	=	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE	0		TOTAL ADD'L FEE		
(Column 1)			(Column 2)		SMALL ENTITY OR			OTHER THAN SMALL ENTITY		
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=			X \$	=	
	Independent (37 CFR 1.16(h))	*	Minus	***	=			X \$	=	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE			TOTAL ADD'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:
/DAVINA G. BUTLER/

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.

IN THE CLAIMS

Please amend the claims as follows:

1. (Previously Presented) A position sensor comprising :
a substrate having a surface with an arrangement of electrodes mounted thereon,
wherein the electrodes define an array of sensing cells arranged in columns and rows to form a capacitive sensing area of the sensor, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together, and
wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by respective row wrap-around connections made outside of the sensing area.
2. (Original) The position sensor of 1, wherein the row wrap-around connections comprise a conductive trace deposited on the substrate.
3. (Original) The position sensor of 1, wherein the row wrap-around connections comprise free wires connected to the respective row sensing electrodes.
4. (Original) The position sensor of 1, wherein the column sensing electrodes of a column of sensing cells at an edge of the sensing area are electrically coupled to one another by column wrap-around connections made outside of the sensing area.
5. (Canceled)
6. (Canceled)

7. (Original) The position sensor of 1, further comprising a plurality of capacitance measurement channels connected to respective ones of the rows and columns of sensing electrodes, wherein each measurement channel is operable to generate a signal indicative of a capacitance between its associated column or row of sensing electrodes and a system ground.
8. (Original) The position sensor of 7, further comprising a processor operable to determine the position of the object in the sensing area along a first direction by comparing signals from the different columns with each other and along a second direction by comparing signals from the different rows with each other.
9. (Original) The position sensor of 7, wherein the capacitance measurement channels comprise a charge transfer circuit.
10. (Original) The position sensor of 7, wherein the capacitance measurement channels are configured to drive a plurality of sensing electrodes substantially synchronously in phase with one another.
11. (Original) The position sensor of 1, wherein the sensing cells are arranged into three columns.
12. (Original) The position sensor of 1, wherein the sensing cells are arranged into four columns.
13. (Original) The position sensor of 1, wherein the column sensing electrode and the row sensing electrode in each sensing cell are interleaved with one another.
14. (Original) The position sensor of 1, wherein the substrate is formed from a transparent material.

15. (Original) The position sensor of 1, wherein the electrodes are formed from a transparent electrically conductive material.

16. (Canceled)

17. (Original) The position sensor of 15, further comprising a graphical display wherein the electrodes in the sensing area are disposed over the graphical display to provide a touch screen.

18. (Original) The position sensor of 1, further comprising an insulating panel wherein the electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad.

19. (Original) A device comprising the position sensor of 1.

20. (Currently Amended) A method comprising:

depositing a single layer of patterned conductive material on a substrate to form an active sensing region of a capacitive sensor, the pattern comprising rows and columns of electrodes connected to individual ones of capacitive sensing channels, and wherein at least one row or column is broken into a plurality of segments within the active sensing region;

connecting a first broken segment at a first end of one of the at least one row or column to a second broken segment at a second end of the one of the at least one row or column using a wrap-around connection lying outside of the active sensing region, the plurality of segments including the first broken segment and the second broken segment;

~~the broken segments together with an electrical conductor, wherein the conductor is made to lie outside of the active sensing region;~~

connecting the rows and columns to individual sensing channels of a multi-channel capacitive sensor circuit having multiple outputs representing amplitudes of capacitance on the rows and columns; and

providing a processor operable to process the multiple outputs to determine a XY coordinate position of an object adjacent the active sensing region.

21. (Original) The method of 20, wherein the processor is operable to compensate for position distortion introduced by the physical geometry of the patterned conductive material.
22. (Original) The method of 20, wherein the processor is operable to calculate a centroid of the signals across rows and a centroid of the signals across columns.
23. (Original) The method of 20, wherein the processor is operable to calculate an interpolation of the signals across rows and an interpolation of the signals across columns.
24. (Original) The method of 20, wherein the capacitive sensing channels employ driving signals which are substantially phase-synchronous with respect to one another.
25. (Original) A capacitive position sensor for determining the position of an object in a sensing area, the sensor comprising a substrate having a surface with an arrangement of conductive electrodes mounted thereon, wherein the electrodes define an array of sensing cells arranged in columns and rows to form the sensing area, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together, wherein at least one column sensing electrode comprises a continuous spine within the sensing area, and at least one other column sensing electrode is made electrically continuous via connections external to the sensing area.
26. (Original) The position sensor of 25, wherein the conductive electrodes are transparent and further comprising a graphical display wherein the conductive electrodes in the sensing area are disposed over the graphical display to provide a touch screen.
27. (Original) The position sensor of 25, further comprising an insulating panel wherein the conductive electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/428,670

07/05/2006

Luben Hristov

3050.015US1

4355

76287

7590

05/14/2010

SCHWEGMAN, LUNDBERG & WOESSNER / ATMEL

P.O. BOX 2938

MINNEAPOLIS, MN 55402

EXAMINER

KUMAR, SRILAKSHMI K

ART UNIT

PAPER NUMBER

2629

NOTIFICATION DATE

DELIVERY MODE

05/14/2010

ELECTRONIC

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 the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@slwip.com

request@slwip.com

Advisory Action Before the Filing of an Appeal Brief	Application No. 11/428,670	Applicant(s) HRISTOV, LUBEN	
	Examiner SRILAKSHMI K. KUMAR	Art Unit 2629	

--The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

THE REPLY FILED 19 April 2010 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. 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. 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.
 Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. 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) 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 amendment(s) 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.
 The status of the claim(s) is (or will be) as follows:
 Claim(s) allowed: _____.
 Claim(s) objected to: _____.
 Claim(s) rejected: _____.
 Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a 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 a 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 a 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:
With respect to claims 1-4, 7-15, and 17-19, applicant's arguments are persuasive. The rejection to claims 1-4, 7-15, 17-19 is withdrawn.

With respect to claim 20, applicant argues where the prior art of Mabuth does not teach a wrap around conductor used to interconnect the plates of the rows or columns such that the conductors lay outside the sensing area of the touch sensitive device. Examiner, respectfully disagrees. Applicant, in claim 20, does not claim the feature of a wrap around conductor. Therefore, the rejections of claims 20-24 are maintained.

12. ☐ Note the attached Information *Disclosure Statement(s)*. (PTO/SB/08) Paper No(s). _____
 13. ☐ Other: _____.

/Srilakshmi K Kumar/
Primary Examiner
Art Unit: 2629

U.S. Patent and Trademark Office
PTOL-303 (Rev. 08-06)

Advisory Action Before the Filing of an Appeal Brief

Part of Paper No. 20100504

EXPEDITED PROCEDURE-EXAMINING GROUP 2629

S/N 11/428,670

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Luben Hristov

Examiner: Srilakshimi Kumar

Serial No.: 11/428,670

Group Art Unit: 2629

Filed: July 5, 2006

Docket No.: 3050.015US1

Customer No.: 76287

Confirmation No.: 4355

Title: Two-Dimensional Position Sensor

RESPONSE UNDER 37 C.F.R. 1.116

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In response to the Final Office Action dated February 19, 2010, please consider the claims below and the appended remarks that follow.

Please Enter
May 7, 2010
/SKK/

EXPEDITED PROCEDURE-EXAMINING GROUP 2629

S/N 11/428,670

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Luben Hristov

Examiner: Srilakshimi Kumar

Serial No.: 11/428,670

Group Art Unit: 2629

Filed: July 5, 2006

Docket No.: 3050.015US1

Customer No.: 76287

Confirmation No.: 4355

Title: Two-Dimensional Position Sensor

RESPONSE UNDER 37 C.F.R. 1.116

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In response to the Final Office Action dated February 19, 2010, please consider the claims below and the appended remarks that follow.

IN THE CLAIMS

The claims are as follows:

1. (Previously Presented) A position sensor comprising :
a substrate having a surface with an arrangement of electrodes mounted thereon,
wherein the electrodes define an array of sensing cells arranged in columns and rows to form a capacitive sensing area of the sensor, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together, and
wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by respective row wrap-around connections made outside of the sensing area.
2. (Original) The position sensor of 1, wherein the row wrap-around connections comprise a conductive trace deposited on the substrate.
3. (Original) The position sensor of 1, wherein the row wrap-around connections comprise free wires connected to the respective row sensing electrodes.
4. (Original) The position sensor of 1, wherein the column sensing electrodes of a column of sensing cells at an edge of the sensing area are electrically coupled to one another by column wrap-around connections made outside of the sensing area.
5. (Canceled)
6. (Canceled)
7. (Original) The position sensor of 1, further comprising a plurality of capacitance measurement channels connected to respective ones of the rows and columns of sensing

electrodes, wherein each measurement channel is operable to generate a signal indicative of a capacitance between its associated column or row of sensing electrodes and a system ground.

8. (Original) The position sensor of 7, further comprising a processor operable to determine the position of the object in the sensing area along a first direction by comparing signals from the different columns with each other and along a second direction by comparing signals from the different rows with each other.

9. (Original) The position sensor of 7, wherein the capacitance measurement channels comprise a charge transfer circuit.

10. (Original) The position sensor of 7, wherein the capacitance measurement channels are configured to drive a plurality of sensing electrodes substantially synchronously in phase with one another.

11. (Original) The position sensor of 1, wherein the sensing cells are arranged into three columns.

12. (Original) The position sensor of 1, wherein the sensing cells are arranged into four columns.

13. (Original) The position sensor of 1, wherein the column sensing electrode and the row sensing electrode in each sensing cell are interleaved with one another.

14. (Original) The position sensor of 1, wherein the substrate is formed from a transparent material.

15. (Original) The position sensor of 1, wherein the electrodes are formed from a transparent electrically conductive material.

16. (Canceled)

17. (Original) The position sensor of 15, further comprising a graphical display wherein the electrodes in the sensing area are disposed over the graphical display to provide a touch screen.

18. (Original) The position sensor of 1, further comprising an insulating panel wherein the electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad.

19. (Original) A device comprising the position sensor of 1.

20. (Previously Presented) A method depositing a single layer of patterned conductive material on a substrate to form an active sensing region of a capacitive sensor, the pattern comprising rows and columns of electrodes connected to individual ones of capacitive sensing channels, and wherein at least one row or column is broken into a plurality of segments within the active region;

connecting the broken segments together with an electrical conductor, wherein the conductor is made to lie outside of the active sensing region;

connecting the rows and columns to individual sensing channels of a multi-channel capacitive sensor circuit having multiple outputs representing amplitudes of capacitance on the rows and columns; and

providing a processor operable to process the multiple outputs to determine a XY coordinate position of an object adjacent the active sensing region.

21. (Original) The method of 20, wherein the processor is operable to compensate for position distortion introduced by the physical geometry of the patterned conductive material.

22. (Original) The method of 20, wherein the processor is operable to calculate a centroid of the signals across rows and a centroid of the signals across columns.

-
23. (Original) The method of 20, wherein the processor is operable to calculate an interpolation of the signals across rows and an interpolation of the signals across columns.
24. (Original) The method of 20, wherein the capacitive sensing channels employ driving signals which are substantially phase-synchronous with respect to one another.
25. (Original) A capacitive position sensor for determining the position of an object in a sensing area, the sensor comprising a substrate having a surface with an arrangement of conductive electrodes mounted thereon, wherein the electrodes define an array of sensing cells arranged in columns and rows to form the sensing area, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together, wherein at least one column sensing electrode comprises a continuous spine within the sensing area, and at least one other column sensing electrode is made electrically continuous via connections external to the sensing area.
26. (Original) The position sensor of 25, wherein the conductive electrodes are transparent and further comprising a graphical display wherein the conductive electrodes in the sensing area are disposed over the graphical display to provide a touch screen.
27. (Original) The position sensor of 25, further comprising an insulating panel wherein the conductive electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad.

REMARKS

This responds to the Final Office Action dated February 19, 2010.

No claims are amended, no claims are canceled, and no claims are added. Thus, claims 1-4, 7-15 and 17-27 remain pending in this application.

The Rejection of Claims Under § 102

Claims 1-3, 6-15, 19-24 were rejected under 35 U.S.C. § 102(b) over Mabuth (U.S. Patent No. 4,550,221). Applicant respectfully traverses the rejection.

FIG. 4 of Mabuth shows electrode plates forming column electrodes. “The plates of each column X1 through X12 are connected together by means of plated-through holes 44 and conductors 46 which are located on the bottom surface of substrate 28 (as shown in FIG. 4).” (Mabuth; col. 4, lines 50-54). The rejection appears to state that a column of plates at the edge of the sensing area in FIG. 4 of Mabuth “teaches where at least one of the rows are electrically coupled to one another in Figs. 3 & 4”. (Office Action, section 7) However, claim 1 recites “wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another”. Mabuth does not show electrode plates at opposing ends of a row (or column) electrically coupled together as required in claim 1.

Additionally, claim 1 goes on to recite that the above-quoted row sensing electrodes are coupled to one another “by respective row wrap-around connections made outside of the sensing area”. In contrast to the above-quoted elements of claim 1 and the assertions of the rejection, the conductors 46 connecting one sensing plate to another sensing plate in FIG. 4 of Mabuth appear to all be shown within the sensing area of the touch sensitive device.

For the reasons above, Mabuth fails to show or suggest all the elements of claim 1. Thus, Mabuth does not anticipate the subject matter of claim 1. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection, and allowance of claim 1.

Claims 2-3, 6-15 and 19 depend either directly or indirectly on independent claim 1 and are believed to be in condition for allowance at least for the reasons provided above with respect to claim 1. Notification to this effect is respectfully requested.

With respect to claim 20, Applicant notes that the the conductors 46 connecting one sensing plate to another sensing plate in FIG. 4 of Mabusth appear to all be shown within the sensing area of the touch sensitive device. Claim 20 recites a method including, “connecting the broken segments together with an electrical conductor, wherein the conductor is made to lie outside of the active sensing region”. Applicant is unable to find in Mabusth a wrap around conductor used to interconnect the plates of the rows or columns such that the conductors lay outside the sensing area of the touch sensitive device. Thus, Mabusth does not show each element of claim 20. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection and allowance of claim 20.

Claims 21-24 depend either directly or indirectly on independent claim 20 and are believed to be in condition for allowance at least for the reasons provided above with respect to claims 20. Notification to this effect is respectfully requested.

The Rejection of Claims Under § 103

Claims 17 and 18 were rejected under 35 U.S.C. § 103(a) over Mabusth as applied to claims 1-3, 6-15, 19-24 above, and further in view of Boie et al (U.S. Patent No. 5,463,388), hereinafter, “Boie”. Applicant respectfully traverses this rejection.

Claims 17 and 18 depend either directly or indirectly on independent claim 1. The asserted combination of Boie with Mabusth fails to cure the deficiencies of the rejection of claim 1 as discussed above. Therefore, claims 17 and 18 are believed to be in condition for allowance at least for the reasons provided above with respect to independent claim 1.

Allowable Subject Matter

Claims 25-27 are allowed. Applicant gratefully acknowledges the allowed subject matter.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (612) 371-2138 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402--0938
(612) 371-2138

Date April 19, 2010

By

Paul G. Kegley
Paul G. Kegley
Reg. No. 60,336

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Mail Stop AF, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 19th day of March, 2010.

Name

Amy Moriarty

Signature

[Signature]

Electronic Acknowledgement Receipt

EFS ID:	7443535
Application Number:	11428670
International Application Number:	
Confirmation Number:	4355
Title of Invention:	Two-Dimensional Position Sensor
First Named Inventor/Applicant Name:	Luben Hristov
Customer Number:	76287
Filer:	Suneel Arora/Amy Moriarty
Filer Authorized By:	Suneel Arora
Attorney Docket Number:	3050.015US1
Receipt Date:	19-APR-2010
Filing Date:	05-JUL-2006
Time Stamp:	17:54:06
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		3050015us1foareponse.pdf	337029 f9f3bd0ee3b69269f05336f316d8e7584b6d9105	yes	9

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Miscellaneous Incoming Letter	1	1
	Amendment After Final	2	2
	Claims	3	6
	Applicant Arguments/Remarks Made in an Amendment	7	9

Warnings:

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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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Luben Hristov

Title: Two-Dimensional Position Sensor

Docket No.: 3050.015US1
Filed: July 5, 2006
Examiner: Srilakshimi Kumar
Customer No.: 76287

Serial No.: 11/428,670
Due Date: April 19, 2010
Group Art Unit: 2629
Confirmation No.: 4355

Mail Stop AF
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

X Response under 37 C.F.R. § 1.116 (8 pgs.)

Please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
Customer No.: 76287

By: Paul D. Kegley
Paul G. Kegley
Reg. No. 60,336

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Mail Stop AF Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 19th day of April, 2010.

Name

Amy Moriarty

Signature

[Signature]

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 11/428,670		Filing Date 07/05/2006		<input type="checkbox"/> To be Mailed	
APPLICATION AS FILED – PART I										
(Column 1)			(Column 2)		SMALL ENTITY <input checked="" type="checkbox"/> OR			OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A				
<input type="checkbox"/> 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 \$	=		X \$	=			
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$	=		X \$	=			
<input type="checkbox"/> 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).									
<input type="checkbox"/> 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)		SMALL ENTITY OR			OTHER THAN SMALL ENTITY		
AMENDMENT	04/19/2010	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 23	Minus	** 24	= 0	X \$26 =	0	OR	X \$ =	
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	X \$110 =	0	OR	X \$ =	
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR			
					TOTAL ADD'L FEE	0	OR	TOTAL ADD'L FEE		
(Column 1)			(Column 2)		(Column 3)					
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =		X \$ =		
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =		X \$ =		
<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR			
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
<p>* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.</p> <p>** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".</p> <p>*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".</p> <p>The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.</p>										

Legal Instrument Examiner:
/WANDA LAWSON/

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.



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
11/428,670	07/05/2006	Luben Hristov	3050.015US1

76287
SCHWEGMAN, LUNDBERG & WOESSNER / ATMEL
P.O. BOX 2938
MINNEAPOLIS, MN 55402

CONFIRMATION NO. 4355
POA ACCEPTANCE LETTER



Date Mailed: 03/30/2010

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 03/19/2010.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/skiflemariam/

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

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

REVOCATION AND POWER OF ATTORNEY
CERTIFICATE UNDER 37 CFR § 3.73(b)
&
CHANGE OF CORRESPONDENCE ADDRESS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In accordance with 37 C.F.R. Section 1.36, M.P.E.P. Section 402.05 and 402.07, please revoke any existing Powers of Attorney, if any, for the below listed applications, and appoint the following attorneys and/or patent agents to prosecute these applications and to transact all business in the Patent and Trademark Office in connection therewith:

Customer Number: 76287

<u>Appl. Serial No.</u>	<u>Filing Date</u>	<u>Attorney Docket No.</u>	<u>Applicant</u>	<u>Reel / Frame</u>	<u>Recordation Date(s)</u>
11/428,670	07/05/2006	3050.015US1	Hristov	024009 / 0990 024029 / 0122	03/01/2010 03/04/2010
11/752,615	05/23/2007	3050.018US1	Philipp et al.	024009 / 0638 024029 / 0122	03/01/2010 03/04/2010
12/114,709	05/02/2008	3050.019US1	Philipp et al.	023959 / 0729 023980 / 0113 024017 / 0870	02/18/2010 02/23/2010 03/02/2010
11/737,934	04/20/2007	3050.021US1	Philipp et al.	024009 / 0627 024029 / 0122	03/01/2010 03/04/2010
12/029,497	02/12/2008	3050.032US1	Philipp et al.	023959 / 0516 024017 / 0870	02/18/2010 03/02/2010

CERTIFICATE UNDER 37 CFR § 3.73(b)

Atmel Corporation hereby certifies that it is the assignee of the entire right, title and interest in the patent applications identified above by virtue of assignments recorded for the patent applications identified above. To the best of my knowledge and belief, titles are in Atmel Corporation, the assignee.

Pursuant to 37 C.F.R. § 3.73(b) I hereby declare that I am empowered to sign this certificate on behalf of Atmel Corporation, the assignee.

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.

Please direct all correspondence in the above cases to:

Schwegman, Lundberg & Woessner, P.A.
Customer No. 76287

Date 3/10/10

By 
Name: Patrick Reutens
Title: Chief Legal Officer

Electronic Acknowledgement Receipt

EFS ID:	7243557
Application Number:	11428670
International Application Number:	
Confirmation Number:	4355
Title of Invention:	Two-Dimensional Position Sensor
First Named Inventor/Applicant Name:	Luben Hristov
Customer Number:	20191
Filer:	Aaron Wesley Pederson/Mandy Brown
Filer Authorized By:	Aaron Wesley Pederson
Attorney Docket Number:	P2E
Receipt Date:	19-MAR-2010
Filing Date:	05-JUL-2006
Time Stamp:	11:24:39
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		3050_015US1_RPOA.pdf	95297 0ab60c194baeab8639cce32a6f45e4d7c4515fd0	yes	3

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
	Transmittal Letter	1	1
	Power of Attorney	2	3
Warnings:			
Information:			
Total Files Size (in bytes):		95297	
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>			

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Luben Hristov

Title: Two-Dimensional Position Sensor

Docket No.: 3050.015US1
Filed: July 5, 2006
Examiner: Srilakshimi Kumar
Customer No.: 76287

Serial No.: 11/428,670
Due Date: N/A
Group Art Unit: 2629
Confirmation No.: 4355


Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

☒ Revocation and Power of Attorney, Certificate Under 37 CFR 3.73(b) & Change of Correspondence Address (2 pgs.)

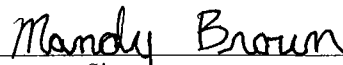
If not provided for in a separate paper filed herewith, please consider this a PETITION FOR EXTENSION OF TIME for sufficient number of months to enter these papers and please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
Customer No.: 76287

By: 
Bradley A. Forrest
Reg. No. 30,837

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 19 day of March, 2010.

Mandy Brown
Name


Signature



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.
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11/428,670

07/05/2006

Luben Hristov

P2E

4355

20191 7590 02/19/2010

DAVID KIEWIT
5901 THIRD ST SOUTH
ST PETERSBURG, FL 33705

EXAMINER

KUMAR, SRILAKSHMI K

ART UNIT

PAPER NUMBER

2629

NOTIFICATION DATE

DELIVERY MODE

02/19/2010

ELECTRONIC

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 the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

dak@patent-faq.com
dakiewit@yahoo.com

Office Action Summary	Application No. 11/428,670	Applicant(s) HRISTOV, LUBEN	
	Examiner SRILAKSHMI K. KUMAR	Art Unit 2629	

-- 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 24 November 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ 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

- 4) ☒ Claim(s) 1-4,6-15 and 17-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 25-27 is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ 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).
- 11) ☐ 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

- 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) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The following office action is in response to the amendment filed on November 24, 2009.

Claims 1 and 20 have amended. Claims 1-4, 6-15, 17-27 are pending.

Claim Rejections - 35 USC § 102

1. 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.

2. Claims 1-3, 6-15, 19-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Mabusth (US 4,550,221).

As to independent claim 1, Mabusth teaches a position sensor (Fig. 3 & 4, abstract) comprising a substrate (28) having a surface with an arrangement of electrodes mounted thereon (30), wherein the electrodes define an array of sensing cells arranged in columns and rows to form a capacitive sensing area (Figs. 3 & 4) of the sensor, each sensing cell including a column sensing electrode and a row sensing electrode (Figs. 3 & 4), the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together (col. 4, lines 49-col. 5, line 53), wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by respective row wrap-around connections made outside of the sensing area (col. 4, lines 49-col. 5, lines 53).

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As to dependent claim 2, limitations of claim 1, and further comprising, Mabusth teaches wherein the row wrap-around connections comprise a conductive trace deposited on the substrate (col. 4, lines 49-col. 5, lines 53).

As to dependent claim 3, limitations of claim 1, and further comprising, Mabusth teaches wherein the row wrap-around connections comprise free wires connected to the respective row sensing electrodes (col. 4, lines 49-col. 5, lines 53).

As to dependent claim 4, limitations of claim 1, and further comprising, Mabusth teaches wherein the column sensing electrodes of a column of sensing cells at an edge of the sensing area are electrically coupled to one another by column wrap-around connections made outside of the sensing area (Figs. 3 & 4, outside edges, col. 4, lines 49-col. 5, lines 53).

As to dependent claim 7, limitations of claim 1, further comprising Mabusth teaches a plurality of capacitance measurement channels connected to respective ones of the rows and columns of sensing electrodes, wherein each measurement channel is operable to generate a signal indicative of a capacitance between its associated column or row of sensing electrodes and a system ground (col. 5, line 65-col. 6, line 35).

As to dependent claim 8, limitations of claim 7, further comprising Mabusth teaches a processor (computer) operable to determine the position of the object in the sensing area along a first direction by comparing signals from the different columns with each other and along a second direction by comparing signals from the different rows with each other (col. 4, lines 28-col. 5, line 53, col. 5, line 65-col. 6, line 35).

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As to dependent claim 9, limitations of claim 7, and further comprising, Mabusth teaches wherein the capacitance measurement channels comprise a charge transfer circuit (col. 5, line 65-col. 6, line 35).

As to dependent claim 10, limitations of claim 7, and further comprising, Mabusth teaches wherein the capacitance measurement channels are configured to drive a plurality of sensing electrodes substantially synchronously in phase with one another (col. 5, line 65-col. 6, line 35).

As to dependent claim 11, limitations of claim 1, and further comprising, Mabusth teaches wherein the sensing cells are arranged into three columns (Figs. 3 & 4).

As to dependent claim 12, limitations of claim 1, and further comprising, Mabusth teaches wherein the sensing cells are arranged into four columns (Figs. 3 & 4).

As to dependent claim 13, limitations of claim 1, and further comprising, Mabusth teaches wherein the column sensing electrode and the row sensing electrode in each sensing cell are interleaved with one another (Figs. 3 & 4).

As to dependent claim 14, limitations of claim 1, and further comprising, Mabusth teaches wherein the substrate is formed from a transparent material (col. 4, lines 28-65).

As to dependent claim 15, limitations of claim 1, and further comprising, Mabusth teaches wherein the electrodes are formed from a transparent electrically conductive material (col. 4, line 28-col. 5, line 53).

As to dependent claim 19, Mabusth teaches a device comprising the position sensor of claim 1 (Figs. 1 and 2).

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As to claims 20-24, these claims differ from claims 1-15, above only in that claims 20-24 are a method, whereas claims 1-18 are directed to an apparatus or device. Thus method claims 20-24 are analyzed as previously discussed with respect to apparatus/device claims 1-18, above.

Claim Rejections - 35 USC § 103

3. 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 negated by the manner in which the invention was made.

4. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mabusth (US 4,550,221) as applied to claims 1-3, 6-15, 19-24 above, and further in view of Boie et al (US 5,463,388).

As to dependent claim 17, limitations of claim 15, further comprising Mabusth does not teach a graphical display wherein the electrodes in the sensing area are disposed over the graphical display to provide a touch screen. Boie et al teaches in Figs. 2, 3 and 7 a graphical display wherein the electrodes in the sensing area are disposed over the graphical display to provide a touch screen. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the graphical display as taught by Boie into Mabusth in order to enable proper actuation and increase usability.

As to dependent claim 18, limitations of claim 1, and further comprising, Mabusth does not teach an insulating panel wherein the electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad. Boie et al teaches an insulating panel wherein the electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad in

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Figs. 2, 3 and 7. It would have been obvious to one of ordinary skill at the time the invention was made to include the insulating panel to provide a keypad as taught by Boie et al into Mabusth to increase usability.

Allowable Subject Matter

5. Claims 25-27 are allowed.

6. The following is an examiner's statement of reasons for allowance:

As to independent claim 25, the prior art of record do not teach wherein at least one column sensing electrode comprises a continuous spine within the sensing area, and at least one other column sensing electrode is made electrically continuous via connections external to the sensing area.

With respect to dependent claims 26-27, these claims are allowable as they depend upon an allowed independent claim.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

7. Applicant's arguments filed November 24, 2009 have been fully considered but they are not persuasive.

With respect to claim 1, Applicant argues where the prior art of Mabusth does not teach the row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by respective row wrap around connections made outside of

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the sensing area. Examiner, respectfully, disagrees. The prior art of Mabusth teaches where at least one of the rows are electrically coupled to one another in Figs. 3 & 4, where the rows are connected to one another through the connection holes, specifically at the end of the rows and columns which satisfy the limitation of outside of the sensing area. Similarly, Claim 20, the broken segments are connected at the ends which is outside the sensing area. Therefore, the prior art of Mabusth teaches the claimed inventions, thus the rejection is maintained and made FINAL.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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 mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SRILAKSHMI K. KUMAR whose telephone number is (571)272-7769. The examiner can normally be reached on 7:00 am to 4:30 pm.

Art Unit: 2629

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Lefkowitz can be reached on 571 272 3638. 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.

/Srilakshmi K Kumar/
Primary Examiner
Art Unit 2629

February 12, 2010 SKK

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)	<i>Complete if Known</i>	
	Application Number	11/428,670
	Filing Date	July 5, 2006
	First Named Inventor	Luben Hristov
	Group Art Unit	2629
	Examiner Name	Srilakshmi Kumar
Sheet 1 of 1		Attorney Docket No: 3050.015US1


US PATENT DOCUMENTS				
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document	Filing Date if Appropriate
/SKK/	US-5,861,583	01/19/1999	Schediwy, Richard R., et al.	07/15/1996
/SKK/	US-2007/0008299A1	01/11/2007	Hristov, L	07/05/2006

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	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.		
/SKK/	"Chinese Application Serial No. 200610143149.0 Office Action Mailed 10/9/2009", 6 pgs		
/SKK/	200610143149.0, "Chinese Application Serial No. 200610143149.0 , Office Action mailed 04-10-09", 8 pgs		

EXAMINER /Srilakshmi Kumar/


DATE CONSIDERED 02/15/2010

* 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 is to place a check mark here if English language Translation is attached

<i>Index of Claims</i> 	Application/Control No. 11428670	Applicant(s)/Patent Under Reexamination HRISTOV, LUBEN
	Examiner SRILAKSHMI K KUMAR	Art Unit 2629

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant				<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47	
CLAIM		DATE							
Final	Original	06/19/2009	02/15/2010						
	1	✓	✓						
	2	✓	✓						
	3	✓	✓						
	4	✓	✓						
	5	-	-						
	6	-	-						
	7	✓	✓						
	8	✓	✓						
	9	✓	✓						
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	15	✓	✓						
	16	-	-						
	17	✓	✓						
	18	✓	✓						
	19	✓	✓						
	20	✓	✓						
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	22	✓	✓						
	23	✓	✓						
	24	✓	✓						
	25	=	=						
	26	=	=						
	27	=	=						

Search Notes 	Application/Control No. 11428670	Applicant(s)/Patent Under Reexamination HRISTOV, LUBEN
	Examiner SRILAKSHMI K KUMAR	Art Unit 2629

SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
East Search	6/17/2009	skk
East search and IDS	2/11/2010	skk

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

--	--

S/N 11/428,670

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Luben Hristov

Examiner: Srilakshimi Kumar

Serial No.: 11/428,670

Group Art Unit: 2629

Filed: July 5, 2006

Docket No.: 3050.015US1

Customer No.: 21186

Confirmation No.: 4355

Title: Two-Dimensional Position Sensor

AMENDMENT & RESPONSE UNDER 37 C.F.R. § 1.111

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In response to the Office Action dated June 24, 2009, please amend the application as follows:

This response is accompanied by a Petition, as well as the appropriate fee, to obtain a two-month extension of the period for responding to the Office action, thereby moving the deadline for response from September 24, 2009 to November 24, 2009.

REMARKS

This responds to the Office Action dated June 24, 2009.

Claims 1 and 20 are amended, claims 5-6 and 16 were previously canceled, and no claims are added. Thus, claims 1-4, 7-15 and 17-27 remain pending in this application. Claims 1 and 20 are amended to improve clarity and readability of the claims. Applicant believes that the amendments do not add new matter to the claims.

§ 102 Rejection of the Claims

Claims 1-3, 7-15 and 19-24 were rejected under 35 U.S.C. § 102(b) over Mabuth (U.S. Patent No. 4,550,221). Applicant respectfully traverses the rejection because the cited reference does not teach all the elements of the claims.

For example, claim 1 recites, in part, “wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by respective row wrap-around connections made outside of the sensing area.” Mabuth shows only one end of a column of electrode plates 44 coupled to something other than an adjacent electrode plate. (Mabuth; FIG. 4.) Adjacent electrode plates within the column are connected together with conductors 46 located on the bottom surface of the substrate. (Mabuth; FIG. 4; col. 4, lines 49-55) The conductors 46 are positioned completely within the sensing area of the electrode pattern. (Mabuth; FIG. 4) Thus, Mabuth does not show or teach electrodes of sensing cells at opposing ends of a row (or column) connected using a wrap-around connection, in contrast to the above quoted elements of independent claim 1. Additionally, since Mabuth does not show or teach such a wrap-around connection, Mabuth also does not teach or show that such connections are made outside the sensing area, as also quoted above in claim 1. Since Mabuth fails to teach each element of claim 1, the rejection fails to present a proper *prima facie* case of anticipation. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection, and allowance of independent claim 1.

Claims 2-3, 7-15 and 19 depend either directly or indirectly on independent claim 1 and are believed to be in condition for allowance at least for the reasons provided above with respect to claim 1.

For reasons similar to those presented above for claim 1, Applicant traverses the rejection of method claim 20. Mabusth shows electrodes 44 connected together using conductors 46 located on the bottom of the electrode substrate. (Mabusth; FIG. 4, col. 4, lines 49-55). The conductors are shown within the sensing area of the device. (Mabusth; FIG. 4). In contrast, claim 20 recites, in part, “connecting the broken segments together with an electrical conductor, wherein the conductor is made to lie outside of the active sensing region”. Connecting electrode segments with conductors within the sensing area as shown in Mabusth is different than connecting electrode segments together with a conductor made to lie outside an active sensing region as quoted above in independent claim 20. As such, Applicant submits Mabusth does not anticipate claim 20. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection, and allowance of independent claim 20.

Claims 21-24 depend either directly or indirectly on independent claim 20 and are believed to be in condition for allowance at least for the reasons provided above with respect to claim 20

§ 103 Rejection of the Claims

Claims 17 and 18 were rejected under 35 U.S.C. § 103(a) over Mabusth (U.S. Patent No. 4,550,221) as applied to claims 1-3, 6-15 and 19-24 above, and further in view of Boie et al (U.S. Patent No. 5,463,388), hereinafter “Boie”

Claims 17 and 18 depend either directly or indirectly on independent claim 1. The asserted combination of Boie with Mabusth fails to cure the deficiencies of the rejection of claim 1 as discussed above. Therefore, claims 17 and 18 are believed to be in condition for allowance at least for the reasons provided above with respect to independent claim 1.

Allowable Subject Matter

Claims 25-27 are allowed. Applicant acknowledges the allowed subject matter.

CONCLUSION

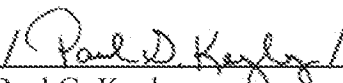
Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (612) 371-2138 to facilitate prosecution of this application.

If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402--0938
(612) 371-2138

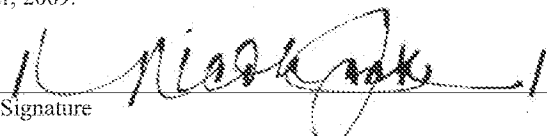
Date November 24, 2009

By 
Paul G. Kegley
Reg. No. 60,336

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 24 day of November, 2009.

Nicole Jack

Name


Signature

S/N 11/428,670

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Luben Hristov	Examiner:	Srilakshimi Kumar
Serial No.:	11/428,670	Group Art Unit:	2629
Filed:	July 5, 2006	Docket:	3050.015US1
Customer No.:	76287	Confirmation No.:	4355
Title:	Two-Dimensional Position Sensor		

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In compliance with the duty imposed by 37 C.F.R. § 1.56, and in accordance with 37 C.F.R. §§ 1.97 *et. seq.*, the enclosed materials are brought to the attention of the Examiner for consideration in connection with the above-identified patent application. Applicant respectfully requests that this Information Disclosure Statement be entered and the documents listed on the attached PTO 1449 Form be considered by the Examiner and made of record. Pursuant to the provisions of MPEP 609, Applicant requests that a copy of the PTO 1449 Form, initialed as being considered by the Examiner, be returned to the Applicant with the next official communication.

Pursuant to 37 C.F.R. § 1.97(b), it is believed that no fee or statement is required with the Information Disclosure Statement. However, if an Office Action on the merits has been mailed, the Commissioner is hereby authorized to charge the required fees to Deposit Account No. 19-0743 in order to have this Information Disclosure Statement considered.

Pursuant to 37 C.F.R. § 1.98(a)(2), copies of cited U.S. Patents and Published Applications, and Non-Published Applications identifiable by USPTO Serial Number, are no longer required to be provided to the Office. Applicant acknowledges the requirement to submit copies of foreign patent documents and non-patent literature in accordance with 37 C.F.R. § 1.98(a)(2).

SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

Serial Number: 11/428,670

Filing Date: July 5, 2006

Title: Two-Dimensional Position Sensor

Page 2

Dkt: 3050.015US1

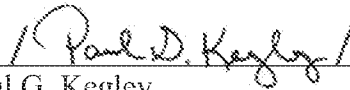
The Examiner is invited to contact the Applicant's Representative at the telephone number indicated if there are any questions regarding this communication.

Respectfully submitted,

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 371-2138

Date November 24, 2009

By



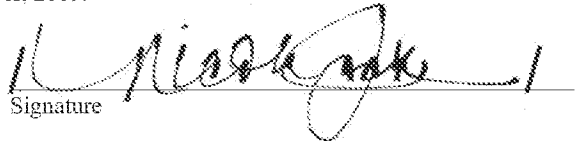
Paul G. Kegley

Reg. No. 60,336

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 24 day of November, 2009.

Nicole Jack

Name


Signature

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)	<i>Complete if Known</i>	
	Application Number	11/428,670
	Filing Date	July 5, 2006
	First Named Inventor	Luben Hristov
	Group Art Unit	2629
	Examiner Name	Srilakshimi Kumar
Sheet 1 of 1		Attorney Docket No: 3050.015US1

US PATENT DOCUMENTS				
Examiner Initial *	USP Document Number	Publication Date	Name of Patentee or Applicant of cited Document	Filing Date if Appropriate
	US-5,861,583	01/19/1999	Schediwy, Richard R., et al.	07/15/1996
	US-2007/0008299A1	01/11/2007	Hristov, L	07/05/2006

OTHER DOCUMENTS – NON PATENT LITERATURE DOCUMENTS			
Examiner Initials*	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.		
	"Chinese Application Serial No. 200610143149.0 Office Action Mailed 10/9/2009", 6 pgs		
	200610143149.0, "Chinese Application Serial No. 200610143149.0 , Office Action mailed 04-10-09", 8 pgs		

EXAMINER

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 is to place a check mark here if English language Translation is attached

Electronic Patent Application Fee Transmittal

Application Number:	11428670			
Filing Date:	05-Jul-2006			
Title of Invention:	Two-Dimensional Position Sensor			
First Named Inventor/Applicant Name:	Luben Hristov			
Filer:	David W. Black/Nicole Jack			
Attorney Docket Number:	P2E			
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:				
Extension - 2 months with \$0 paid	1252	1	490	490

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Submission- Information Disclosure Stmt	1806	1	180	180
Total in USD (\$)				670

Electronic Acknowledgement Receipt

EFS ID:	6518262
Application Number:	11428670
International Application Number:	
Confirmation Number:	4355
Title of Invention:	Two-Dimensional Position Sensor
First Named Inventor/Applicant Name:	Luben Hristov
Customer Number:	20191
Filer:	David W. Black/Nicole Jack
Filer Authorized By:	David W. Black
Attorney Docket Number:	P2E
Receipt Date:	24-NOV-2009
Filing Date:	05-JUL-2006
Time Stamp:	15:32:16
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$670
RAM confirmation Number	2106
Deposit Account	190743
Authorized User	

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)

Charge any Additional Fees required under 37 C.F.R. Section 1.17 (Patent application and reexamination processing fees)

Petitioner Samsung and HP Ex.-1008, 0093

Charge any Additional Fees required under 37 C.F.R. Section 1.19 (Document supply fees)

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)

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1		3050015US1RESP.pdf	109256 37192c79145abb8208b8cde7a23441477336e961	yes	13
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Miscellaneous Incoming Letter		1	1	
	Extension of Time		2	2	
	Amendment/Req. Reconsideration-After Non-Final Reject		3	3	
	Claims		4	7	
	Applicant Arguments/Remarks Made in an Amendment		8	10	
	Transmittal Letter		11	12	
	Information Disclosure Statement (IDS) Filed (SB/08)		13	13	
Warnings:					
Information:					
2	NPL Documents	CN.pdf	438101 1edeb2481e3a4c5d0799dbac22010a5cbae92e78	no	6
Warnings:					
Information:					
3	NPL Documents	CNOA2.pdf	1222898 be6e6f583ed3bb3adadce6415bcdae74f709f35e	no	8
Warnings:					
Information:					
4	Fee Worksheet (PTO-875)	fee-info.pdf	31968 245e45e9e41bba7124e32ce541a3e3e90694614e	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			1802223		

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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Luben Hristov

Title: Two-Dimensional Position Sensor

Docket No.: 3050.015US1
Filed: July 5, 2006
Examiner: Srilakshimi Kumar
Customer No.: 76287

Serial No.: 11/428,670
Due Date: November 24, 2009
Group Art Unit: 2629
Confirmation No.: 4355

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

We are transmitting herewith the following attached items (as indicated with an "X"):

- ☒ Amendment and Response under 37 C.F.R. § 1.111 (8 pgs.)
- ☒ Petition for Extension of Time (1 pg.)
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$490.00 to cover the Extension of Time Fee.
- ☒ Supplemental Information Disclosure Statement (2 pgs.), Form 1449 (1 pg.), Copies of Cited References (2).
- ☒ Authorization to charge Deposit Account 19-0743 in the amount of \$180.00 to cover the fee for consideration of Information Disclosure Statement under 97(c).

Please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
Customer No.: 76287

By: Paul G. Kegley
Paul G. Kegley
Reg. No. 60,336

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 24 day of November, 2009.

Nicole Jack

Name

Nicole Jack
Signature

S/N 11/428,670

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Luben Hristov

Examiner: Srilakshimi Kumar

Serial No.: 11/428,670

Group Art Unit: 2629

Filed: July 5, 2006

Docket: 3050.015US1

Customer No.: 76287

Confirmation No.: 4355

Title: Two-Dimensional Position Sensor

PETITION FOR A TWO-MONTH EXTENSION OF TIME

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

In accordance with the provision of 37 C.F.R. § 1.136(a), it is respectfully requested that a two-month extension of time be granted in which to respond to the Office Action mailed June 24, 2009, said period of response being extended from September 24, 2009 to November 24, 2009.

Please charge Deposit Account No. 19-0743 in the amount of \$490.00 to cover the required extension fee. Please charge any additional fees or credit overpayment to deposit Account No. 19-0743.

Respectfully submitted,

SCHWEGMAN, LUNDBERG & WOESSNER, P.A.
P.O. Box 2938
Minneapolis, MN 55402
(612) 371-2138

Date November 24, 2009

By

Paul G. Kegley

Reg. No. 60,336

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 24 day of November, 2009.

Nicole Jack

Name

Nicole Jack
Signature

PATENT APPLICATION FEE DETERMINATION RECORD
Substitute for Form PTO-875

Filing Date
07/05/2006

☐ To be Mailed

OTHER THAN

(Column 2)

SMALL ENTITY ☒

OR

SMALL ENTITY

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)
<input type="checkbox"/> BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	
<input type="checkbox"/> SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	
<input type="checkbox"/> 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 \$ =			X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =	
<input type="checkbox"/> 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).						
<input type="checkbox"/> 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		

* If the difference in column 1 is less than zero, enter "0" in column 2.

OTHER THAN

(Column 3)

SMALL ENTITY

OR

SMALL ENTITY

AMENDMENT	11/24/2009	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total (37 CFR 1.16(j))	* 24	Minus	** 24	= 0
	Independent (37 CFR 1.16(h))	* 3	Minus	***3	= 0
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))				
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))				
	(Column 1)	(Column 2)	(Column 3)		

RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)
X \$26 =	0	OR	X \$ =	
X \$110 =	0	OR	X \$ =	
		OR		
TOTAL ADD'L FEE	0	OR	TOTAL ADD'L FEE	

(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 \$ =	
	<input type="checkbox"/> Application Size Fee (37 CFR 1.16(s))										
	<input type="checkbox"/> FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								OR		
									OR		
									OR		
					TOTAL ADD'L FEE			OR	TOTAL ADD'L FEE		

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

Legal Instrument Examiner:
/AMANDA FORD/

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.

IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) A ~~capacitive~~ position sensor ~~for determining the position of an object in a sensing area, the sensor~~ comprising :
 a substrate having a surface with an arrangement of electrodes mounted thereon,
 wherein the electrodes define an array of sensing cells arranged in columns and rows to form [the] a capacitive sensing area of the sensor, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together, and
 wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by respective row wrap-around connections made outside of the sensing area.
2. (Original) The position sensor of 1, wherein the row wrap-around connections comprise a conductive trace deposited on the substrate.
3. (Original) The position sensor of 1, wherein the row wrap-around connections comprise free wires connected to the respective row sensing electrodes.
4. (Original) The position sensor of 1, wherein the column sensing electrodes of a column of sensing cells at an edge of the sensing area are electrically coupled to one another by column wrap-around connections made outside of the sensing area.
5. (Canceled)
6. (Canceled)

7. (Original) The position sensor of 1, further comprising a plurality of capacitance measurement channels connected to respective ones of the rows and columns of sensing electrodes, wherein each measurement channel is operable to generate a signal indicative of a capacitance between its associated column or row of sensing electrodes and a system ground.
8. (Original) The position sensor of 7, further comprising a processor operable to determine the position of the object in the sensing area along a first direction by comparing signals from the different columns with each other and along a second direction by comparing signals from the different rows with each other.
9. (Original) The position sensor of 7, wherein the capacitance measurement channels comprise a charge transfer circuit.
10. (Original) The position sensor of 7, wherein the capacitance measurement channels are configured to drive a plurality of sensing electrodes substantially synchronously in phase with one another.
11. (Original) The position sensor of 1, wherein the sensing cells are arranged into three columns.
12. (Original) The position sensor of 1, wherein the sensing cells are arranged into four columns.
13. (Original) The position sensor of 1, wherein the column sensing electrode and the row sensing electrode in each sensing cell are interleaved with one another.
14. (Original) The position sensor of 1, wherein the substrate is formed from a transparent material.

15. (Original) The position sensor of 1, wherein the electrodes are formed from a transparent electrically conductive material.

16. (Canceled)

17. (Original) The position sensor of 15, further comprising a graphical display wherein the electrodes in the sensing area are disposed over the graphical display to provide a touch screen.

18. (Original) The position sensor of 1, further comprising an insulating panel wherein the electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad.

19. (Original) A device comprising the position sensor of 1.

20. (Currently Amended) ~~A method of constructing a capacitively sensitive surface disposed on a substrate which reports an X-Y coordinate position of an object within an active sensing region when the object is adjacent to said surface, comprising the steps of: (a)~~

depositing a single layer of patterned conductive material on a substrate to form an in the active sensing region of a capacitive sensor, the pattern comprising rows and columns of electrodes connected to individual ones of capacitive sensing channels, and wherein at least one row or column is broken into a plurality of segments within the active region;

~~(b)~~ connecting the broken segments together with an electrical conductor, wherein the conductor is made to lie outside of the active sensing region;

~~(c)~~ connecting the rows and columns to individual sensing channels of a multi-channel capacitive sensor circuit having multiple outputs representing amplitudes of capacitance on the rows and columns; and

~~(d)~~ providing a processor operable to process the multiple outputs to determine a XY coordinate position of ~~the adjacent~~ an object adjacent the active sensing region as an XY location.

21. (Original) The method of 20, wherein the processor is operable to compensate for position distortion introduced by the physical geometry of the patterned conductive material.
22. (Original) The method of 20, wherein the processor is operable to calculate a centroid of the signals across rows and a centroid of the signals across columns.
23. (Original) The method of 20, wherein the processor is operable to calculate an interpolation of the signals across rows and an interpolation of the signals across columns.
24. (Original) The method of 20, wherein the capacitive sensing channels employ driving signals which are substantially phase-synchronous with respect to one another.
25. (Original) A capacitive position sensor for determining the position of an object in a sensing area, the sensor comprising a substrate having a surface with an arrangement of conductive electrodes mounted thereon, wherein the electrodes define an array of sensing cells arranged in columns and rows to form the sensing area, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together, wherein at least one column sensing electrode comprises a continuous spine within the sensing area, and at least one other column sensing electrode is made electrically continuous via connections external to the sensing area.
26. (Original) The position sensor of 25, wherein the conductive electrodes are transparent and further comprising a graphical display wherein the conductive electrodes in the sensing area are disposed over the graphical display to provide a touch screen.
27. (Original) The position sensor of 25, further comprising an insulating panel wherein the conductive electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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11/428,670

07/05/2006

Luben Hristov

P2E

4355

20191

7590

06/24/2009

DAVID KIEWIT

5901 THIRD ST SOUTH

ST PETERSBURG, FL 33705

EXAMINER

KUMAR, SRILAKSHMI K

ART UNIT

PAPER NUMBER

2629

MAIL DATE

DELIVERY MODE

06/24/2009

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. 11/428,670	Applicant(s) HRISTOV, LUBEN	
	Examiner SRILAKSHMI K. KUMAR	Art Unit 2629	

-- 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 29 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ 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

- 4) ☒ Claim(s) 1-3,6-15 and 17-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 25-27 is/are allowed.
- 6) ☒ Claim(s) 1-3,6-15 and 17-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ 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).
- 11) ☐ 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

- 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) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The following office action is in response to the preliminary amendment filed on September 29, 2007. Claims 4, 5 and 16 have been cancelled. Claims 1-3, 6-15, 17-27 are pending.

Claim Rejections - 35 USC § 102

1. 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.

2. Claims 1-3, 6-15, 19-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Mabusth (US 4,550,221).

As to independent claim 1, Mabusth teaches a capacitive position sensor (Fig. 3 & 4, abstract) for determining the position of an object in a sensing area (abstract), the sensor comprising a substrate (28) having a surface with an arrangement of electrodes mounted thereon (30), wherein the electrodes define an array of sensing cells arranged in columns and rows to form the sensing area (Figs. 3 & 4), each sensing cell including a column sensing electrode and a row sensing electrode (Figs. 3 & 4), the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together (col. 4, lines 49-col. 5, line 53), wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by respective row wrap-around connections made outside of the sensing area (col. 4, lines 49-col. 5, lines 53).

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As to dependent claim 2, limitations of claim 1, and further comprising, Mabusth teaches wherein the row wrap-around connections comprise a conductive trace deposited on the substrate (col. 4, lines 49-col. 5, lines 53).

As to dependent claim 3, limitations of claim 1, and further comprising, Mabusth teaches wherein the row wrap-around connections comprise free wires connected to the respective row sensing electrodes (col. 4, lines 49-col. 5, lines 53).

As to dependent claim 4, limitations of claim 1, and further comprising, Mabusth teaches wherein the column sensing electrodes of a column of sensing cells at an edge of the sensing area are electrically coupled to one another by column wrap-around connections made outside of the sensing area (Figs. 3 & 4, outside edges, col. 4, lines 49-col. 5, lines 53).

As to dependent claim 7, limitations of claim 1, further comprising Mabusth teaches a plurality of capacitance measurement channels connected to respective ones of the rows and columns of sensing electrodes, wherein each measurement channel is operable to generate a signal indicative of a capacitance between its associated column or row of sensing electrodes and a system ground (col. 5, line 65-col. 6, line 35).

As to dependent claim 8, limitations of claim 7, further comprising Mabusth teaches a processor (computer) operable to determine the position of the object in the sensing area along a first direction by comparing signals from the different columns with each other and along a second direction by comparing signals from the different rows with each other (col. 4, lines 28-col. 5, line 53, col. 5, line 65-col. 6, line 35).

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As to dependent claim 9, limitations of claim 7, and further comprising, Mabusth teaches wherein the capacitance measurement channels comprise a charge transfer circuit (col. 5, line 65-col. 6, line 35).

As to dependent claim 10, limitations of claim 7, and further comprising, Mabusth teaches wherein the capacitance measurement channels are configured to drive a plurality of sensing electrodes substantially synchronously in phase with one another (col. 5, line 65-col. 6, line 35).

As to dependent claim 11, limitations of claim 1, and further comprising, Mabusth teaches wherein the sensing cells are arranged into three columns (Figs. 3 & 4).

As to dependent claim 12, limitations of claim 1, and further comprising, Mabusth teaches wherein the sensing cells are arranged into four columns (Figs. 3 & 4).

As to dependent claim 13, limitations of claim 1, and further comprising, Mabusth teaches wherein the column sensing electrode and the row sensing electrode in each sensing cell are interleaved with one another (Figs. 3 & 4).

As to dependent claim 14, limitations of claim 1, and further comprising, Mabusth teaches wherein the substrate is formed from a transparent material (col. 4, lines 28-65).

As to dependent claim 15, limitations of claim 1, and further comprising, Mabusth teaches wherein the electrodes are formed from a transparent electrically conductive material (col. 4, line 28-col. 5, line 53).

As to dependent claim 19, Mabusth teaches a device comprising the position sensor of claim 1 (Figs. 1 and 2).

Art Unit: 2629

As to claims 20-24, these claims differ from claims 1-15, above only in that claims 20-24 are a method, whereas claims 1-18 are directed to an apparatus or device. Thus method claims 20-24 are analyzed as previously discussed with respect to apparatus/device claims 1-18, above.

Claim Rejections - 35 USC § 103

3. 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 negated by the manner in which the invention was made.

4. Claims 17 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mabusth (US 4,550,221) as applied to claims 1-3, 6-15, 19-24 above, and further in view of Boie et al (US 5,463,388).

As to dependent claim 17, limitations of claim 15, further comprising Mabusth does not teach a graphical display wherein the electrodes in the sensing area are disposed over the graphical display to provide a touch screen. Boie et al teaches in Figs. 2, 3 and 7 a graphical display wherein the electrodes in the sensing area are disposed over the graphical display to provide a touch screen. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the graphical display as taught by Boie into Mabusth in order to enable proper actuation and increase usability.

As to dependent claim 18, limitations of claim 1, and further comprising, Mabusth does not teach an insulating panel wherein the electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad. Boie et al teaches an insulating panel wherein the electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad in

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Figs. 2, 3 and 7. It would have been obvious to one of ordinary skill at the time the invention was made to include the insulating panel to provide a keypad as taught by Boie et al into Mabusth to increase usability.

Allowable Subject Matter

5. Claims 25-27 are allowed.

6. The following is an examiner's statement of reasons for allowance:

As to independent claim 25, the prior art of record do not teach wherein at least one column sensing electrode comprises a continuous spine within the sensing area, and at least one other column sensing electrode is made electrically continuous via connections external to the sensing area.

With respect to dependent claims 26-27, these claims are allowable as they depend upon an allowed independent claim.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to SRILAKSHMI K. KUMAR whose telephone number is (571)272-7769. The examiner can normally be reached on 7:00 am to 4:30 pm.

Art Unit: 2629

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Lefkowitz can be reached on 571 272 3638. 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.

/Srilakshmi K Kumar/
Primary Examiner
Art Unit 2629

June 16, 2009
SKK

Notice of References Cited	Application/Control No. 11/428,670	Applicant(s)/Patent Under Reexamination HRISTOV, LUBEN	
	Examiner SRILAKSHMI K. KUMAR	Art Unit 2629	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,463,388	10-1995	Boie et al.	341/33
	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)
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	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.

<i>Index of Claims</i> 	Application/Control No. 11428670	Applicant(s)/Patent Under Reexamination HRISTOV, LUBEN
	Examiner SRILAKSHMI K KUMAR	Art Unit 2629

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

<input type="checkbox"/> Claims renumbered in the same order as presented by applicant			<input type="checkbox"/> CPA			<input type="checkbox"/> T.D.			<input type="checkbox"/> R.1.47		
CLAIM		DATE									
Final	Original	06/19/2009									
	1	✓									
	2	✓									
	3	✓									
	4	✓									
	5	-									
	6	-									
	7	✓									
	8	✓									
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	22	✓									
	23	✓									
	24	✓									
	25	=									
	26	=									
	27	=									

Search Notes 	Application/Control No. 11428670	Applicant(s)/Patent Under Reexamination HRISTOV, LUBEN
	Examiner SRILAKSHMI K KUMAR	Art Unit 2629

SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES		
Search Notes	Date	Examiner
East Search	6/17/2009	skk

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		2006-07-05
First Named Inventor	Hristov	
Art Unit		
Examiner Name		
Attorney Docket Number	P2E	

U.S.PATENTS

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
/SKK/	1	4954823	A1	1990-09-04	Binstead	
/SKK/	2	5463388	A1	1995-10-31	Boie et al.	Fig. 1 & associated text
/SKK/	3	5430165	A1	1998-03-24	Philipp	
/SKK/	4	5844506	A1	1998-12-01	Binstead	Figs. 4 & 6
/SKK/	5	6466036	B1	2002-10-15	Philipp	

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		2006-07-05
First Named Inventor	Hristov	
Art Unit		
Examiner Name		
Attorney Docket Number	P2E	

Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ² j	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
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NON-PATENT LITERATURE DOCUMENTS

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EXAMINER SIGNATURE

Examiner Signature	/Srilakshmi Kumar/	Date Considered	06/19/2009
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*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

In Re PATENT APPLICATION of

Applicant: Hristov

Docket: P2E

Filing Date: 07/05/2006

Application Number: 11/428670

Art Unit: 2629

Examiner: Hjerpe, R. A.

Title: Two-dimensional Position Sensor

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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

A. Introductory Comments

Please enter the amendments to the claims submitted herewith in the captioned new application.

Date: September 29, 2007

Mail: 5901 Third Street South
St. Petersburg FL 33705-5305

/David A Kiewit/
David A. Kiewit
Reg. No. 34640
(727) 866-0669 voice/fax

B. Amendments to the Claims

Claim 1(original) A capacitive position sensor for determining the position of an object in a sensing area, the sensor comprising a substrate having a surface with an arrangement of electrodes mounted thereon, wherein the electrodes define an array of sensing cells arranged in columns and rows to form the sensing area, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together, wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by respective row wrap-around connections made outside of the sensing area.

Claim 2(original) The position sensor of claim 1, wherein the row wrap-around connections comprise a conductive trace deposited on the substrate.

Claim 3(original) The position sensor of claim 1, wherein the row wrap-around connections comprise free wires connected to the respective row sensing electrodes.

Claim 4(original) The position sensor of claim 1, wherein the column sensing electrodes of a column of sensing cells at an edge of the sensing area are electrically coupled to one another by column wrap-around connections made outside of the sensing area.

Claim 5(canceled)

Claim 6(canceled)

Claim 7(original) The position sensor of claim 1, further comprising a plurality of capacitance measurement channels connected to respective ones of the rows and columns of sensing electrodes, wherein each measurement channel is operable to generate a signal indicative of a capacitance between its associated column or row of sensing electrodes and a system ground.

Claim 8(original) The position sensor of claim 7, further comprising a processor operable to determine the position of the object in the sensing area along a first direction by comparing signals from the different columns with each other and along a second direction by comparing signals from the different rows with each other.

Claim 9(original) The position sensor of claim 7, wherein the capacitance measurement channels comprise a charge transfer circuit.

Claim 10(original) The position sensor of claim 7, wherein the capacitance measurement channels are configured to drive a plurality of sensing electrodes substantially synchronously in phase with one another.

Claim 11(original) The position sensor of claim 1, wherein the sensing cells are arranged into three columns.

Claim 12(original) The position sensor of claim 1, wherein the sensing cells are arranged into four columns.

Claim 13(original) The position sensor of claim 1, wherein the column sensing electrode and the row sensing electrode in each sensing cell are interleaved with one another.

Claim 14(original) The position sensor of claim 1, wherein the substrate is formed from a transparent material.

Claim 15(original) The position sensor of claim 1, wherein the electrodes are formed from a transparent electrically conductive material.

Claim 16(canceled)

Claim 17(original) The position sensor of claim 15, further comprising a graphical display wherein the electrodes in the sensing area are disposed over the graphical display to provide a touch screen.

Claim 18(original) The position sensor of claim 1, further comprising an insulating panel wherein the electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad.

Claim 19(original) A device comprising the position sensor of claim 1.

Claim 20(original) A method of constructing a capacitively sensitive surface disposed on a substrate which reports an X-Y coordinate position of an object within an active sensing region when the object is adjacent to said surface, comprising the steps of: (a) depositing a single layer of patterned conductive material in the active sensing region, the pattern comprising rows and columns of electrodes connected to individual ones

of capacitive sensing channels, and wherein at least one row or column is broken into a plurality of segments within the active region; (b) connecting the broken segments together with an electrical conductor, wherein the conductor is made to lie outside of the active sensing region; (c) connecting the rows and columns to individual sensing channels of a multi-channel capacitive sensor circuit having multiple outputs representing amplitudes of capacitance on the rows and columns; and (d) providing a processor operable to process the multiple outputs to determine a coordinate position of the adjacent object as an XY location.

Claim 21(original) The method of claim 20, wherein the processor is operable to compensate for position distortion introduced by the physical geometry of the patterned conductive material.

Claim 22(original) The method of claim 20, wherein the processor is operable to calculate a centroid of the signals across rows and a centroid of the signals across columns.

Claim 23(original) The method of claim 20, wherein the processor is operable to calculate an interpolation of the signals across rows and an interpolation of the signals across columns.

Claim 24(original) The method of claim 20, wherein the capacitive sensing channels employ driving signals which are substantially phase-synchronous with respect to one another.

Claim 25(original) A capacitive position sensor for determining the position of an object in a sensing area, the sensor comprising a substrate having a surface with an arrangement of conductive electrodes mounted

thereon, wherein the electrodes define an array of sensing cells arranged in columns and rows to form the sensing area, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together, wherein at least one column sensing electrode comprises a continuous spine within the sensing area, and at least one other column sensing electrode is made electrically continuous via connections external to the sensing area.

Claim 26(original) The position sensor of claim 25, wherein the conductive electrodes are transparent and further comprising a graphical display wherein the conductive electrodes in the sensing area are disposed over the graphical display to provide a touch screen.

Claim 27(original) The position sensor of claim 25, further comprising an insulating panel wherein the conductive electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad.

Electronic Acknowledgement Receipt

EFS ID:	2260786
Application Number:	11428670
International Application Number:	
Confirmation Number:	4355
Title of Invention:	Two-Dimensional Position Sensor
First Named Inventor/Applicant Name:	Luben Hristov
Customer Number:	20191
Filer:	David A. Kiewit
Filer Authorized By:	
Attorney Docket Number:	P2E
Receipt Date:	29-SEP-2007
Filing Date:	05-JUL-2006
Time Stamp:	10:06:56
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1	Preliminary Amendment	p2eA1intro.pdf	25023 d489a76916fcee50b82b37bd748ae016 debae1b1	no	1

Warnings:

Information:					
2	Claims	p2eA1claim.pdf	32772	no	5
			7e0c262b922bcc61db9cff87d8e69e0969fd1a		
Warnings:					
Information:					
Total Files Size (in bytes):			57795		
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>					

In Re PATENT APPLICATION of

Applicant: Hristov

Docket: P2E

Filing Date: 07/05/2006

Application Number: 11/428670

Art Unit: 2629

Examiner: Hjerpe, R. A.

Title: Two-dimensional Position Sensor

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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

Request for Refund under 37 C. F. R. § 1.117

Subject application has not received an Office Action as of the date of this request.

Three claims are now canceled to reduce their number to a total of 24.

Hence, a refund of \$75 (3 claims at the small entity rate of \$25 each) is requested. Please pay this refund by crediting Deposit Account 50-1012, which was used to pay fees at the time of filing.

Date: September 29, 2007

Mail: 5901 Third Street South
St. Petersburg FL 33705-5305

/David A Kiewit/
David A. Kiewit
Reg. No. 34640
(727) 866-0669 voice/fax

Electronic Acknowledgement Receipt

EFS ID:	2260788
Application Number:	11428670
International Application Number:	
Confirmation Number:	4355
Title of Invention:	Two-Dimensional Position Sensor
First Named Inventor/Applicant Name:	Luben Hristov
Customer Number:	20191
Filer:	David A. Kiewit
Filer Authorized By:	
Attorney Docket Number:	P2E
Receipt Date:	29-SEP-2007
Filing Date:	05-JUL-2006
Time Stamp:	10:21:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	p2erefund.pdf	30992 <small>2d86cdadb9bf64df7e95b0c32cd51484fd51cd3d4</small>	no	1

Warnings:

Information:	
Total Files Size (in bytes):	30992
<p>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.</p> <p><u>New Applications Under 35 U.S.C. 111</u> 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.</p> <p><u>National Stage of an International Application under 35 U.S.C. 371</u> 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.</p> <p><u>New International Application Filed with the USPTO as a Receiving Office</u> 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.</p>	

PATENT APPLICATION FEE DETERMINATION RECORD

Effective October 1, 2003

Application or Docket Number

11/428,690

CLAIMS AS FILED - PART I

(Column 1)

(Column 2)

TOTAL CLAIMS		
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	24 minus 20 =	4
INDEPENDENT CLAIMS	3 minus 3 =	0
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>		

* If the difference in column 1 is less than zero, enter "0" in column 2

CLAIMS AS AMENDED - PART II

(Column 1)

(Column 2)

(Column 3)

AMENDMENT A	9/29/07	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	24	Minus	27	0
	Independent	3	Minus	3	0
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

SMALL ENTITY TYPE ☐

OR

OTHER THAN SMALL ENTITY

RATE	FEE
BASIC FEE	385.00
X\$ 9=	175
X43=	
+145=	
TOTAL	

RATE	FEE
BASIC FEE	770.00
X\$18=	
X86=	
+290=	
TOTAL	

SMALL ENTITY TYPE ☐

OR

OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE
X\$ 9=	25
X43=	
+145=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	30
X86=	280
+290=	
TOTAL ADDIT. FEE	

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

RATE	ADDITIONAL FEE
X\$ 9=	
X43=	
+145=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X86=	
+290=	
TOTAL ADDIT. FEE	

AMENDMENT C		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

RATE	ADDITIONAL FEE
X\$ 9=	
X43=	
+145=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$18=	
X86=	
+290=	
TOTAL ADDIT. 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.

INDEX OF CLAIMS

11/428,670

✓ Rejected - (Through numeral) ... Canceled N Non-elected A Appeal
 = Allowed + Restricted I Interference O Objection

Claim	Date
1	
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If more than 150 claims or 9 actions staple additional sheet here

In Re PATENT APPLICATION of

Applicant: Hristov

Filing Date: 07/05/2006

Docket: P2E

Application Number: 11428670

**Identification Of Applications And Patents Having At Least One Inventor In
Common**

(37 CRF §1.78 (f) (1) (i) - (ii))

The captioned application has a filing date that is the same as or within two months of the filing date of:

Application serial number	Filing date	Owner in common
11/422799	06/07/2006	Philipp
11/424900	06/19/06	Philipp

The identification of the other pending or patented nonprovisional application(s) required by paragraph (f)(1)(i) of this section is submitted within:

 (A) Four months from the actual filing date in a nonprovisional application filed under 35 U.S.C. 111(a);

 (B) Four months from the date on which the national stage commenced under 35 U.S.C. 371(b) or (f) in a nonprovisional application entering the national stage from an international application under 35 U.S.C. 371;

 (C) Two months from the mailing date of the initial filing receipt in such other nonprovisional application for which identification is required by paragraph (f)(1)(i) of this section; or

 X (D) A time period ending on February 1, 2008.

Respectfully submitted on September 20, 2007

/David A Kiewit/
David A Kiewit
Reg. 34640

Electronic Acknowledgement Receipt

EFS ID:	2223275
Application Number:	11428670
International Application Number:	
Confirmation Number:	4355
Title of Invention:	Two-Dimensional Position Sensor
First Named Inventor/Applicant Name:	Luben Hristov
Customer Number:	20191
Filer:	David A. Kiewit
Filer Authorized By:	
Attorney Docket Number:	P2E
Receipt Date:	20-SEP-2007
Filing Date:	05-JUL-2006
Time Stamp:	19:26:51
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes) /Message Digest	Multi Part /.zip	Pages (if appl.)
1	Miscellaneous Incoming Letter	p2e2mo.pdf	28691 9cddf97c6c6ca2753fa1 1f84f40f6cdf1 ce 0b5be	no	1

Warnings:

Information:	
Total Files Size (in bytes):	28691
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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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P.O. Box 1450
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www.uspto.gov

APPLICATION NUMBER	FILING OR 371(c) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/428,670	07/05/2006	Luben Hristov	P2E

CONFIRMATION NO. 4355

20191
DAVID KIEWIT
5901 THIRD ST SOUTH
ST PETERSBURG, FL33705

Title: Two-Dimensional Position Sensor

Publication No. US-2007-0008299-A1

Publication Date: 01/11/2007

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

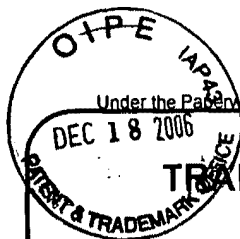
The publication may be accessed through the USPTO's publicly available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

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In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 703-305-3028.

Pre-Grant Publication Division, 703-605-4283



PTO/SB/21 (09-06)

Approved for use through 03/31/2007. OMB 0651-0031
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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**TRANSMITTAL
FORM**

(to be used for all correspondence after initial filing)

Total Number of Pages in This Submission

Application Number 11/428670

Filing Date 07/05/2006

First Named Inventor Hristov

Art Unit 2629

Examiner Name

Attorney Docket Number P2E

ENCLOSURES (Check all that apply)

<input type="checkbox"/> Fee Transmittal Form	<input type="checkbox"/> Drawing(s)	<input type="checkbox"/> After Allowance Communication to TC
<input type="checkbox"/> Fee Attached	<input type="checkbox"/> Licensing-related Papers	<input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences
<input type="checkbox"/> Amendment/Reply	<input type="checkbox"/> Petition	<input type="checkbox"/> Appeal Communication to TC (Appeal Notice, Brief, Reply Brief)
<input type="checkbox"/> After Final	<input type="checkbox"/> Petition to Convert to a Provisional Application	<input type="checkbox"/> Proprietary Information
<input type="checkbox"/> Affidavits/declaration(s)	<input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address	<input type="checkbox"/> Status Letter
<input type="checkbox"/> Extension of Time Request	<input type="checkbox"/> Terminal Disclaimer	<input type="checkbox"/> Other Enclosure(s) (please identify below):
<input type="checkbox"/> Express Abandonment Request	<input type="checkbox"/> Request for Refund	
<input checked="" type="checkbox"/> Information Disclosure Statement	<input type="checkbox"/> CD, Number of CD(s) _____	
<input type="checkbox"/> Certified Copy of Priority Document(s)	<input type="checkbox"/> Landscape Table on CD	
<input type="checkbox"/> Reply to Missing Parts/ Incomplete Application	Remarks	
<input type="checkbox"/> Reply to Missing Parts under 37 CFR 1.52 or 1.53	Copies of foreign patent documents and non-patent literature reference enclosed herewith. Disclosure is made prior to a first office action on the merits and within 3 months of the mailing of subject references from a foreign patent office.	

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm Name	David Kiewit		
Signature			
Printed name	David Kiewit		
Date	12/14/2006	Reg. No.	34640

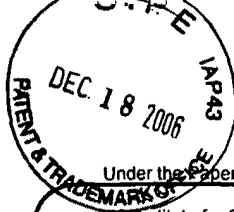
CERTIFICATE OF TRANSMISSION/MAILING

I hereby certify that this correspondence is being facsimile 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 on the date shown below:

Signature			
Typed or printed name	David Kiewit	Date	12/15/2006

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Substitute for form 1449/PTO

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(Use as many sheets as necessary)

Complete if Known

Application Number	11428670
Filing Date	2006-07-05
First Named Inventor	Hristov
Art Unit	2629
Examiner Name	-
Attorney Docket Number	P2E

Sheet 1 of 2

U. S. PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Document Number	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	Pages, Columns, Lines, Where Relevant Passages or Relevant Figures Appear
		Number-Kind Code ² (if known)			
		US- 4,550,221 A	10-29-1985	Mabusth	
		US- 6,288,707	09-11-2001	Philipp	
		US-			
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FOREIGN PATENT DOCUMENTS

Examiner Initials*	Cite No. ¹	Foreign Patent Document	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
		Country Code ³ -Number ⁴ -Kind Code ⁵ (if known)				
		EP 0609021 A	08-03-1994	AT&T Corp		

Examiner
SignatureDate
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.

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Substitute for form 1449/PTO

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**

(Use as many sheets as necessary)

Complete if Known

Application Number 11428670

Filing Date 2006-07-05

First Named Inventor Hristov

Art Unit 2629

Examiner Name

Attorney Docket Number P2E

Sheet 2 of 2

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
		IBM Technical Disclosure Bulletin, Vol. 21, No 10, March 1979, N. D. Lupat et al. "One layer optically transparent keyboard for input display", p 3904 to 3906	

Examiner
SignatureDate
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, 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.



Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number : **0 609 021 A3**

(12)

EUROPEAN PATENT APPLICATION

(21) Application number : **94300416.8**

(51) Int. Cl.⁵ : **G06K 11/16**

(22) Date of filing : **19.01.94**

(30) Priority : **29.01.93 US 11040**

(43) Date of publication of application :
03.08.94 Bulletin 94/31

(84) Designated Contracting States :
FR GB

(88) Date of deferred publication of search report :
12.10.94 Bulletin 94/41

(71) Applicant : **AT & T Corp.**
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200 Linden Avenue
Westfield, New Jersey 07090 (US)
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South Plainfield, New Jersey 07080 (US)

(74) Representative : **Johnston, Kenneth Graham et al**
AT&T (UK) Ltd.
5 Mornington Road
Woodford Green Essex, IG8 OTU (GB)

(54) **Capacitive position sensor.**

(57) A computer input device for use as a computer mouse or keyboard comprises a thin, insulating surface covering an array of electrodes. Such electrodes are arranged in a grid pattern and can be connected in columns and rows. Each column and row is connected to circuitry for measuring the capacitance seen by each column and row. The position of an object, such as a finger or handheld stylus, with respect to the array is determined from the centroid of such capacitance values, which is calculated in a microcontroller. For applications in which the input device is used as a mouse, the microcontroller forwards position change information to the computer. For applications in which the input device is used as a keyboard, the microcomputer identifies a key from the position of the touching object and forwards such key identity to the computer.

EP 0 609 021 A3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number

EP 94 30 0416

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. CL.5)
D,A	US-A-5 113 041 (G.E. BLUNDER et al.) * abstract; figure 1 *	1-4,10	G 06 K 11/16
A	US-A-4 736 191 (K.E. MATZKE et al.) * abstract; figures 1-3 *	1-3,10	
A	US-A-4 550 221 (S. MABUSTH) * abstract; figures 2-5 *	1-4,10	
A	FR-A-2 662 528 (SEXTANT AVIONIQUE) * abstract; figures 1-3 *	1,2,4,10	
			TECHNICAL FIELDS SEARCHED (Int. CL.5)
			G 06 K
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 27-07-1994	Examiner ZOPF K H M
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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(54) **Capacitive position sensor.**

(57) A computer input device for use as a computer mouse or keyboard comprises a thin, insulating surface covering an array of electrodes. Such electrodes are arranged in a grid pattern and can be connected in columns and rows. Each column and row is connected to circuitry for measuring the capacitance seen by each column and row. The position of an object, such as a finger or handheld stylus, with respect to the array is determined from the centroid of such capacitance values, which is calculated in a microcontroller. For applications in which the input device is used as a mouse, the microcontroller forwards position change information to the computer. For applications in which the input device is used as a keyboard, the microcomputer identifies a key from the position of the touching object and forwards such key identity to the computer.

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Field of the Invention

This invention relates to sensors for capacitively sensing the position or movement of an object, such as a finger, on a surface.

Background of the Invention

Numerous devices are known for sensing the position of objects on surfaces, many of which relate to computer input tablets. For example, U. S. Patent No. 5,113,041 to Greg E. Blonder et al. discloses a computer input tablet for use with a stylus in which the position of the stylus can be determined from signals transmitted to the stylus from a grid of signal lines embedded in the tablet, and U. S. Patent No 4,806,709 to Blair Evans discloses a touch-screen having a resistive layer with a number of point electrodes spaced thereon such that the position of a finger touching the screen can be determined from the relative values of the currents drawn from the point electrodes. The first such device requires means for the stylus itself to transmit information, such as a direct electrical connection. The second such device, and other kinds of tablets that sense the pressure of a finger or stylus, do not require such information-transmitting means.

Computer input tablets can be used for input of textual or graphical information. Various systems are known in the art which process handwritten text as if it were entered on a keyboard. Graphical information can also be captured by means of such tablets.

Other input devices such as computer "mice," joysticks and trackballs can be used with computers to control the position of a cursor on a display screen, such as a video terminal, for input of graphical information and for interactive programs such as computer games and programs using "windows" for display of information. Movement of a mouse in a particular direction on a surface causes a corresponding movement of the cursor or other object on the screen. Similarly, movement of a joystick or trackball in a particular direction causes such movement.

Input devices such as mice, joysticks and trackballs can be cumbersome because of their size and shape and, particularly with mice, the room needed for use. These drawbacks are more apparent with respect to portable computers, such as the so-called "notebook" computers. It is desirable, therefore, to furnish such control capabilities in an input device that can be incorporated in a small space, but without sacrificing ease of use. It is also desirable to be able to use such a device for multiple functions, for example, a particular area of a computer keyboard that can also be used as a mouse without losing its functionality as a keyboard. Further, it is desirable that such an input device be capable of operation by a finger or handheld stylus that does not require an electrical connection or other means for transmitting information.

Summary of the Invention

The capacitive sensor of the invention comprises a thin, insulating surface covering a plurality of electrodes. The position of an object, such as a finger or hand-held stylus, with respect to the electrodes, is determined from the centroid of capacitance values measured at the electrodes. The electrodes can be arranged in one or two dimensions. In a two-dimensional array, the capacitance for each electrode can be measured separately or the electrodes can be divided into separate elements connected in columns and rows and the capacitances measured for each column and row. The x and y coordinates of the centroid are calculated in a microcontroller from the measured capacitances. For applications in which the sensor is used to emulate a mouse or trackball, the microcontroller forwards position change information to utilizing means. For applications in which the sensor is used to emulate a keyboard, the microcontroller identifies a key from the position of the touching object and forwards such key identification to utilizing means.

These and other aspects of the invention will become apparent from the attached drawings and detailed description.

Brief Description of the Drawing

FIG. 1 is a graphic diagram showing the relationship between the position of a user's finger and capacitances at electrodes in a two-dimensional sensor constructed in accordance with the invention.

FIG. 2 is a more detailed representation of interdigitated electrode components at the intersections of rows and columns in a two-dimensional sensor.

FIG. 3 is an alternate arrangement for electrodes in the array.

FIG. 4 is an overall block diagram of a two-dimensional capacitive position sensor in accordance with the invention.

FIG. 5 is a diagram of an integrating amplifier and bootstrap circuit associated with the electrodes.

FIG. 6 is a flow chart showing operation of the capacitive position sensor of the invention as a computer mouse or trackball.

FIG. 7 is a diagram showing use of the capacitive position sensor of the invention as a keyboard.

5 FIG. 8 is a flow chart showing operation of the capacitive position sensor of the invention as a keyboard.

Detailed Description

10 The invention will be described in terms of an exemplary two-dimensional embodiment adapted to emulate a computer mouse or keyboard for use with a personal computer. However, it will be clear to those skilled in the art that the principles of the invention can be utilized in other applications in which it is convenient to sense position of an object capacitively in one or more dimensions.

15 The operational principle of the capacitive position sensor of the invention is shown in FIG. 1. Electrode array 100 is a square or rectangular array of electrodes 101 arranged in a grid pattern of rows and columns, as in an array of tiles. A 4 x 4 array is shown, which we have found adequate for emulating a computer mouse by finger strokes on the array. However, the invention can be used with arrays of other sizes, if desired. The electrodes are covered with a thin layer of insulating material (not shown). Finger 102 is shown positioned with respect to array 100. Electrode array 100 can be one-dimensional for applications in which position in only one dimension is to be sensed.

20 Histogram 110 shows the capacitances for electrodes 101 in array 100 with respect to finger 102. Such capacitances are a two-dimensional sampling of the distribution of capacitance between array 100 and finger 102. The centroid (center of gravity or first moment) 111 of such distribution will correspond to the position of finger 102, or some other object touching array 100, if suitable sampling criteria are met; that is, by choosing electrodes of sufficiently small size when compared to the extent of the distribution. Such criteria are discussed
25 in the Blonder et al. patent referred to above.

The x and y coordinates of the centroid can be determined by directly measuring the capacitance at each electrode 101 and calculating such x and y coordinates from such measured capacitances. Thus, for the 4 x 4 array 100, sixteen capacitance measurements would be needed. The number of measurements can be reduced, however, by taking advantage of the fact that the one-dimensional centroids of the projections of the distribution onto the x and y axes also correspond to the finger position. Such projections can be formed by
30 subdividing each electrode 101 into two elements, as shown in FIG. 2.

FIG. 2 shows four such subdivided electrodes in more detail at an intersection of two rows and two columns in array 100. As can be seen from FIG. 2, a horizontal element 201 and a vertical element 202 are situated at each intersection of a row and column. Horizontal elements 201 are interconnected by leads 203 and vertical
35 elements 202 are interconnected by leads 204. Elements 201 and 202 can be interdigitated as shown. It is advantageous for the conducting areas of elements 201 and 202 to cover the surface of array 100 as completely as possible. For finger strokes, we have used interdigitated elements 201 and 202 that are approximately 0.37" square. Smaller electrodes 101 or elements 201 and 202 be desirable for use with a hand-held stylus having a smaller cross-section than a finger.

40 As will be clear to those skilled in the art, elements 201 and 202 can be fabricated in one plane of a multi-layer printed circuit board together with one set of interconnections, for example, the horizontal row connections 203. The vertical row connections 204 can then be fabricated in another plane of the circuit board with appropriate via connections between the planes.

Other electrode array configurations can be used, if desired. For example, FIG. 3 shows horizontal strip electrodes 203' overlapping vertical strip electrodes 204'. Electrodes 203' and 204' are separated by a thin insulating layer (not shown) and covered by another thin insulating layer (not shown). In such a configuration, areas of electrodes 204' must be left unmasked by electrodes 203' so that electrodes 204' can still "see" the capacitance of an object touching the surface in which such electrodes are embedded. A similar configuration of electrodes is shown in the Blonder et al. patent. However, the structure of FIG. 2 is preferred because the
50 interdigitated elements 201 and 202 do not overlap and the capacitance values measured can be higher for a given area of array 100, thus providing greater noise immunity.

FIG. 4 is an overall block diagram of a capacitive sensor 400 in accordance with the invention. Electrode array 100 comprises rows and columns of electrodes, for example, rows and columns of connected horizontal and vertical elements as shown in FIG. 2. Referring again to FIG. 4, each row and column of electrodes from
55 array 100 is connected to an integrating amplifier and bootstrap circuit 401, which is shown in more detail in FIG. 5 and will be described below. Each of the outputs from circuits 401 can be selected by multiplexer 402 under control of microcontroller 406. The selected output is then forwarded to summing circuit 403, where such output is combined with a signal from trimmer resistor 409. Synchronous detector and filter 404 convert the

output from summing circuit 403 to a signal related to the capacitance of the row or column selected by multiplexer 402. RF oscillator 408 provides an RF signal, for example, 100 kilohertz, to circuits 401, synchronous detector and filter 404 via inverter 410, and guard plane 411. Guard plane 411 is a substantially continuous plane parallel to array 100 and associated connections, and serves to isolate array 100 from extraneous signals. The operation of synchronous detector and filter 404 is well known in the art, for example, see page 889 of "The Art of Electronics," Second Edition, by Horowitz and Hill, Cambridge University Press (1989).

Apparatus similar to that shown in FIG. 4 can also be used for applications in which it is desired to measure separate capacitance values for each electrode in array 100 instead of the collective capacitances of subdivided electrode elements connected in rows and columns. To measure such capacitances separately, a circuit 401 is provided for each electrode in array 100 and multiplexer 402 is enlarged to accommodate the outputs from all circuits 401.

The output of synchronous detector and filter 404 is converted to digital form by analog-to-digital converter 405 and forwarded to microcontroller 406. Thus, microcontroller 406 can obtain a digital value representing the capacitance seen by any row or column of electrode elements (or electrode if measured separately) selected by multiplexer 402. Buttons 407, which can be auxiliary pushbuttons or switches situated near array 400, are also connected to microcontroller 406. Buttons 407 can be used, for example, for the same purposes as the buttons on a computer mouse. Microcontroller 407 sends data to utilizing means, such as a personal computer (not shown) over lead 420. A particular device that can be used for A/D converter 405 and microcontroller 406 is the 87C552 circuit made by Intel Corporation, which includes both an A/D converter and a microprocessor.

FIG. 5 is a circuit diagram of each integrating amplifier and bootstrap circuit 401. The RF signal from RF oscillator 408 drives the base of transistor Q1 and the bootstrap circuit comprised of resistor 501 and capacitor 502. Current source 503 provides a constant DC bias current through transistor Q1. An electrode in array 100 is connected to the emitter of transistor Q1. The RF current to an electrode is determined by the capacitance seen by the electrode; thus, an increase in capacitance caused by the proximity of an object, such as a finger, causes an increase in such current. Such an increase is reflected as a change in the RF current flowing from the collector of transistor Q1. The collector of transistor Q1 is connected to the input node of integrating amplifier 505 via coupling capacitor 506. For a change in capacitance, ΔC , at the electrode, the change in the amplitude of the output signal from amplifier 505 will be approximately $A(\Delta C/C_i)$, where A is the amplitude of the RF signal from oscillator 408 and C_i is the value of integrating capacitor 507. Resistor 508 provides a bias current for amplifier 505 and resistor 504 provides bias current for transistor Q1.

The effects of electrode-to-electrode capacitances, wiring capacitances and other extraneous capacitances are minimized by driving all electrodes and guard plane 411 in unison from RF oscillator 408. The bootstrap circuit serves to minimize any signal due to the finite impedance of the biasing circuit of transistor Q1. The base-to-collector capacitance of transistors Q1 and other stray capacitances in the circuit can be compensated for by adjusting trim resistor 109 shown in FIG. 1.

In using the position sensor of the invention as a computer mouse or trackball to control a cursor, movement of the mouse or trackball is emulated by touching array 100 with finger 102, or some other object, and stroking finger 102 over array 100 to move the cursor. Changes in position of the finger with respect to array 100 are reflected in corresponding changes in position of the cursor. Thus, for such an application, microcontroller 406 sends data over lead 420 relating to changes in position. FIG. 6 is a flow chart of the operation of microcontroller 406 in such an application.

Referring to FIG. 6, microcomputer 406 reads the initial capacitance values for all the elements in array 100 and stores such values (step 601). Such initial values should reflect the state of array 100 without a finger or other object being nearby, accordingly, it may be desirable to repeat step 601 a number of times and then to select the minimum capacitance values read as the initial values, thereby compensating for the effect of any objects moving close to array 100 during the initialization step. After initialization, all capacitance values are periodically read and the initial values subtracted to yield a remainder value for each element (step 602). If one or more of the remainders exceeds a preset threshold (step 603), indicating that an object is close to or touching array 100, then the x and y coordinates of the centroid of capacitance for such object can be calculated from such remainders (step 604). For applications in which the electrodes of array 100 are connected in rows and columns, as shown in FIG. 2 and FIG. 3, such calculation can be performed as follows:

$$x = \frac{\sum_{n_x=1}^{u_x} n_x V(n_x)}{\sum_{n_x=1}^{u_x} V(n_x)} \quad (1)$$

$$y = \frac{\sum_{n_y=1}^{u_y} n_y V(n_y)}{\sum_{n_y=1}^{u_y} V(n_y)} \quad (2)$$

where:

u_x is the number of columns, $V(n_x)$ is the value measured for column n_x , u_y is the number of rows and $V(n_y)$ is the value measured for row n_y . To avoid spurious operation, it may be desirable to require that two or more measurements exceed the preset threshold. The threshold can be set to some percentage of the range of A/D converter 405, for example 10-15% of such range.

For applications in which the capacitance values for the electrode 101 in array 100 are measured separately, the x and y values of the centroid can also be calculated using equations (1) and (2) by adding all the capacitances measured for a row or column to obtain the value of V for such row or column. Such addition has the same effect as if the electrodes were connected together in a row or column.

When set, the "T" flag indicates that remainders were above the threshold during the previous iteration through step 603. Such flag is set during step 606 and cleared during step 607. Thus, after the first iteration through step 603, indicating a new stroke of finger 102 on array 100, the "T" flag is set and the x and y values just calculated are stored. During each subsequent iteration during such stroke, the changes in x and y (dx and dy) are calculated (step 608) as follows:

$$dx = x_c - x_p \quad (3)$$

$$dy = y_c - y_p \quad (4)$$

where x_c and y_c are the values just calculated in step 605 and x_p and y_p are the values calculated and stored (step 610) during the previous iteration.

It may be desirable to remove jitter from the least-significant bit in the values of dx and dy calculated (step 609). This can be accomplished by incrementing negative values by 1 and decrementing positive values by 1, leaving zero values without change.

The values calculated for x and y are stored (step 610) for use in calculating dx and dy during the next iteration. Then, if other inputs, such as buttons 407, are connected to microcontroller 406, the state of such inputs is read (step 611). Finally, if x and y have changed ($dx \neq 0$ or $dy \neq 0$) or the state of buttons 407 has changed (step 612), data relating to such changes is sent over line 420 to the computer or other utilizing means to which sensor 400 is connected (step 613). Such data typically includes dx , dy and the current state of the buttons, which corresponds to that sent to a computer by a conventional computer mouse or trackball. Finally the states of such other inputs are stored (step 614) for use during the next iteration.

Typically the cycle time through the above-described steps will be about 20 milliseconds, depending on the time constant of the filter in circuit 404. After each change of multiplexer 402, microcontroller 406 is programmed to wait approximately 2 milliseconds for the output of circuit 404 to settle.

It will be clear that the absolute values of x and y can be included in the data sent over line 420 to utilizing means, if desired. For example, capacitive input sensor 400 can be adapted for use as a general purpose input pad for entering handwritten information. For such an application, it may be desirable to increase the number of electrodes to improve definition, but even a 4x4 matrix for use with finger input can produce useful input data because of the interpolating effect of the centroid-finding calculations performed in step 604.

Instead of using buttons 407 for additional input when array sensor 100 is used as a computer mouse, it may be desirable to sense different finger pressures. For example, to perform a "click and drag" operation, a typical use of a computer mouse, a heavier finger pressure can be used on array 100 than when an ordinary cursor movement is desired. Clearly finger pressures can be sensed by electromechanical or other means,

but differences in the capacitances sensed by sensor 400 can also be used for this purpose.

The magnitudes of the capacitance values sensed by array 100 are somewhat related to finger pressure because of the compressibility of the fingertip when contacting array 100. Higher finger pressure will cause higher capacitance values to be sensed. This effect can be enhanced by replacing the insulating layer (not shown) on array 100 with a compressible insulating layer. Different finger pressures can be set by defining one or more additional thresholds for use in step 603. An ordinary touch would cause the remainders to exceed only the first threshold; a heavier touch would cause at least one remainder to exceed a higher threshold, which could then be used to indicate a different button state.

FIG. 7 is a diagram showing how an array 100 can be used as a keyboard in accordance with the invention. Again, array 100 is shown as a 4 x 4 matrix of electrodes, but with a keyboard pattern overlay superimposed on the matrix. Such a keyboard pattern can be printed on the insulating layer covering the electrodes. Note that the individual "keys" in the keyboard do not necessarily correspond to the underlying electrodes. The x and y coordinates are shown for reference purposes. Since the values obtained for x and y in a 4 x 4 matrix using equations (1) and (2) will range from 1 to 4, this range is shown on the coordinates.

The identity of a key touched is determined from the x and y values computed for the centroid of capacitance resulting from the touch. For example, using the x and y coordinates shown in FIG. 7, a "5" can be defined as a touch with $[1.7 \leq x \leq 2.3, 2.3 \leq y \leq 2.7]$; a "0" can be defined as a touch with $[1 \leq x \leq 2.3, 1 \leq y \leq 1.3]$; and a "+" can be defined as a touch with $[3.7 \leq x \leq 4, 2.4 \leq y \leq 3.5]$. These ranges are chosen to leave guard bands between adjacent keys.

FIG. 8 is a flow chart showing operation of microcontroller 406 when the capacitive position sensor of the invention is used as a keyboard. Steps 801, 802, 803 and 805 are similar to steps 601, 602, 603 and 604, respectively, in FIG. 6. In step 806, the identity of the key touched is determined from the values of x and y calculated in step 806. In step 807, the identity of the key touched is sent to utilizing means. The "T" flag is set in step 808, cleared in step 809 and tested in step 804. Such flag assures that the key identity is sent to utilizing means only once.

It should be clear that the various ways described above of using the capacitive position sensor of the invention can be combined. For example, a combination mouse-keyboard can be implemented in which one portion of array 100 is used as a mouse responsive to finger strokes and a second portion is used as a keyboard responsive to finger touches. Alternatively, array 100 can be adapted to operate in different modes: the first mode as a mouse, the second as a keyboard. Switching between modes can be accomplished, for example, with one of buttons 407, or with extra pressure in a specified region of array 100. Thus, where space is at a premium, such as in a portable computer, the capacitive position sensor of the invention can be used as part of the keyboard and also as a mouse.

The invention has been shown and described with reference to particular embodiments. However, it will be understood by those skilled in the art that various changes may be made therein without departing from the spirit and scope of the invention.

Claims

1. A sensor (100) for capacitively sensing the position of an object on a surface, which includes an array of electrodes (101) on said surface, an insulating layer covering said electrodes and means (401, 402, 403, 404, 405, 408, 409, 410) for measuring a capacitance value for each said electrode;

CHARACTERIZED BY

- means (406) operative when at least one of said capacitance values exceeds a first preset threshold for determining the position of said object by calculating the centroid of capacitance for said array from said measured capacitance values and
- means (406) for sending said position to utilizing means.

2. The sensor of claim 1

CHARACTERIZED IN THAT

- said array is a two-dimensional array and said electrodes are arranged in rows and columns.

3. The sensor of claim 1

CHARACTERIZED IN THAT

- said calculating means periodically calculates changes in said position and said sending means periodically sends said changes to said utilizing means.

4. The sensor of claim 2

FURTHER CHARACTERIZED IN THAT

said sensor is adapted for use as a keyboard wherein said means for calculating further comprises:
a stored range of coordinates (in 406) for each key in said keyboard;

means for determining a key identity from said calculated position and said stored range and said
sending means sends said key identity to said utilizing means.

5. The sensor of claim 1

FURTHER CHARACTERIZED BY

means operative when at least one of said capacitance values exceeds at least a second preset
threshold for indicating to said utilizing means the thresholds exceeded.

6. The sensor of claim 2

FURTHER CHARACTERIZED BY

at each intersection of a row and a column, a first electrode element is connected to other electrode
elements in said row, thereby forming the electrode for said row, and a second electrode element is con-
nected to other electrode elements in said column, thereby forming the electrode for said column.

7. The sensor of claim 6

FURTHER CHARACTERIZED BY

said first and second electrode elements at each intersection are interdigitated.

8. The sensor of claim 1

FURTHER CHARACTERIZED IN THAT

said measuring means further comprises:

means (408) for supplying an RF signal in unison to each said electrode,

means (401) for sensing RF current signals for each said electrode, and

means (403, 404, 409, 410) for converting said RF current signals into signals representative of
the capacitances seen by each said electrode.

9. The sensor of claim 8

FURTHER CHARACTERIZED BY

a guard plane (411) substantially parallel to said electrodes, and said means for supplying further
comprises:

means for supplying said RF signal to said guard plane in unison with the RF signals supplied to
said electrodes.

10. The sensor of any of claims 1-9

CHARACTERIZED IN THAT

said sensor is adapted for use as a touch-sensitive input device for a computer.

FIG. 1

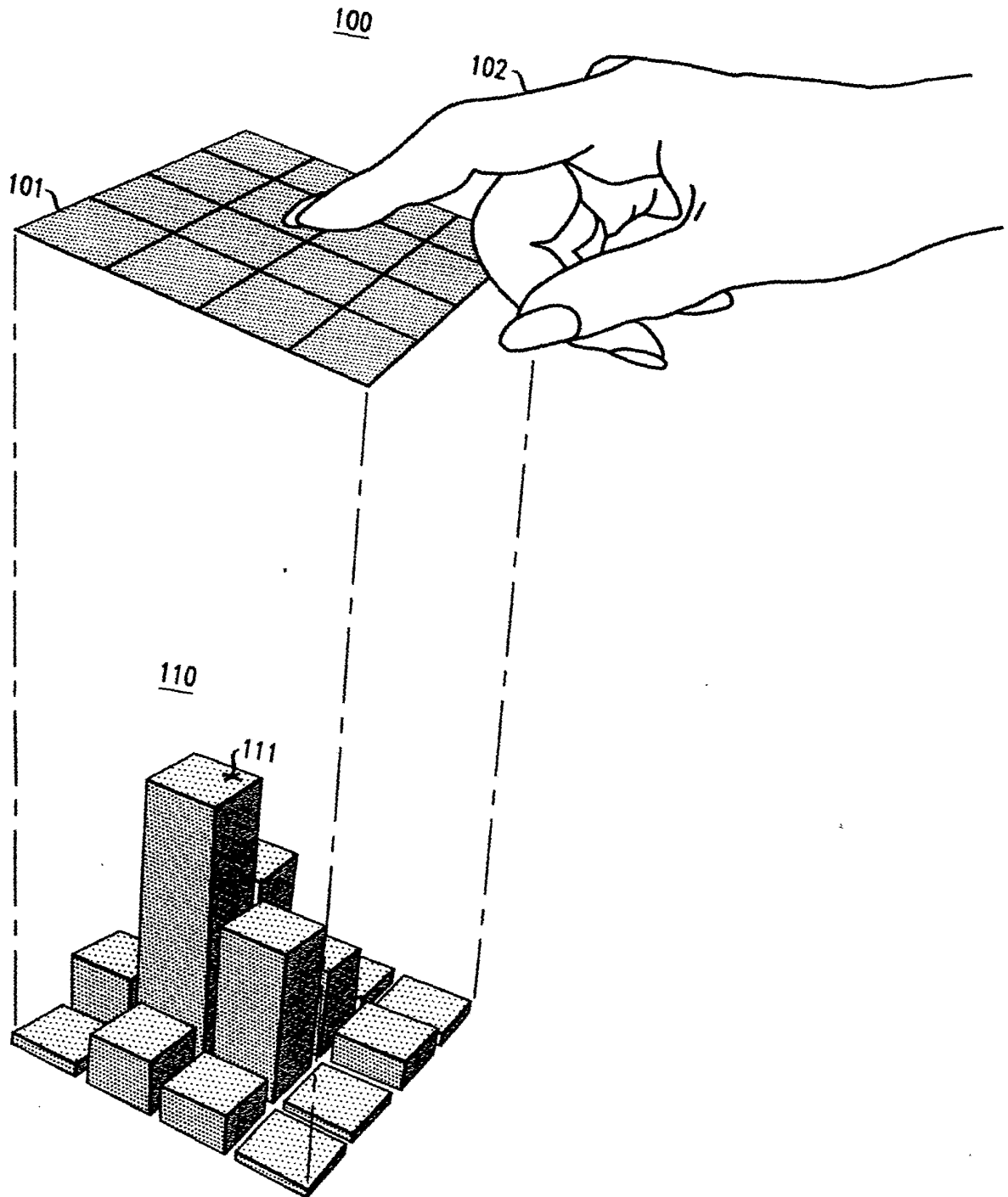


FIG. 2

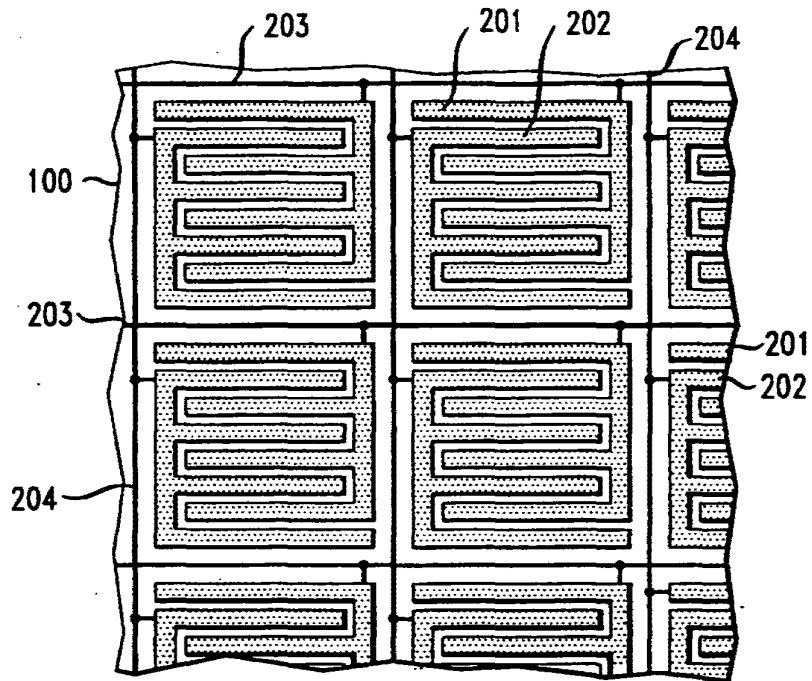


FIG. 3

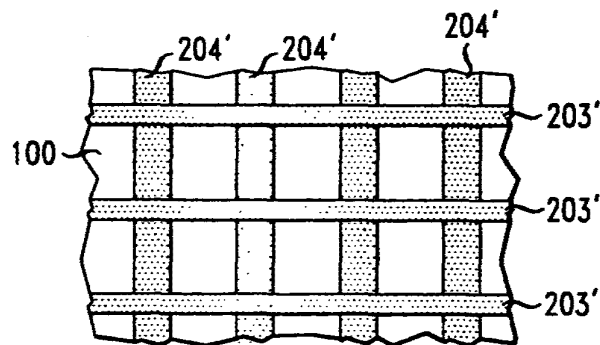
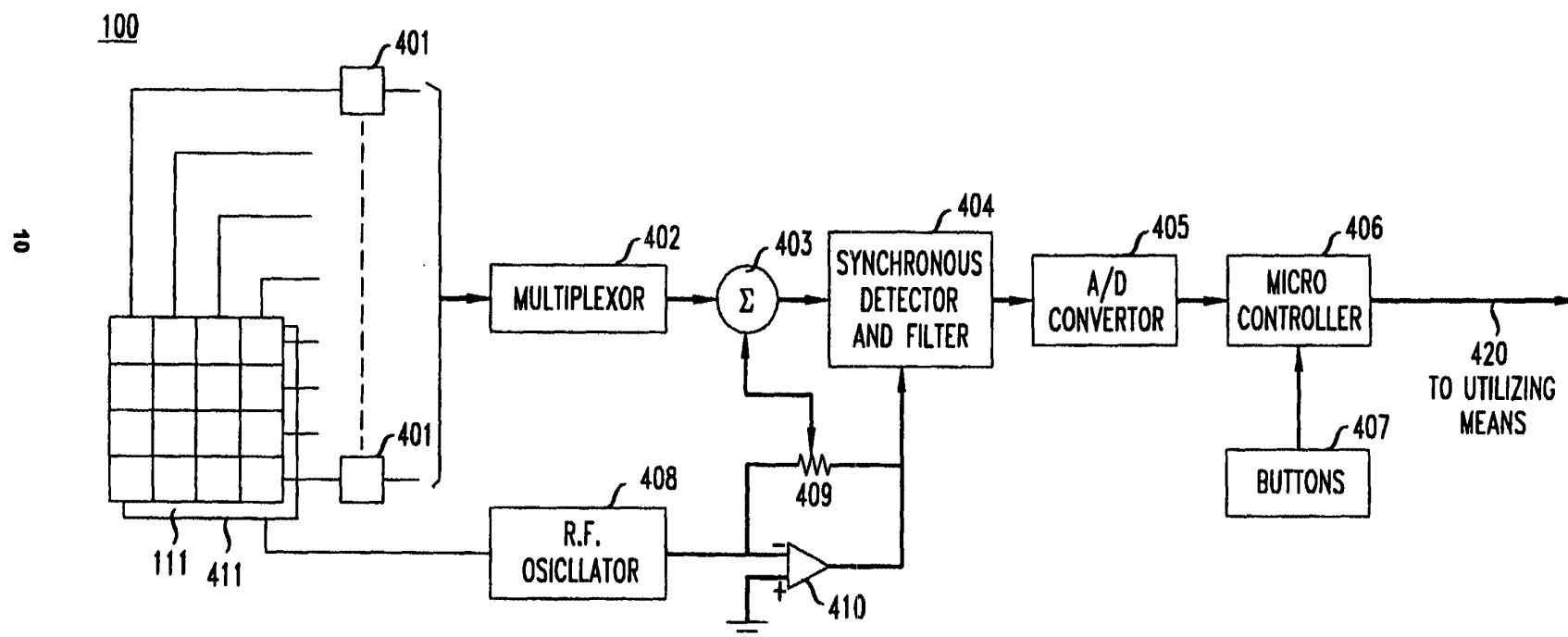


FIG. 4



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FIG. 5

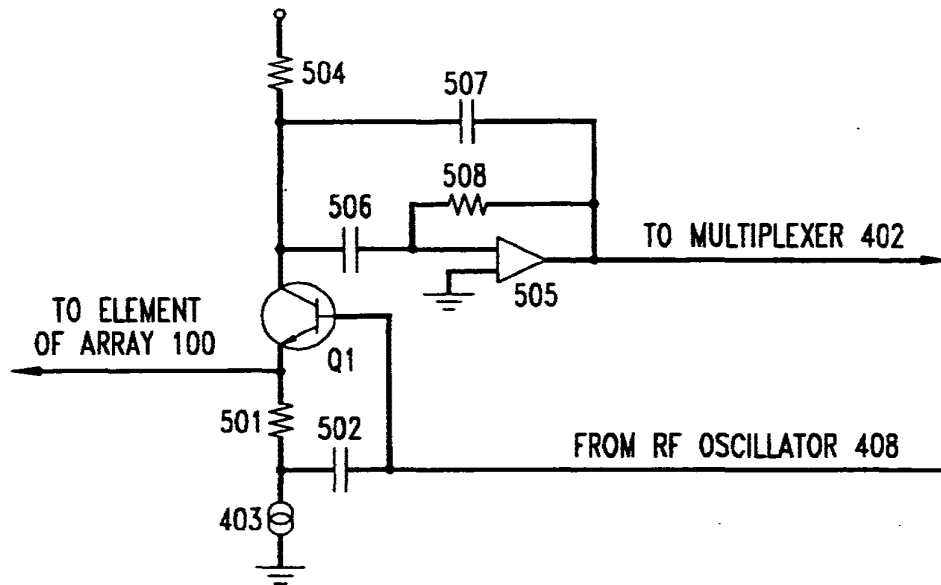


FIG. 7

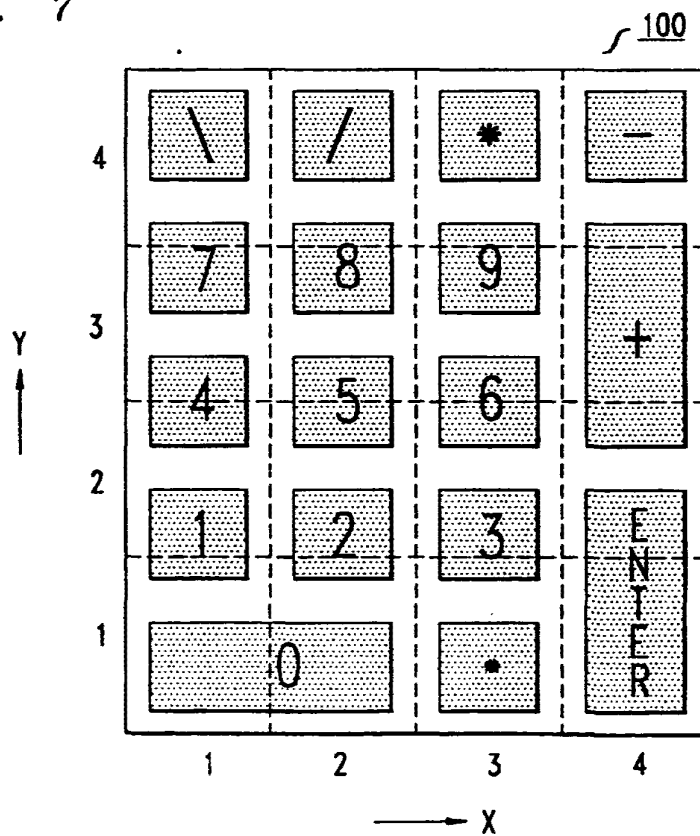


FIG. 6

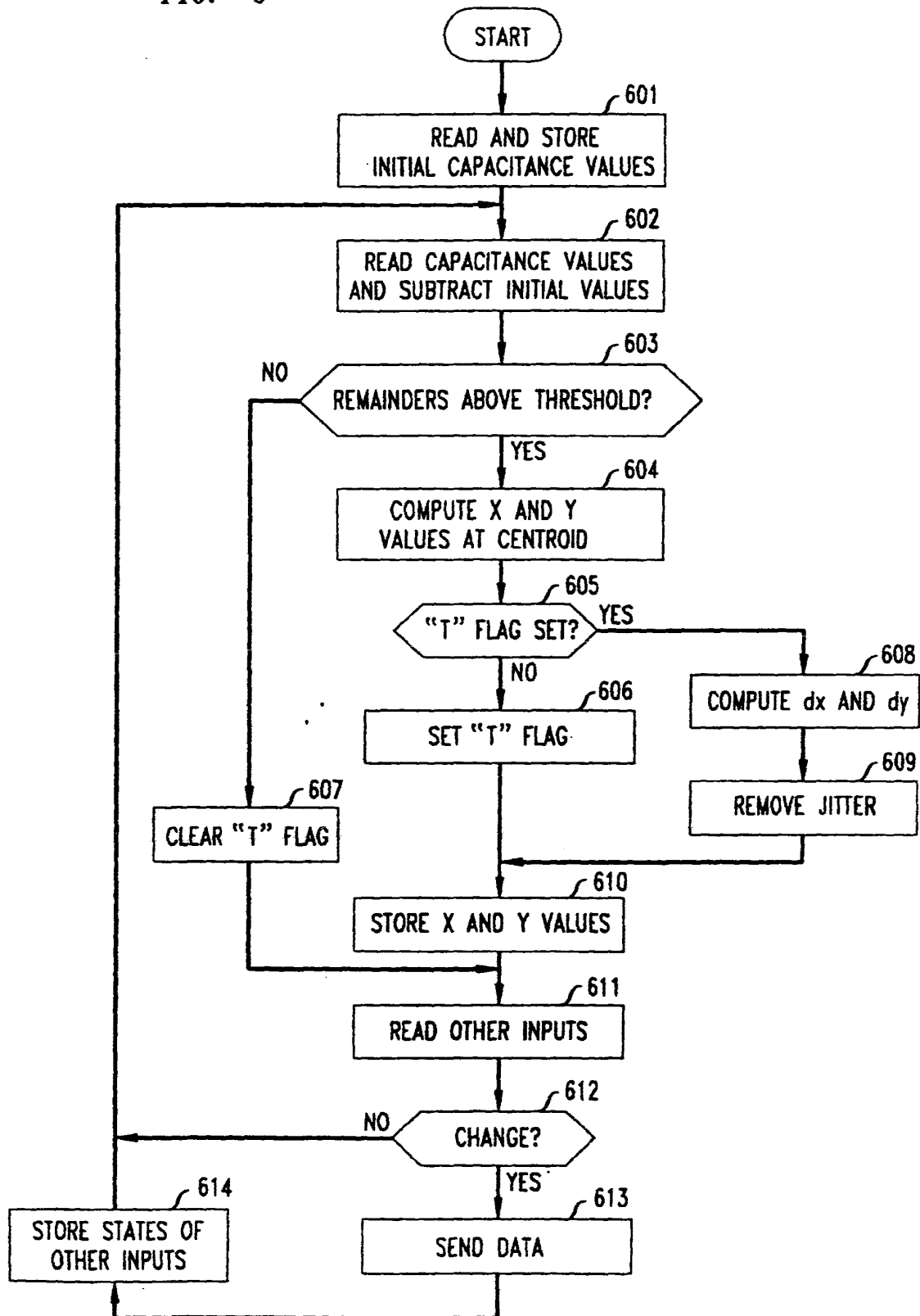
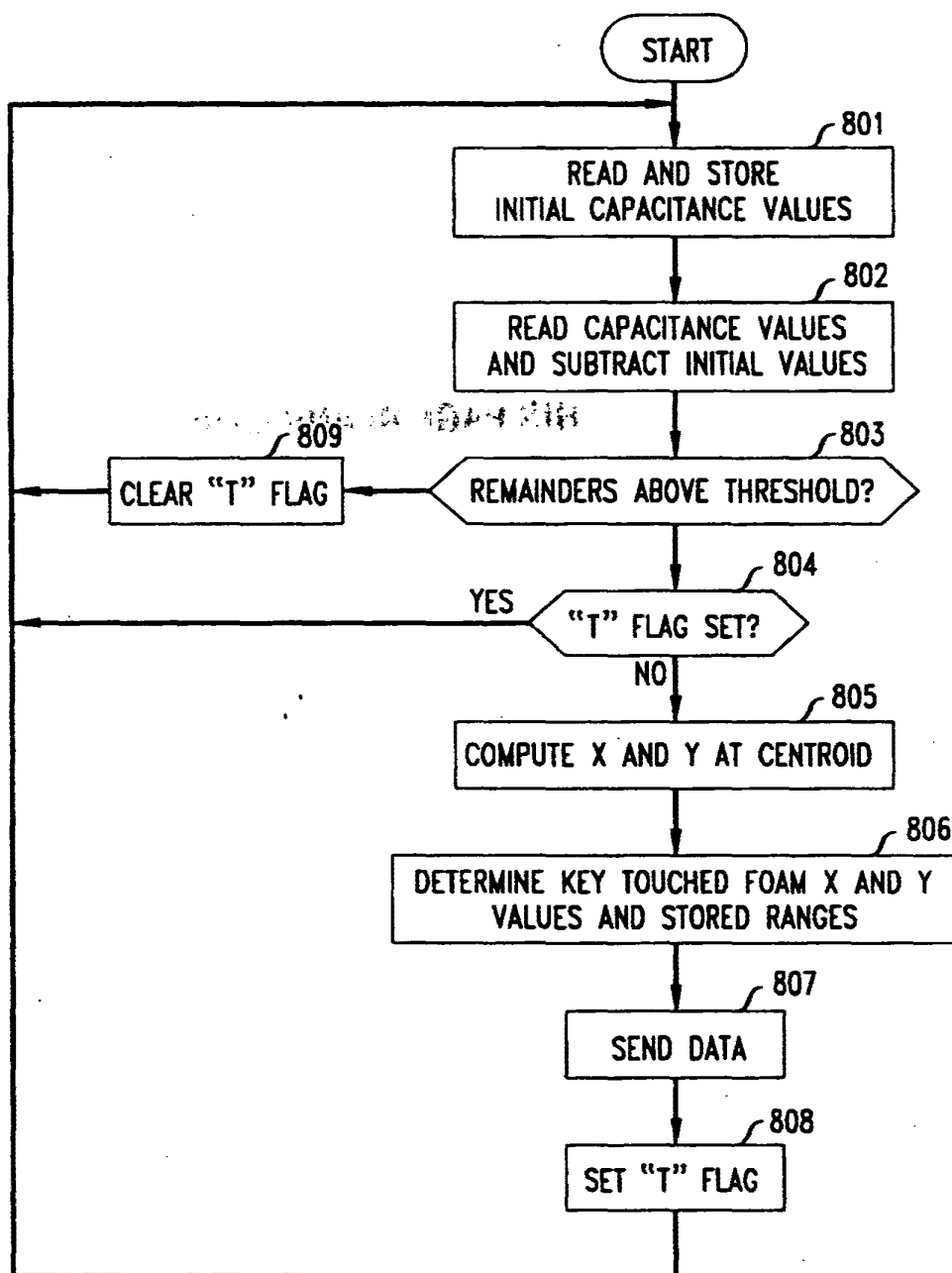


FIG. 8



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In Re PATENT APPLICATION of

Applicant: Hristov

Docket: P2E

Filing Date: 07/05/2006

Application Number: 11 428 670

Title: Two-Dimensional Position Sensor

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

Sir:

Please correct an error made by the undersigned in the Application Data Sheet for the captioned patent application.

The as-filed Application Data Sheet inadvertently showed a claim for foreign priority when none was intended.

A Supplemental Application Data Sheet with the correct information is supplied herewith.

Respectfully submitted

/David A Kiewit/

David Kiewit
Reg. No. 34640

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SUPPLEMENTAL Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P2E
		Application Number	11/428670
Title of Invention	Two-Dimensional Position Sensor		
<p>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.</p> <p>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.</p>			

Secrecy Order 37 CFR 5.2

<input type="checkbox"/>	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.)
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Applicant Authority		<input checked="" type="radio"/> Inventor		<input type="radio"/> Legal Representative under 35 U.S.C. 117		<input type="radio"/> Party of Interest under 35 U.S.C. 118
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<input type="checkbox"/> An Address is being provided for the correspondence Information of this application.			
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Application Information:

Title of the Invention	Two-Dimensional Position Sensor		
Attorney Docket Number	P2E	Small Entity Status Claimed	<input checked="" type="checkbox"/>
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)	8	Suggested Figure for Publication (if any)	3

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Supplemental Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P2E
		Application Number	11 428670
Title of Invention	Two-Dimensional Position Sensor		

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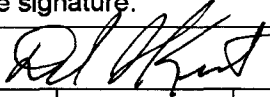
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Supplemental Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P2E
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Title of Invention	Two-Dimensional Position Sensor		

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TITLE OF THE INVENTION: Two-Dimensional Position Sensor

BACKGROUND OF THE INVENTION

[0001] The invention relates to a capacitive position sensor for determining the position of an object within a two-dimensional sensing area.

[0002] The use of two-dimensional touch-sensitive position sensors is becoming more common. Examples include the use of position sensors in laptop computers in place of mouse pointing devices, as control panels for receiving user inputs to control an appliance, or particularly as a glass touchscreen apparatus having an X-Y coordinate output. Some applications require a clear sensing layer so that a display can be viewed beneath the screen, while others only require an opaque touch surface, for example for a keypanel on a kitchen appliance or a PC peripheral.

[0003] Touch-sensitive position sensors are frequently preferred to mechanical devices because they provide for a more robust interface and are often considered to be more aesthetically pleasing. Furthermore, because touch-sensitive position sensors require no moving parts to be accessible to a user, they are less prone to wear than their mechanical counterparts and can be provided within a sealed outer surface. This makes their use where there is a danger of dirt or fluids entering a device being controlled particularly attractive.

[0004] There exists a large body of art involving 2D touchpanels and screens. They can be generally divided into two classifications: those that report an X-Y coordinate of a more or less continuous nature ('XY' type), and those that have a discrete sensing surface ('discrete' type) having predefined key areas that are fixed by physical geometry. The XY type find dominant use over LCD or other display types while the latter find use in fixed function key panels. There are

exceptions to this, for example touchpad surfaces on laptops report XY position but are opaque. XY types invariably involve a sensing surface on the user-side or 'first surface' of the touch area. For example, both continuous resistive and capacitive touch screens involve a sensing layer that must be either physically depressed by the user or touched almost directly, or at most through a thin layer of insulation (as in mouse touchpads). These types require that the product have a bezel opening to allow direct or near-direct contact by the user with the sensing layer. A significant disadvantage of these types is that there has to be an opening in the panel, which requires sealing against moisture and dirt and hence is expensive to mount. Furthermore the sensing layer is directly exposed to abuse and can be easily damaged by sharp objects or abrasion. While robust capacitive types are known which have buried wires inside a glass layer (e.g. US 5,844,506), these still require a bezel opening in a panel which must be sealed, and require two sensing layers as a matrix due to the need to cross X and Y conductors. Furthermore these screens are very expensive to produce and in fact cannot be produced on a mass scale; additionally the sensing circuitry is known to be complex and expensive.

[0005] In the field of discrete touch buttons, it has been known for some time that capacitive keys can be placed behind a solid surface having no requirement for a bezel opening. However these types only provide for limited resolution, as predefined by the location of discrete electrode shapes. An example of this can be found in US 4,954,823, Figures 4 and 6. While it is well known that these electrodes can be made of a single layer of clear conductor such as Indium Tin Oxide ('ITO') to allow placement over a bezel-less display, for example by the application of the layer as a film on the back of a subsection of a panel, nevertheless the technology is limited to discrete touch areas based on the number, size, and placement of discrete electrodes.

[0006] Figure 1 schematically shows in plan view a touch pad 2 of the type described in US 4,954,823, but laid out in an orthogonal array. The touch pad 2 comprises a grid of discrete electrodes 4 mounted on an insulating substrate 6. Each electrode is connected to a channel of capacitance measurement circuitry in a controller 8. US 5,463,388 describes this geometry in passing in conjunction with its Figure 1, to show how such an array can be used to determine a position of an object proximate the sensing layer via a method of determining a centroid of the signals from each pad. However US 5,463,388 fails to show how to implement such a design and describes instead a matrix of conductors along with a centroidal calculation of continuous X-Y position. In fact it is not practical to have so many sensing channels as one per sense pad, and a matrix arrangement is much more efficient as described below.

[0007] Figure 2 schematically shows a position sensor 12 based on a matrix of conductors as described in US 5,463,388. The position sensor 12 comprises a number of vertically aligned strip electrodes (columns) 14 mounted on an upper surface of an insulating substrate 16 and a number of horizontally aligned strip electrodes (rows) 15 mounted on an opposing lower surface of the insulating substrate. Each vertical strip electrode is connected to a channel of capacitance measurement circuitry in a controller 18. Thus, this type of position sensor allows an X-Y coordinate output of a continuous nature by means of calculation of a centroid of capacitance among the rows and columns rather than among discrete pads. However this type requires two sensing layers so that the matrix traces can be routed, and does not allow the use of optically clear materials.

[0008] The ideal touch surface would eliminate the need for a bezel opening (or at least, make it optional), have an inexpensive sensing surface that is applied to the rear of the panel surface that can project through a reasonable thickness of panel material (e.g. up to 4mm of glass or plastic), optionally require only one sensing layer with no crossovers in the sensing region, be

usable with clear sensing layers such as ITO, have an XY type of output, and have a compact, inexpensive driver circuit. This set of ideal goals has not been achieved with any known prior art.

SUMMARY OF THE INVENTION

[0009] According to a first aspect of the invention there is provided a capacitive position sensor for determining the position of an object in a sensing area, the sensor comprising a substrate having a surface with an arrangement of electrodes mounted thereon, wherein the electrodes define an array of sensing cells arranged in columns and rows to form the sensing area, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together, wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by respective row wrap-around connections made outside of the sensing area.

[0010] Thus a position sensor having electrodes on only a single layer of a substrate can be provided. Furthermore, because the position sensor employs an intersecting array of columns and rows of sensing electrodes (i.e. a matrix), fewer measurement channels are required than with sensors based on an array of discrete electrodes.

[0011] Because the position sensor is based on sensing electrodes on only a single surface, it can be cheaper to manufacture than known double-sided position sensors. This also means the sensing electrodes can be deposited directly onto a surface for which the opposing surface is inaccessible (e.g. a display screen). The sensing electrodes can also be deposited on an inside surface of a device housing, thus removing the need for any protective covering

that might be required if electrodes were also required to be on the outer surface.

[0012] The electrical row wrap-around connections may comprise a conductive trace mounted on the substrate. This allows the connection outside of the sensing area to be made in the same processing step as the sensing electrodes within it. Alternatively, the row wrap-around connections may be made by a free wire appropriately connected to the respective row sensing electrodes.

[0013] The column sensing electrodes of a column of sensing cells at an edge of the sensing area may be electrically coupled to one another by column wrap-around connections made outside of the sensing area in a similar fashion.

[0014] The position sensor may further comprise a plurality of capacitance measurement channels connected to respective ones of the rows of row sensing electrodes and the columns of column sensing electrodes, wherein each measurement channel is operable to generate a signal indicative of a capacitance between its associated column or row of sensing electrodes and a system ground.

[0015] In addition, the position sensor may further comprise a processor operable to determine the position of the object along the first direction by comparing signals from the columns of column sensing electrodes and along the second direction by comparing signals from the rows of row sensing electrodes.

[0016] This allows the determination of the position of a touch to be made using otherwise conventional circuitry connected to the sensing elements.

[0017] The capacitance measurement channels may comprise charge transfer circuitry since this provides a reliable and robust way to measure capacitances of

the level that might be expected in a typical implementation. However, other forms of capacitance measurement circuitry may equally be used. In general it is preferential to use a capacitive driver circuit that drives all the rows and column connections in a substantially phase-synchronous manner so as to prevent the electric fields from cross-loading into adjacent rows and columns. This is described also in US 5,463,388, where all the rows and column conductors are driven by a single oscillator.

[0018] The sensing cells may be arranged into three or four columns. This can provide a position sensor with sufficient resolution over a typically sized sensing area for most applications.

[0019] The column and row sensing electrodes in each sensing cell may be interleaved with one another (e.g. by spiraling around one another or being interlaced/intertwined), especially in designs where the row and column spacing is larger than that of a typical finger. This provides for a much more uniform blend of signals from the X and Y drives in each intersecting location, allowing better position reporting with respect to a finger touching the overlying surface. This is described also in US 5,463,388, for example Figure 2. In layouts where the row and column spacings are similar to or smaller than a human finger it is sufficient to use other arrangements of electrode pattern, for example an array of diamond shapes as shown in Figure 8 and described further below.

[0020] The position sensor may include a transparent substrate and transparent electrodes (e.g. formed from Indium Tin Oxide (ITO) deposited on the substrate). This allows it to be placed over a display screen without obscuring what is displayed beneath. Thus the display screen might be configured to display “virtual” buttons to a user that may be selected by the user placing their finger over the appropriate part of the display adjacent the position sensor. The position of the user’s touch can then be compared with the positions

of the “virtual” buttons being displayed to determine which one has been selected.

[0021] According to a second aspect of the invention there is provided a device comprising a position sensor according to the first aspect of the invention. The position sensor may be used in many types of device. For example the device may be a portable / hand-held device, e.g. a personal data assistant (PDA), a multimedia player, a mobile (cell) phone, a re-configurable remote controller, or a still camera or video camera, for example with the position sensor overlaying a display. Alternatively, the position sensor could equally be used in larger scale devices such as kitchen appliances, kiosks, and the like. Opaque versions can be fashioned for use in PC-style trackpads, keypads, and other human interface devices as are well known in the art.

[0022] According to a third aspect of the invention there is provided a method of constructing a capacitively sensitive surface disposed on a substrate which reports an X-Y coordinate position of an object within an active sensing region when the object is adjacent to said surface, comprising the steps of: (a) depositing a single layer of patterned conductive material in the active sensing region, the pattern comprising rows and columns of electrodes connected to individual ones of capacitive sensing channels, and wherein at least one row or column is broken into a plurality of segments within the active region; (b) connecting the broken segments together with an electrical conductor, wherein the conductor is made to lie outside of the active sensing region; (c) connecting the rows and columns to individual sensing channels of a multi-channel capacitive sensor circuit having multiple outputs representing amplitudes of capacitance on the rows and columns; and (d) providing a processor operable to process the multiple outputs to determine a coordinate position of the adjacent object as an XY location.

[0023] The processor may be operable to compensate for position distortion introduced by the physical geometry of the patterned conductive material.

[0024] The processor may also be operable to calculate a centroid of the signals across rows and a centroid of the signals across columns.

[0025] According to a fourth aspect of the invention there is provided a capacitive position sensor for determining the position of an object in a sensing area, the sensor comprising a substrate having a surface with an arrangement of conductive electrodes mounted thereon, wherein the electrodes define an array of sensing cells arranged in columns and rows to form the sensing area, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together, wherein at least one column sensing electrode comprises a continuous spine within the sensing area, and the at least one other column is made electrically continuous via connections external to the sensing area.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] For a better understanding of the invention and to show how the same may be carried into effect reference is now made by way of example to the accompanying drawings in which:

[0027] Figure 1 schematically shows in plan view a known two-dimensional capacitive position sensor;

[0028] Figure 2 schematically shows in plan view another known two-dimensional capacitive position sensor;

[0029] Figure 3 schematically shows in plan view a two-dimensional capacitive position sensor according to an embodiment of the invention;

[0030] Figure 4 schematically shows in perspective view a device including the position sensor of Figure 3;

[0031] Figures 5A and 5B are graphs schematically showing capacitance as function of column number (Figure 5A) and row number (Figure 5B) of sensing cells used to determine the position of an object adjacent the position sensor of the device shown in Figure 4;

[0032] Figure 6 schematically shows in plan view the two-dimensional capacitive position sensor and display screen of the device shown in Figure 4;

[0033] Figures 7 and 8 schematically show in plan view two-dimensional capacitive position sensors according to other embodiments of the invention;

[0034] Figure 9 schematically shows in plan view reported positions compared to actual positions for an object adjacent a position sensor according to an embodiment of the invention; and

[0035] Figure 10 schematically shows in plan view a display of the outlines of desired key positions compared to the outlines of reported key positions for a position sensor according to an embodiment of the invention.

DETAILED DESCRIPTION

[0036] Figure 3 schematically shows in plan view a two-dimensional touch-sensitive capacitive position sensor 22 according to an embodiment of the

invention. The position sensor 22 is operable to determine the position of an object along a first (x) and a second (y) direction, the orientation of which are shown towards the top left of the drawing. The sensor 22 comprises a substrate 24 having an arrangement of sensing electrodes 26 mounted thereon. The sensing electrodes 26 define a sensing area within which the position of an object (e.g. a finger or stylus) adjacent the sensor may be determined. The substrate 24 is of a transparent plastics material and the electrodes are formed from a transparent film of Indium Tin Oxide (ITO) deposited on the substrate 24 using conventional techniques. Thus the sensing area of the sensor is transparent and can be placed over a display screen without obscuring what is displayed behind the sensing area. In other examples the position sensor may not be intended to be located over a display and may not be transparent; in these instances the ITO layer may be replaced with a more economical material such as a copper laminate PCB, for example.

[0037] The pattern of the sensing electrodes on the substrate 24 is such as to divide the sensing area into an array (grid) of sensing cells 28 arranged into rows and columns. (It is noted that the terms “row” and “column” are used here to conveniently distinguish between two directions and should not be interpreted to imply either a vertical or a horizontal orientation.) By way of example one of the sensing cell 28 is identified by a dotted outline in Figure 3. In this position sensor there are four columns of sensing cells aligned with the y-direction and five rows of sensing cells aligned with the x direction (twenty sensing cells in total). The top-most row of sensing cells for the orientation shown in Figure 3 is referred to as row y1, the next one down as row y2, and so on down to row y5. The columns of sensing cells are similarly referred to from left to right as columns x1 to x4. Thus the sensing cell 28 shown with a dotted outline in Figure 3 is at the intersection of row y1 and column x3.

[0038] Each sensing cell includes a row sensing electrode 30 and a column sensing electrode 32. The row sensing electrodes 30 and column sensing electrodes are arranged within each sensing cell 28 to interleave with one another (in this case by squared spiraling around one another), but are not galvanically connected. Because the row and column sensing electrodes are interleaved (intertwined), an object adjacent a given sensing cell can provide a significant capacitive coupling to both sensing electrodes irrespective of where in the sensing cell the object is positioned. The characteristic scale of interleaving may be on the order of, or smaller than, the capacitive footprint of a typical object to be detected to provide the best results. The size and shape of the sensing cell 28 can be comparable to that of the object to be detected or larger (within practical limits).

[0039] The row sensing electrodes 30 of all sensing cells in the same row are electrically connected together to form five separate rows of row sensing electrodes. Similarly, the column sensing electrodes 32 of all sensing cells in the same column are electrically connected together to form four separate columns of column sensing electrodes.

[0040] The column sensing electrodes in column x2 are connected to one another by a connection 51, also referred to as a spine, made within the sensing area by a part of one of the electrodes deposited on the substrate and which runs between columns x2 and x3. This connection runs the length of the sensing area. Thus a single continuous conductive electrode deposited on the substrate 24 provides the column sensing electrodes 32 of all of the sensing cells in column x2 and their interconnections. The column sensing electrodes in column x3 are similarly connected to one another by a connection 53 made within the sensing area, again running between columns x2 and x3 as a spine. Thus again a single continuous conductive electrode deposited in the substrate 24 provides

the column sensing electrodes 32 of all of the sensing cells in column x3 and their interconnections.

[0041] The row sensing electrodes 30 in columns x1 and x2 of row y2 are also connected together by a connection made within the sensing area. Thus a single continuous conductive electrode 34 deposited on the substrate 24 provides the row sensing electrodes of the sensing cells in columns x1 and x2 of row y2 and their interconnection. The row sensing electrodes in columns x3 and x4 of row y2 are similarly connected together by a connection made within the sensing area so that a single continuous electrode 36 again provides these row sensing electrodes and their interconnection. However, because of the on-substrate connections (spines) running between columns x2 and x3 to connect between their respective column sensing electrodes, the row sensing electrodes in columns x1 and x2 of row y2 cannot be connected to the row sensing electrodes in columns x3 and x4 of row y2 by a connection made on the surface of the substrate. Thus a connection 38 between the row sensing electrodes at opposing ends of this row (i.e. in columns x1 and x4) is provided outside of the sensing area. The connection 38 runs around the outside of the sensing area to connect the electrode 34 providing the row sensing electrodes in columns x1 and x2 of row y2 with the electrode 36 providing the row sensing electrodes in columns x3 and x4 of row y2. Thus all row sensing electrodes in this row are electrically connected together. Similar wrap-around connections outside of the sensing area are made to ensure the respective row sensing electrodes of the other rows are connected together. It is noted that although one is shown in Figure 3, a connection outside of the sensing area between the row sensing electrodes at opposing ends of row y1 is not required because the spines connecting between the column sensing electrodes of columns x2 and x3 need not extend to the very edge of the sensing area and a connection running along the top edge of the sensing area could be used to connect between the row sensing electrodes in row y1 (not shown).

[0042] Each column sensing electrode in column x1 is formed from a separate electrode on the substrate. These separate electrodes are connected together by connections 40 made external to (i.e. outside of) the sensing area. The column sensing electrodes in column x4 are connected together by connections 41 in a similar manner to those of column x1. In this fashion the outer two columns can be discontinuous within the sensing area to allow access by row electrodes into cells, yet the columns are nevertheless made whole.

[0043] In this example the various connections made outside of the sensing area between the row sensing electrodes in sensing cells at opposing ends of the respective rows and the column sensing electrodes in the columns at the periphery of the sensing area are formed from free wires attached to the electrodes of the sensing area as appropriate using conventional techniques. Because the connections are established by free wires, no difficulties arise from the need for the connections made outside of the sensing area to cross one another in places. In an alternative design the connections made outside of the sensing area may be provided by conductive traces on the substrate similar to the electrodes forming the sensing area. This can be beneficial because the electrodes forming the sensing area and the electrical traces making the connections outside of the sensing area can be fabricated in single processing step. Conventional electrical jumpers can be used at the locations where connections outside of the sensing area cross one another. In yet another alternative and more preferable design, the wiring is accomplished by a combination of conductive traces on the substrate similar to the electrodes forming the sensing area connecting some attachment nodes, plus a dielectric insulator deposited on top of these conductors, plus conductive ink (e.g. silver ink) patterned on top of the dielectric insulator to connect together all remaining nodes needing to be joined. This produces a low cost, thin planar surface which requires only well-known processing steps, with no need for discrete jumpers.

[0044] It will be appreciated that the numbers of rows and columns do not need to be 5 and 4 respectively as shown in Fig. 3; other numbers of rows and columns may be used to suit different geometries. Also, while the rows and columns are shown to be of the same basic dimension giving rise to square cells 28, the rows and columns may be of non-matching or even non-uniform dimensions giving rise to rectangular cells 28, or possibly other shapes such as trapezoids. Furthermore, in cases where the regions of the cells 28 are interleaved, they do not require angular patterns of interleaving as shown; the interleavings can be circular, spiral, or other shapes to accomplish the same general effect.

[0045] The position sensor 22 further comprises a series of capacitance measurement channels 42 coupled to respective ones of the rows of row sensing electrodes and the columns of column sensing electrodes. Each measurement channel is operable to generate a signal indicative of a value of capacitance between the associated column or row of sensing electrodes and a system ground. The capacitance measurement channels 42 are shown in Figure 3 as two separate banks with one bank coupled to the rows of row sensing electrodes (measurement channels labeled y1 to y5) and one bank coupled to the columns of column sensing electrodes (measurement channels labeled x1 to x4). However, it will be appreciated that in practice all of the measurement channel circuitry will most likely be provided in a single unit such as a programmable or application specific integrated circuit. Furthermore, although nine separate measurement channels are shown in Figure 3, the capacitance measurement channels could equally be provided by a single capacitance measurement channel with appropriate multiplexing although this is not a preferred mode of operation. Equally the circuitry of the kind described in US 5,463,388 or similar can be used, which while using a scanning multiplexer does drive all the rows and columns with a single oscillator simultaneously in order to propagate a

laminar set of sensing fields through the overlying substrate. Preferably, the sensing channels 42 are multiple in-phase charge-transfer sensors of the type described in US 5,730,165 or US 6,466,036. Driving multiple ones of such sensing circuits in a phase synchronous manner provides for a desirable laminar field flow.

[0046] It is also noted that the substrate provides a valuable function in further mixing the electric fields, so that not only are the fields from X and Y lines better mixed above cells 28, but sensing gradients are produced between adjacent ones of cells 28. This gives rise to the ability to provide interpolated positions in both X and Y dimensions even though the dimensions of cells 28 are wider than an actuating object. Thicker panels are noted to give better mixing performance and hence a better ability to interpolate position.

[0047] The signals indicative of the capacitance values measured by the measurement channels 42 are provided to processing circuitry 44. The processing circuitry is configured to determine the interpolated position of a capacitive load applied to the sensing area by an object adjacent the position sensor. The interpolated position of the capacitive load along the x-direction is determined from the signals from the capacitance measurement channels associated with the columns of column sensing electrodes and the interpolated position of the capacitive load along the y-direction is determined from the signals from the capacitance measurement channels associated with the rows of row sensing electrodes. Once the position of the object along the x- and y-directions has been determined, the position is reported to a host controller 46 so that it can take appropriate action.

[0048] Figure 4 schematically shows in perspective view a device 50 including the position sensor 22 shown in Figure 3. The device in this example is a hand-held multimedia player comprising a housing 52 containing device control

electronics (not shown) and a liquid crystal display screen 54. Various lines of text can be seen on the display screen, for example, representing a menu of commands for the device. The sensing area of the position sensor overlays the display screen 54 with the electrical connections between the various column and row sensing electrodes made outside of the sensing area being hidden from view within the housing 52. The electrode layer is completely inside the housing, being underneath the cover plastic, being a film layer that is applied to the interior of the enclosure. This provides for a control surface having no openings and therefore no need for a bezel. The use of a single layer of clear ITO with external node connections provides for high clarity and low cost. A user can select from the menu of commands displayed on the screen 54 by pointing at the appropriate location. The position sensor reports the location of the touch to the device controller which in turn determines which command is to be executed. This is done by comparing the position of the touch with the positions of the currently displayed menu items.

[0049] Also shown in Figure 4 is a finger 56 positioned at a point P adjacent the position sensor 22 and above the display screen 54. The presence of the finger 56 in the vicinity of the position sensor 22 affects the capacitance of each of the rows and columns of sensing electrodes differently depending on the position of the finger within the sensing area. Thus the processing circuitry 44 is able to determine the position of the touch from the signals provided by the respective capacitance measurement channels.

[0050] Figures 5A and 5B are graphs schematically showing the signals generated by the capacitance measurement channels 42 for the position sensor 22 when the finger 56 is at the position shown in Figure 4. Figure 5A shows the signals C_x from respective ones of the columns of column sensing electrodes (x1 to x4). The vertical dotted lines schematically represent the boundaries of each of the columns. Figure 5B shows the signals C_y from respective ones of the rows

of row sensing electrodes (y1 to y5) with the vertical dotted lines representing the boundaries of each of the rows. The signals provided by the capacitance measurement channels have been processed according to conventional techniques, e.g. background capacitance removal, touch threshold detection, normalization and filtering have been performed as desired.

[0051] It can be seen from Figure 5A that the presence of the finger 56 provides the greatest increase in capacitive coupling to system ground for column x2 (i.e. column x2 shows the greatest signal value). This means the point P corresponding to the interpolation or centroid of the capacitive load applied by the finger 56 is within column x2. Furthermore, the increase in capacitive coupling to system ground for column x3 is greater than that for column x1. This means the point P is closer to column x3 than it is to x1. The determination of the position of point P along the x-direction is thus made by comparing the signals from the different columns of column sensing electrodes, and in particular by determining the interpolation or centroid of the signal values. This can be done using conventional processing techniques. In this case the interpolation or centroid of the distribution of signals shown in Figure 5A is determined to be at position X_p . Assuming the columns to be of unit width, and taking the left hand boundary of column x1 to be $x = 0$, point P is at a position along the x-direction of around $x = 1.8$ units, as marked in Figure 5A by an arrow. A similar analysis is made for the signals from the rows of row sensing electrodes. Assuming the rows to be of unit width, and taking the top most boundary of row y1 to be $y = 0$, point P is at a position Y_p along the y-direction of around $y = 2.8$ units, again as marked an arrow. Thus the position P of the finger is determined to be at $(x,y) = (1.8, 2.8)$. It is noted that the inherent interpolation provided by the different capacitive couplings of the finger to neighboring columns/rows means the centroid or interpolation of the capacitive load applied by the finger (i.e. the deemed position of the touch) can be determined with a resolution that is better than the characteristic size of the sensing cells.

[0052] The reported XY position from position sensors according to some embodiments of the invention can be distorted depending on the size, placement and shape of the cells. However, this hardly has any net effect in practical use for menu button usage or other forms of input, as the reported position can be readily corrected, for example via a lookup table, or, the coordinates of menu buttons can be merely compensated for any distortion. The XY distortion caused by the cell size is repeatable from one unit to the next, as it is a physical phenomenon linked to the pattern itself.

[0053] For example, Figure 9 shows a keypad or touchscreen of the type of Figure 3, having a 5x4 array of sensing cells 28, with a diagonal line 91 drawn across the surface from top left to bottom right. The actual reported position may instead be as per solid line 93. The reported line 93 can be readily corrected in X and Y using a correction algorithm or lookup table so the final reported position is corrected to be properly along ideal line 91. Alternatively keys that are mapped into the sensitive area of the position sensor 22 can be inverse-distorted to compensate for the reported distortion as shown in Figure 10. Here, physically desired key outlines 101 and 102 are distorted into reported shapes 103 and 104. Rather than attempt to correct the reported X-Y data, the key outlines for purposes of key recognition can be distorted into the same reported outline shapes 103 and 104 as shown. If this is done, the reported keys are made identical to the desired shapes 101 and 102.

[0054] Figure 6 schematically shows a plan view of the display screen 54 of the device 50 shown in Figure 4 displaying a menu of commands. The menu of commands displayed to a user includes a series of box outlines in which the numbers 0 to 9 are displayed, a box outline containing the word “ENTER”, and a box outline of a box partially filled with shading and having gradations marked next to it representing the volume of music being played as a fraction of

maximum volume. Also shown on the display 54 is a region bounded by a dotted line and showing some previously entered commands. The pattern of sensing electrodes associated with the position sensor overlaying the display screen is also shown in Figure 6, although it will be appreciated that the position sensor is transparent and would not be visible in practice. Since the sensing layer and associated electronics is able to report an X-Y location, the position of buttons is arbitrary as it would be with any analogue touch screen input device. Thus, any known interface schema can be deployed over the face of the screen, such as menu buttons, sliders, wheels, gesture recognition, character recognition, and the like. Furthermore these schemes do not need to be aligned with the cells, and can be placed arbitrarily over the surface.

[0055] Figure 7 schematically shows in plan view a two-dimensional capacitive position sensor 72 according to another embodiment of the invention. This position sensor again has five rows of sensing cells (labeled y1 to y5) but has only three columns of sensing cells (labeled x1 to x3). Column X2 forms a continuous spine 73 in the sensor area, and connections 38 (similar to the correspondingly numbered connections shown in Figure 3) are shown which connect the rows together externally to the sensing area and connections 40, 41 (similar to the correspondingly numbered connections shown in Figure 3) make the outer columns continuous externally to the sensing area. This position sensor has a total of fifteen sensing cells. This means it will generally have less positional resolution along the x-direction than the position sensor 22 shown in Figure 3 if it were to have same size sensing area as that sensor. Alternatively, it may have the same (or better) positional resolution if it has a smaller sensing area than the sensor shown in Figure 3. The operation of the position sensor 72 shown in Figure 7 is otherwise similar to and will be understood from the position sensor 22 of Figure 3.

[0056] Figure 8 schematically shows in plan view a two-dimensional capacitive position sensor 82 according to another embodiment of the invention. This position sensor has five rows and three columns of sensing cells. A first 84 and a second 86 sensing cell are identified by dotted outlines. In this example, the row and column sensing electrodes of each sensing cell do not spiral around one another. In sensing cells in column x2 (e.g. sensing cell 84) the column sensing electrode runs continuously through the sensing cell as a spine, with the row sensing electrode comprising two conductive regions on either side of the column sensing electrode. In sensing cells in columns at the edge of the sensing area (i.e. columns x1 and x3, e.g. sensing cell 86) the row sensing electrode runs continuously through the sensing cell with the column sensing electrode comprising two conductive regions on either side of the row sensing electrode. The operation of the position sensor 82 shown in Figure 8 is otherwise similar to and will be understood from the position sensors 22, 72 of Figures 3 and 7. It will be understood the sensing cells of Figure 8 may also be considered to be interleaved, albeit in a minimal fashion. This shows that other basic shapes are also possible other than diamonds or closely intertwined traces. The important aspect is that in a cell, there exists a portion of a row electrode and a portion of a column electrode.

[0057] The size of the sensing area in a given position sensor will depend on its implementation. For example in a hand-held mobile device of the kind shown in Figure 4, a sensing area on the order of 4cm (x-direction) by 5cm (y direction) might be suitable. This would provide sensing cells on the order of 1cm². This is comparable to the typical size of a finger tip and so can ensure there is good capacitive coupling to both the row and column sensing electrodes within each cell when used to sense the position of a user's finger. However, larger or smaller sensing areas could equally be employed. There is also no need for the columns and rows to have the same widths, although if they were different it would mean the positional resolution might be different in the two directions.

[0058] Furthermore, there is no limit on the number of rows that may be used while still providing for a sensing area having a single layer of sensing electrodes within the sensing area (i.e. sensing electrodes on one side of the substrate only). The patterns shown in Figures 3, 7 and 8 may simply be repeated in y with corresponding additional capacitance measurement channels being provided for the additional rows of row sensing electrodes. However, it is not possible to have both more than four rows and more than four columns for a position sensor having sensing electrodes on one side of the substrate only.

[0059] It will also be understood that it is not necessary for the position sensor to have a continuous spine within the sensing area to connect between column sensing electrodes in columns that are not at an edge of the sensing area. For example, the spines associated with columns x2 and x3 in Figure 3 could be broken at some point along their length with connections made outside of the sensing area between the respective groups of column sensing electrodes above and below the break. For example, the spines could be broken between rows y2 and y3 so that the row sensing electrodes in columns x1 and x2 of these rows can be connected to the row sensing electrodes in columns x3 and x4 by connections made within the sensing area through the break in the spines. There would then be no need for connections made outside of the sensing area for these rows, although connections outside of the sensing area would be needed for columns x2 and x3.

[0060] It will be appreciated that position sensors embodying the invention may incorporate a variety of additional features. For example, in some applications it is desirable to have a 'wakeup' function, whereby the entire device 'sleeps' or is in some quiescent or background state. In such cases, it is often desirable to have a wake signal from mere proximity of a human body part some distance away. The element can be driven as a single large capacitive electrode

without regard to position location, while the unit is in the background state. During this state the electronic driver logic looks for a very small change in signal, not necessarily enough to process as a 2D coordinate, but enough to determine that an object or human is in proximity. The electronics then 'wakes up' the overall system and the element is driven so as to become a true position sensor once again.

[0061] Finally, it is noted that although the term "touch" is frequently used in the above description, a position sensor of the kind described above can be sufficiently sensitive that it is able to register the location of an adjacent finger (or other object such as a stylus) without requiring physical contact. The term "touch" as used herein should therefore be interpreted accordingly.

What is claimed is:

1. A capacitive position sensor for determining the position of an object in a sensing area, the sensor comprising a substrate having a surface with an arrangement of electrodes mounted thereon, wherein the electrodes define an array of sensing cells arranged in columns and rows to form the sensing area, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together, wherein row sensing electrodes of sensing cells at opposing ends of at least one of the rows are electrically coupled to one another by respective row wrap-around connections made outside of the sensing area.
2. The position sensor of claim 1, wherein the row wrap-around connections comprise a conductive trace deposited on the substrate.
3. The position sensor of claim 1, wherein the row wrap-around connections comprise free wires connected to the respective row sensing electrodes.
4. The position sensor of claim 1, wherein the column sensing electrodes of a column of sensing cells at an edge of the sensing area are electrically coupled to one another by column wrap-around connections made outside of the sensing area.
5. The position sensor of claim 4, wherein the column wrap-around connections comprise conductive traces deposited on the substrate.

6. The position sensor of claim 4, wherein the column wrap-around connections comprise free wires connected to the respective column sensing electrodes.
7. The position sensor of claim 1, further comprising a plurality of capacitance measurement channels connected to respective ones of the rows and columns of sensing electrodes, wherein each measurement channel is operable to generate a signal indicative of a capacitance between its associated column or row of sensing electrodes and a system ground.
8. The position sensor of claim 7, further comprising a processor operable to determine the position of the object in the sensing area along a first direction by comparing signals from the different columns with each other and along a second direction by comparing signals from the different rows with each other.
9. The position sensor of claim 7, wherein the capacitance measurement channels comprise a charge transfer circuit.
10. The position sensor of claim 7, wherein the capacitance measurement channels are configured to drive a plurality of sensing electrodes substantially synchronously in phase with one another.
11. The position sensor of claim 1, wherein the sensing cells are arranged into three columns.
12. The position sensor of claim 1, wherein the sensing cells are arranged into four columns.
13. The position sensor of claim 1, wherein the column sensing electrode and the row sensing electrode in each sensing cell are interleaved with one another.

14. The position sensor of claim 1, wherein the substrate is formed from a transparent material.

15. The position sensor of claim 1, wherein the electrodes are formed from a transparent electrically conductive material.

16. The position sensor of claim 15, wherein the transparent electrically conductive material is a film of Indium Tin Oxide (ITO) deposited on the substrate.

17. The position sensor of claim 15, further comprising a graphical display wherein the electrodes in the sensing area are disposed over the graphical display to provide a touch screen.

18. The position sensor of claim 1, further comprising an insulating panel wherein the electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad.

19. A device comprising the position sensor of claim 1.

20. A method of constructing a capacitively sensitive surface disposed on a substrate which reports an X-Y coordinate position of an object within an active sensing region when the object is adjacent to said surface, comprising the steps of:

(a) depositing a single layer of patterned conductive material in the active sensing region, the pattern comprising rows and columns of electrodes connected to individual ones of capacitive sensing channels, and wherein at least one row or column is broken into a plurality of segments within the active region;

(b) connecting the broken segments together with an electrical conductor, wherein the conductor is made to lie outside of the active sensing region;

(c) connecting the rows and columns to individual sensing channels of a multi-channel capacitive sensor circuit having multiple outputs representing amplitudes of capacitance on the rows and columns; and

(d) providing a processor operable to process the multiple outputs to determine a coordinate position of the adjacent object as an XY location.

21. The method of claim 20, wherein the processor is operable to compensate for position distortion introduced by the physical geometry of the patterned conductive material.

22. The method of claim 20, wherein the processor is operable to calculate a centroid of the signals across rows and a centroid of the signals across columns.

23. The method of claim 20, wherein the processor is operable to calculate an interpolation of the signals across rows and an interpolation of the signals across columns.

24. The method of claim 20, wherein the capacitive sensing channels employ driving signals which are substantially phase-synchronous with respect to one another.

25. A capacitive position sensor for determining the position of an object in a sensing area, the sensor comprising a substrate having a surface with an arrangement of conductive electrodes mounted thereon, wherein the electrodes define an array of sensing cells arranged in columns and rows to form the sensing area, each sensing cell including a column sensing electrode and a row sensing electrode, the column sensing electrodes of sensing cells in the same

column being electrically coupled together and the row sensing electrodes of sensing cells in the same row being electrically coupled together, wherein at least one column sensing electrode comprises a continuous spine within the sensing area, and at least one other column sensing electrode is made electrically continuous via connections external to the sensing area.

26. The position sensor of claim 25, wherein the conductive electrodes are transparent and further comprising a graphical display wherein the conductive electrodes in the sensing area are disposed over the graphical display to provide a touch screen.

27. The position sensor of claim 25, further comprising an insulating panel wherein the conductive electrodes in the sensing area are disposed beneath the insulating panel to provide a keypad.

ABSTRACT OF THE DISCLOSURE

A capacitive position sensor for determining the position of an object along first and second directions is described. The sensor comprises a substrate having an arrangement of electrodes mounted on a single surface thereof. The electrodes are arranged so as to define an array of sensing cells arranged in columns and rows to form a sensing area. Each of the sensing cell including a column sensing electrode and a row sensing electrode with the column sensing electrodes of sensing cells in the same column being electrically coupled together and the row sensing electrodes of sensing cells in the same row also being electrically coupled together. Row sensing electrodes of sensing cells at opposing ends of at least one of the rows are connected together by an electrical connection made outside of the sensing area so that there is no requirement for electrical connections to cross within the sensing area, thus providing a capacitive position sensor having a sensing area with electrodes on only one side of a substrate.

1/8

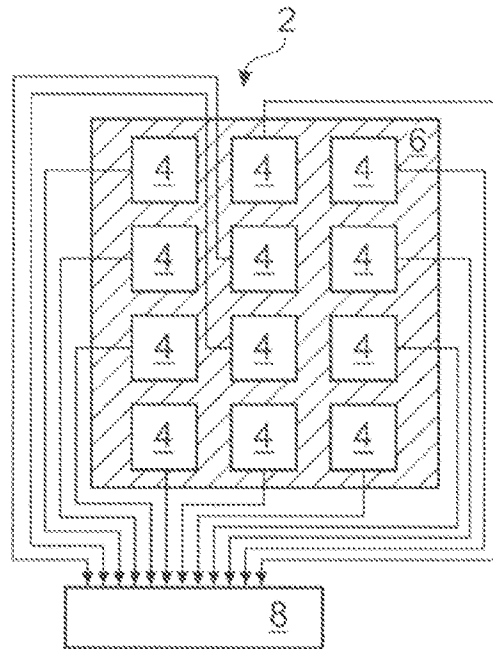


Fig. 1 (PRIOR ART)

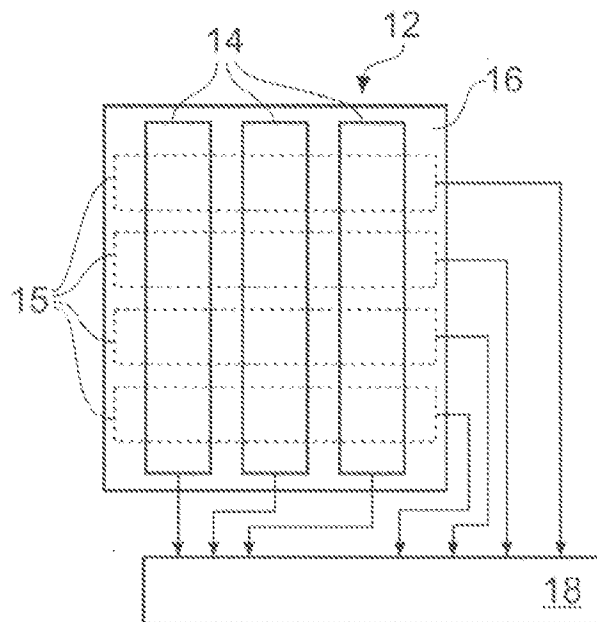


Fig. 2 (PRIOR ART)

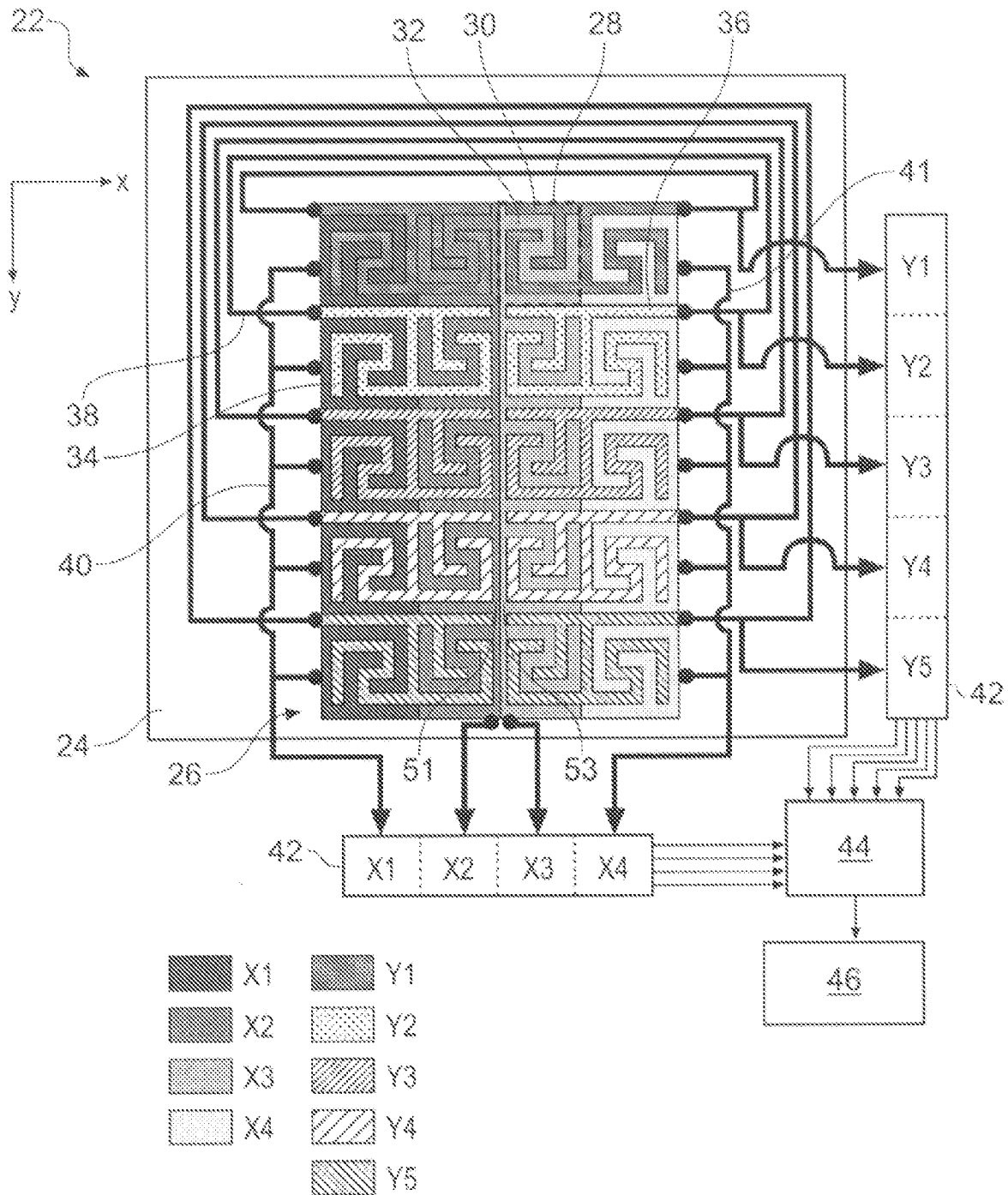


Fig. 3

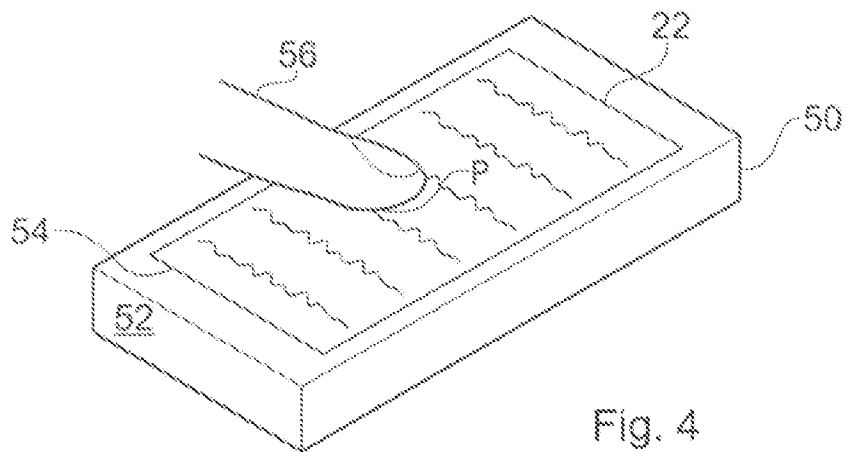


Fig. 4

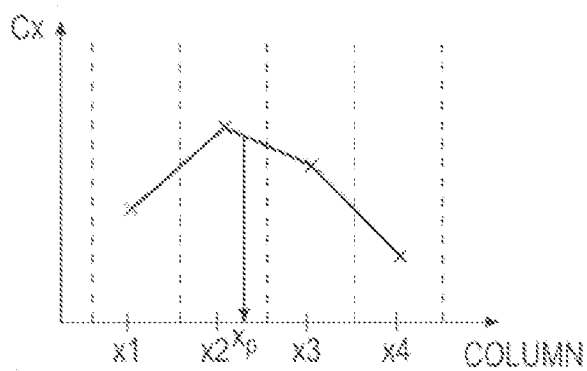


Fig. 5A

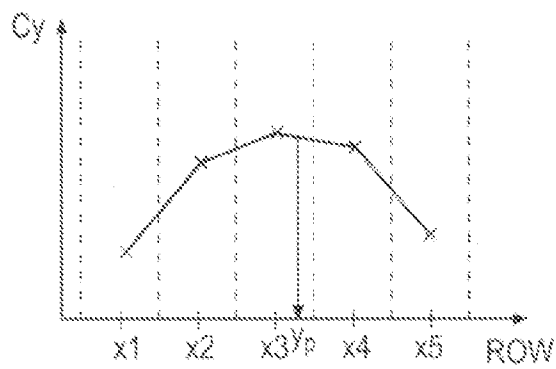


Fig. 5B

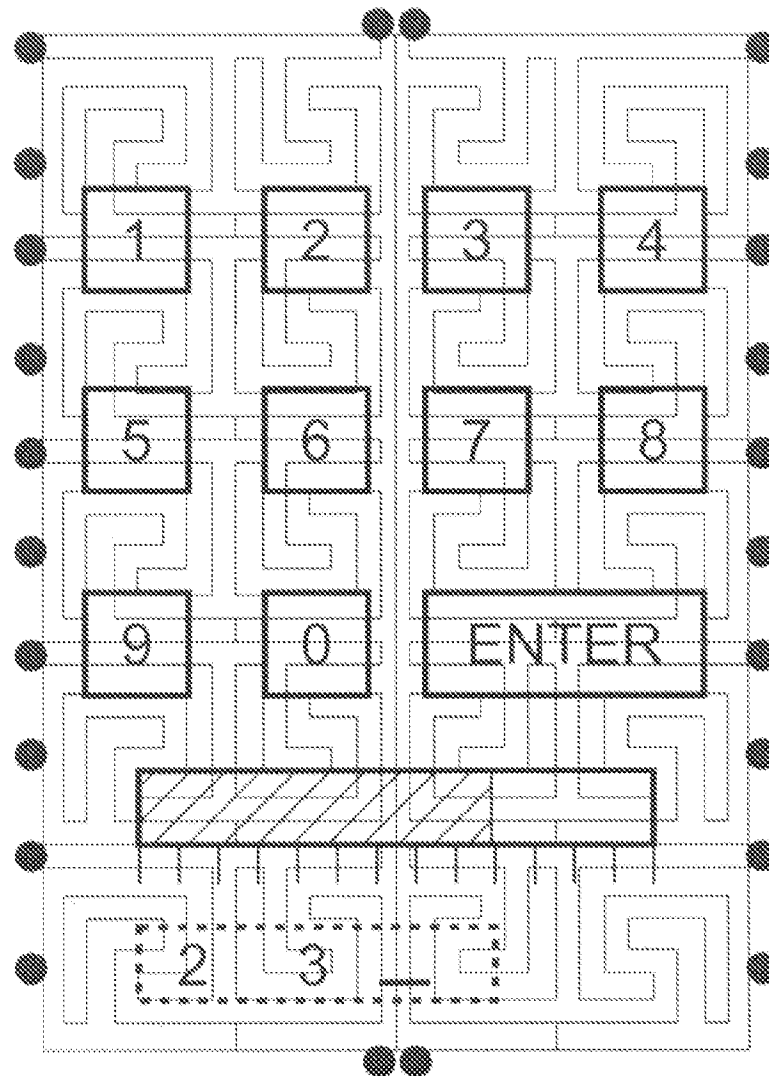


Fig. 6

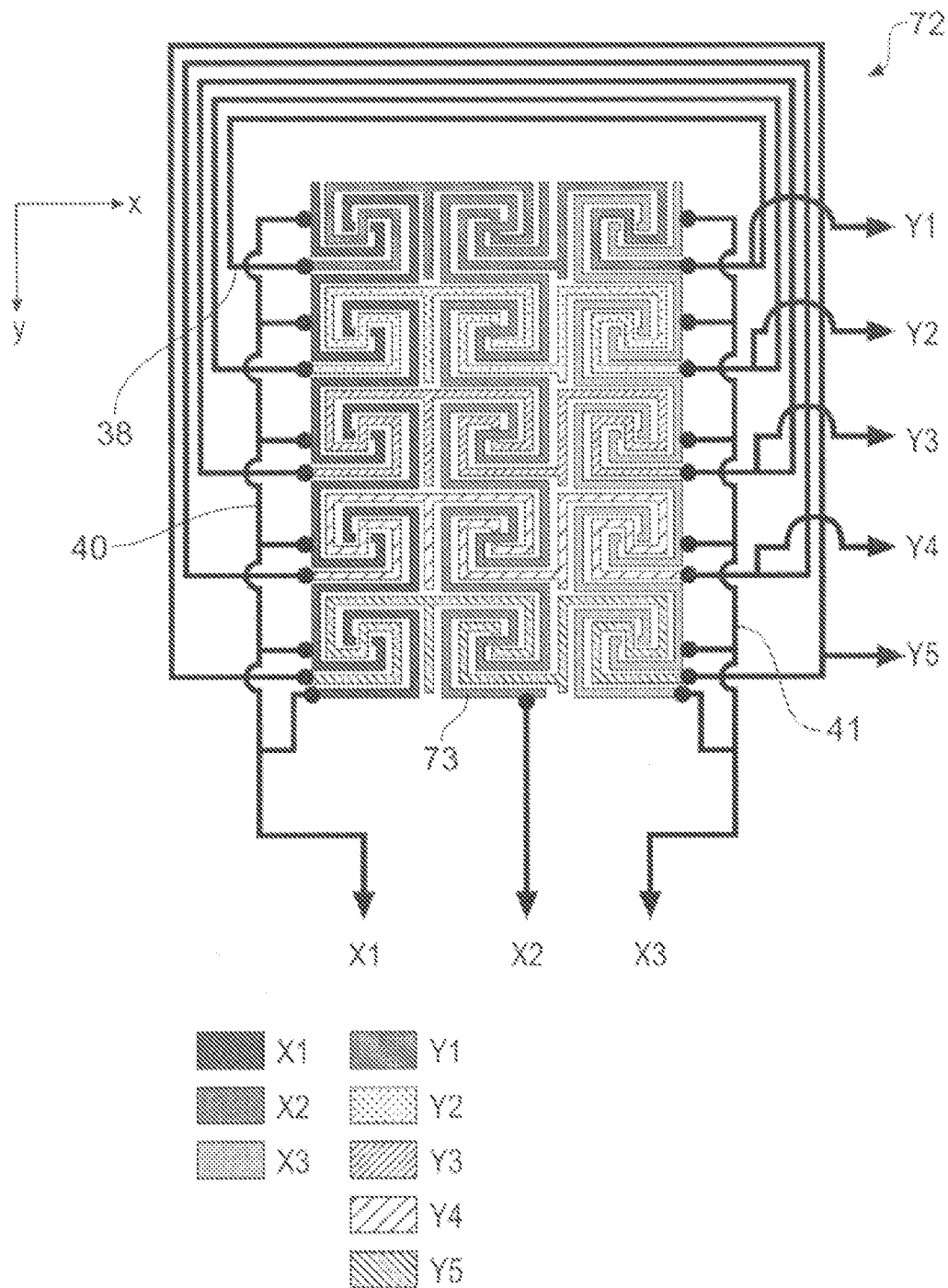


Fig. 7

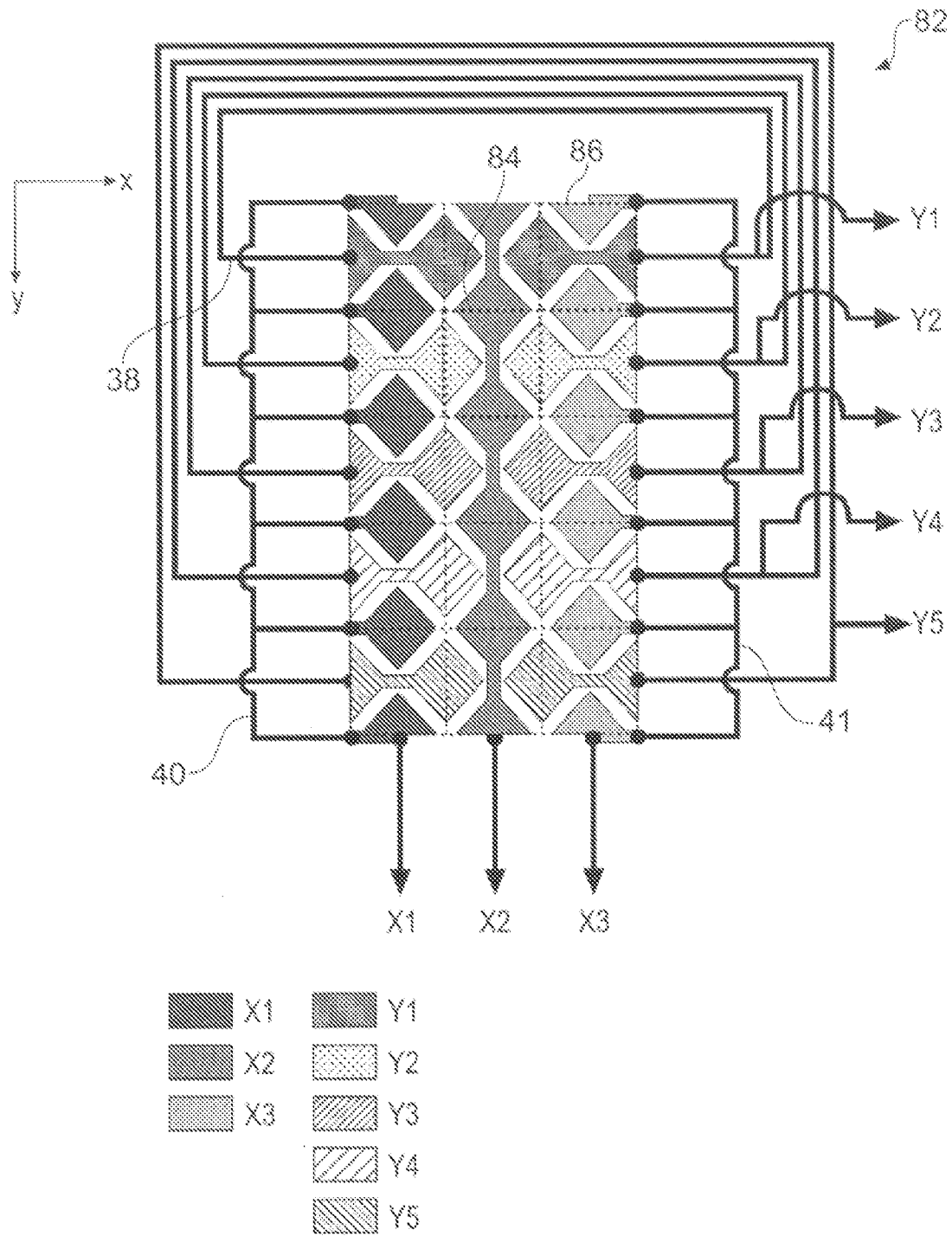


Fig. 8

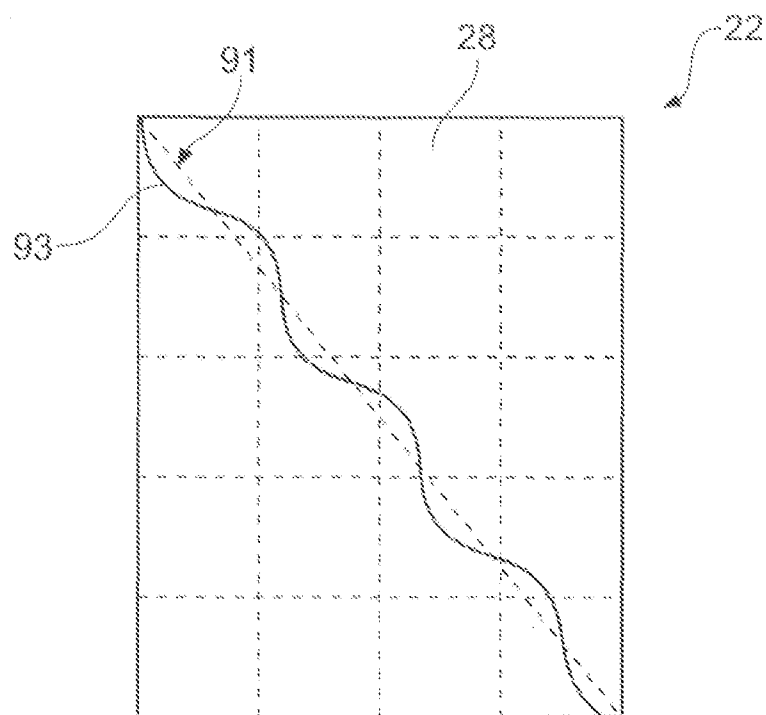


Fig. 9

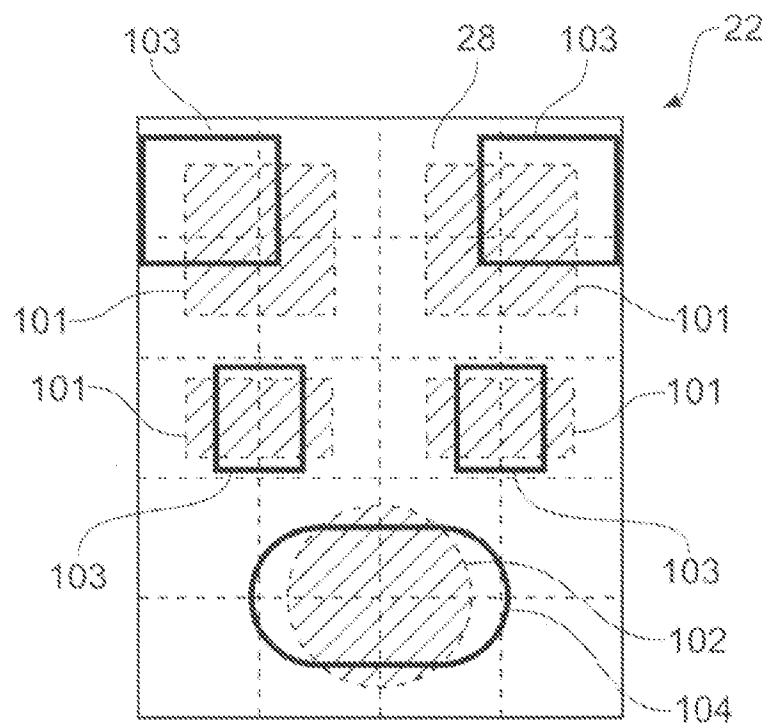


Fig. 10

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P2E
		Application Number	
Title of Invention	Two-Dimensional Position Sensor		
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Application Information:

Title of the Invention	Two-Dimensional Position Sensor		
Attorney Docket Number	P2E	Small Entity Status Claimed	<input checked="" type="checkbox"/>
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)	8	Suggested Figure for Publication (if any)	3

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P2E
		Application Number	
Title of Invention	Two-Dimensional Position Sensor		

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☐ 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 been and will not be the subject of an application filed in another country, or under a multilateral agreement, that requires publication at eighteen months after filing.
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Please Select One: ☒ Customer Number ☐ US Patent Practitioner ☐ US Representative (37 CFR 11.9)

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Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	non provisional of	60697613	2005-07-08
Additional Domestic Priority Data may be generated within this form by selecting the Add button.			Add

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Application Data Sheet 37 CFR 1.76		Attorney Docket Number		P2E	
		Application Number			
Title of Invention		Two-Dimensional Position Sensor			
Prefix		Given Name	Middle Name	Family Name	Suffix
		Harald		Philipp	
Mailing Address Information:					
Address 1		7 Cirrus Gardens			
Address 2					
City		Hamble, Southampton	State/Province		
Country i		GB	Postal Code		SO31 4RH
Phone Number		412-391-7367	Fax Number		412-291-1015
Email Address		h.phil@qprox.com			
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Signature:

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Signature		/David A Kiewit/		Date (YYYY-MM-DD)	
				2006-07-05	
First Name	David	Last Name	Kiewit	Registration Number	34640

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**DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN
APPLICATION DATA SHEET (37 CFR 1.76)**

Title of Invention	Two-Dimensional Position Sensor
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As the below named inventor(s), I/we declare that:

This declaration is directed to:

- ☒ The attached application, or
- ☐ Application No. _____ filed on _____
- ☐ As amended on _____ (if applicable);

I/we believe that I/we am/are the original and first inventor(s) of the subject matter which is claimed and for which a patent is sought;

I/we have reviewed and understand the contents of the above-identified application, including the claims, as amended by any amendment specifically referred to above;

I/we acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me/us to be 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.

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FULL NAME OF INVENTOR(S)

Inventor one: Luben Hristov

Signature: _____ Citizen of: Bulgaria

Inventor two: _____

Signature: _____ Citizen of: _____

☐ Additional inventors or a legal representative are being named on _____ additional form(s) attached hereto.

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		2006-07-05
First Named Inventor	Hristov	
Art Unit		
Examiner Name		
Attorney Docket Number	P2E	

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Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear	
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	2	5463388	A1	1995-10-31	Boie et al.	Fig. 1 & associated text	
	3	5430165	A1	1998-03-24	Philipp		
	4	5844506	A1	1998-12-01	Binstead	Figs. 4 & 6	
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	Filing Date		2006-07-05
	First Named Inventor	Hristov	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	P2E	

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¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

**INFORMATION DISCLOSURE
STATEMENT BY APPLICANT**
(Not for submission under 37 CFR 1.99)

Application Number		
Filing Date		2006-07-05
First Named Inventor	Hristov	
Art Unit		
Examiner Name		
Attorney Docket Number	P2E	

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement 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 the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement 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 information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ Fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☐ None

SIGNATURE

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

Signature		Date (YYYY-MM-DD)	
Name/Print		Registration Number	

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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.
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Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	Two-Dimensional Position Sensor			
First Named Inventor:	Luben Hristov			
Filer:	David A. Kiewit			
Attorney Docket Number:	P2E			
Filed as Small Entity				
Utility Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility filing Fee (Electronic filing)	4011	1	75	75
Utility Search Fee	2111	1	250	250
Utility Examination Fee	2311	1	100	100
Pages:				
Claims:				
Claims in excess of 20	2202	7	25	175
Miscellaneous-Filing:				
Petition:				

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 (\$)				600

Electronic Acknowledgement Receipt

EFS ID:	1102462
Application Number:	11428670
Confirmation Number:	4355
Title of Invention:	Two-Dimensional Position Sensor
First Named Inventor:	Luben Hristov
Customer Number:	20191
Filer:	David A. Kiewit
Filer Authorized By:	
Attorney Docket Number:	P2E
Receipt Date:	05-JUL-2006
Filing Date:	
Time Stamp:	15:12:22
Application Type:	Utility
International Application Number:	

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 600
RAM confirmation Number	50
Deposit Account	501012
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 and 1.17	

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Document Number	Document Description	File Name	File Size(Bytes)	Multi Part	Pages
1	Specification	p2espec.pdf	112104	no	22
Warnings:					
Information:					
2	Claims	p2eclaims.pdf	26655	no	5
Warnings:					
Information:					
3	Abstract	p2eabstr.pdf	13267	no	1
Warnings:					
Information:					
4	Drawings	p2edwg.pdf	2048273	no	8
Warnings:					
Information:					
5	Application Data Sheet	p2eADS.pdf	1045852	no	4
Warnings:					
Information:					
6	Oath or Declaration filed	p2edecl.PDF	863228	no	1
Warnings:					
Information:					
7	Information Disclosure Statement (IDS) Filed	p2eIDS.pdf	722286	no	4
Warnings:					
Information:					
8	Fee Worksheet (PTO-875)	fee-info.pdf	8425	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			4840090		

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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.

National Stage of an International Application under 35 U.S.C. 371

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