

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

IMMERSION CORPORATION,
Patent Owner.

Case IPR2017-01368
Patent No. 8,581,710

DECLARATION OF YON VISELL, PH.D.
IN SUPPORT OF IMMERSION CORPORATION'S
PATENT OWNER PRELIMINARY RESPONSE

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I, Yon Visell, declare as follows:

I. INTRODUCTION

1. My name is Yon Visell. I am an Assistant Professor in the Department of Electrical and Computer Engineering and Media Arts and Technology Graduate Program at the University of California, Santa Barbara (“UCSB”).

2. I have been engaged by Immersion Corporation (“Immersion”) as an expert in connection with matters raised in the Petition for Inter Partes Review (“Petition”) of U.S. Patent No. 8,581,710 B2 (the “’710 patent”) filed by Apple Inc. (“Apple” or “Petitioner”).

3. This declaration is based on the information currently available to me. To the extent that additional information becomes available, I reserve the right to continue my investigation and study, which may include a review of documents and information that may be produced, as well as testimony from depositions that have not yet been taken.

II. SUMMARY OF OPINIONS

4. The ’710 patent is entitled “Systems and methods for haptic confirmation of commands.” Ex. 1101. The ’710 patent is directed to a novel system and method for haptic confirmation of commands on electronic devices using a binary logic structure whereby an affirmative command is provided

indicating that user input has been recognized and an associated command determined or, in the alternative, a negative command is provided indicating that the user input was not recognized or a command was not determined. *Id.*, cl. 13. The petition challenges claims 13 and 18-20 of the '710 patent.

5. Petitioner's Ground 1 challenges claims 1 and 19-20 of the '710 patent as obvious in light of U.S. Patent No. 7,336,260 B2 ("Martin"), Ex. 1106, and U.S. Patent Pub. No. 2009/0164207 ("Makela"), Ex. 1107, based on obviousness under pre-AIA 35 U.S.C. § 103(a). Based on studying the petition and the exhibits cited in the petition as well as other documents, it is my opinion that claims 1 and 19-20 of the '710 patent are not rendered obvious by the cited references.

6. Petitioner's Ground 2 challenges claims 1 and 18-19 of the '710 patent as obvious in light of U.S. Patent No. 6,505,159 ("Theodore"), Ex. 1104, and U.S. Patent 2002/0033795 ("Shahoian"), Ex. 1105, based on obviousness under pre-AIA 35 U.S.C. § 103(a). Based on studying the Petition and the exhibits cited in the Petition as well as other documents, it is my opinion that claims 1 and 18-19 are not rendered obvious by the cited references.

III. QUALIFICATIONS AND EXPERIENCE

7. I obtained my Ph.D. degree in Electrical and Computer Engineering from McGill University in 2011. Before that, I received my MA in Physics from

the University of Texas at Austin in 1999, and my BA in Physics from Wesleyan University in 1995.

8. Since 2015, I have worked as an Assistant Professor at UCSB. From 2013 to 2015, I worked as an Assistant Professor in the Department of Electrical and Computer Engineering at Drexel University.

9. At UCSB, I lead the RE Touch Lab as its Director and Principal Investigator. The RE Touch Lab includes six Ph.D. students and numerous affiliated researchers and undergraduate students. Some of the topics that my teams at the RE Touch Lab have explored include computational perception, such as how the mechanical signatures of contact elicit conscious perception of touch, and the creation of novel haptic devices for simulating the feel of touched objects.

10. My personal research focuses on haptic engineering, robotics, and the mechanics and neuroscience of touch. My work is motivated by creative applications in haptic human-computer interaction, sensorimotor augmentation, and interaction in virtual reality.

11. In addition to my research at the RE Touch Lab, I also teach classes, including linear and nonlinear control systems, haptics, human-computer interaction, interactive arts, artificial intelligence, and robotics.

12. I am the author of over 60 articles in journals and conference proceedings. I hold one issued patent, U.S. Patent No. 9,041,521 ("Floor-Based

Haptic Communication System”), and one pending patent application (“Stretchable Tactile Sensing Array”), both pertaining to haptic technology. I am the editor of two books on virtual reality, including *Human Walking in Virtual Reality*. I have received several awards and honors, including the Google Faculty Research Award in 2016, and several best paper awards at haptics symposia. I have chaired and edited several conferences and symposia.

13. I also have experience working in industry. Before receiving my Ph.D., I worked for several years as the Principal DSP developer, audio at Ableton, a renowned music software company. Before that I worked for several years as a Research Scientist investigating speech recognition at Loquendo Inc., which is now part of Nuance.

14. My *curriculum vitae* is attached as Exhibit 2002.

15. I am being compensated by Immersion for my time spent in developing this declaration at a rate of \$400 per hour, and for any time spent testifying in connection with this declaration at a rate of \$500 per hour. My compensation is not contingent upon the substance of my opinions, the content of this declaration or any testimony I may provide, or the outcome of the *inter partes* review or any other proceeding.

16. I have no financial interest in Immersion, and have financial interests of less than \$3000 in Apple through long-term mutual fund investments representing less than 1% of my portfolio.

17. My opinions expressed in this declaration are based on the petition and exhibits cited in the petition, and other documents and materials identified in this declaration, including the '710 patent (Ex. 1101) and its prosecution history (Ex. 2008), the prior art references and materials discussed in this declaration, and any other references specifically identified in this declaration.

18. I am aware of information generally available to, and relied upon by, persons of ordinary skill in the art at the relevant times, including technical dictionaries and technical reference materials (including, for example, textbooks, manuals, technical papers, articles, and relevant technical standards).

19. I reserve the right to supplement my opinions to address any information obtained, or positions taken, based on any new information that comes to light throughout this proceeding.

IV. LEVEL OF ORDINARY SKILL IN THE ART

20. It is my understanding that the '710 patent should be interpreted based on how it would be read by a person of ordinary skill in the art at the time of the effective filing date of the application. It is my understanding that factors such as the education level of those working in the field, the sophistication of the

technology, the types of problems encountered in the art, the prior art solutions to those problems, and the speed at which innovations are made may help establish the level of skill in the art.

21. I am familiar with the technology at issue and the state of the art at the earliest priority date of the '710 patent.

22. It is my opinion, based upon a review of the '710 patent, its file history, and my knowledge of the field of the art, a person of ordinary skill in the art for the field of the '710 patent would have at least: (1) a Bachelor's of Science degree in an engineering discipline such as Mechanical Engineering or Computer Science, or (2) at least two years' experience working with human machine interface systems, graphical user interfaces, haptic feedback systems, robotics, biomechanics, or mobile devices or equivalent embedded systems. This level of skill is commensurate with the interdisciplinary nature of the '710 patent, which combines knowledge of computer software and user interface design with knowledge of electrical and/or mechanical systems for producing haptic effects.

23. I have considered the issues discussed in the remainder of this declaration from this perspective of a person of ordinary skill in the art. Although I use this perspective, I do not believe that any of my opinions would change if a slightly higher or lower level of skill were adopted.

V. LEGAL PRINCIPLES

A. Claim Construction

24. I am not a patent attorney and my opinions are limited to what I believe a person of ordinary skill in the art would have understood, based on the patent documents. I use the principles below, however, as a guide in formulating my opinions.

25. My understanding is that a primary step in determining validity of patent claims is to properly construe the claims to determine claim scope and meaning.

26. In an *inter partes* review proceeding, as I understand from Immersion counsel, claims are to be given their broadest reasonable construction (“BRC”) in light of the patent’s specification. 37 C.F.R. § 42.100(b). In other forums, such as in federal courts, different standards of proof and claim interpretation control, which are not applied by the patent office for *inter partes* review. Accordingly, I reserve the right to argue for a different interpretation or construction of the challenged claims in other proceedings, as appropriate.

27. It is my understanding that in determining whether a patent claim is anticipated or obvious in view of the prior art, the patent office must construe the claim by giving the claim its broadest reasonable construction consistent with the specification. For the purposes of this review, I have construed each claim term in

accordance with its plain and ordinary meaning under the required broadest reasonable construction.

B. Anticipation

28. It is my understanding that a claim is anticipated under 35 U.S.C. § 102 if each and every element and limitation of the claim is found either expressly or inherently in a single prior art reference. I understand that anticipation is a question of fact. I further understand that the requirement of strict identity between the claim and the reference is not met if a single element or limitation required by the claim is missing from the applied reference.

C. Obviousness

29. It is my understanding that a claim is unpatentable under 35 U.S.C. § 103 if the claimed subject matter as a whole would have been obvious to a person of ordinary skill in the art at the time of the alleged invention. I understand that the determination of obviousness is made with respect to the subject matter as a whole, not separate pieces of the claim. I understand that obviousness is a question of law based on underlying factual issues. I also understand that an obviousness analysis takes into account the scope and content of the prior art, the differences between the claimed subject matter and the prior art, the level of ordinary skill in the art at the time of the invention, and the existence of secondary consideration such as commercial success or long-felt but unresolved needs.

VI. THE '710 PATENT

30. I have read and reviewed the '710 patent and have an understanding of its background as well as its particular improvements over the prior art. I understand that the '710 patent is entitled “Systems and methods for haptic confirmation of commands.” Ex. 1101. In my opinion, the '710 patent is directed to a novel system and method for haptic confirmation of commands on electronic devices using a binary logic structure whereby a first haptic effect is provided indicating that user input has been recognized and an associated command determined or, in the alternative, a second different haptic effect is provided indicating that the user input was not recognized or a command was not determined. *Id.*, cl. 13. This binary logic structure is required to practice the claimed invention.

31. Reflecting this focus, the challenged claims require a computer implemented method using the following binary logic structure:

if the user input is recognized and the command is determined:

generate a first actuator signal **configured to cause** the actuator to output a first haptic effect; and

transmit the first actuator signal to the actuator;

otherwise:

generate a second actuator signal **configured to cause** the actuator to output a second haptic effect; and

transmit the second actuator signal to the actuator.

Ex. 1101, cl. 13 (emphasis added).

32. In one illustration of the concept of the challenged claims, a user of a mobile phone may direct a telephone with user input in the form of vocal command “call home.” Ex. 1101 at 2:16-19. If the phone recognizes the command and knows a number that corresponds to “home,” it may generate a haptic effect indicating that it will call that number. *Id.* at 2:19-25. Alternatively, if the phone does not understand the user—or understands the user, but has no stored number for “home”—the phone may generate a second haptic effect, notifying the user that it is unable to execute a function in response to the user’s command. *Id.* at 2:25-29; *see also* 3:62-4:12 (explaining similar functionality in

response to a command to “add an appointment to a calendar for Tuesday at 3 p.m.”).

33. In the binary logic structure described in the claims and the specification, the first and second haptic effects are mutually exclusive alternatives. The confirmatory effects may be affirmative to communicate success, or negative to communicate that the input was not recognized or that a command is not available.

VII. CLAIM CONSTRUCTION

A. “If ... otherwise” (All Claims)

34. In my opinion, the broadest reasonable construction of the “if ... otherwise” conditional portion of claim 13 requires use of a binary logic configuration for a given user input that entails two mutually exclusive alternatives for a scenario—“if” the particular user input is recognized and a command is determined, a first confirmatory haptic effect is generated; “otherwise,” a second haptic effect is generated. Ex. 1101, cl. 13. This is the ordinary meaning of “if ... otherwise,” as applied to the functionality of the ’710 patent as implemented for user inputs. The recited “second haptic effect” is only generated if the user input is not recognized or a command is not determined.

35. A person of skill in the art (“POSITA”) would understand, in view of the plain meaning of the claims and the specification, that the broadest reasonable

construction of the “if ... otherwise” binary logic structure requires that implementing functionality include *both* branches of the “if ... otherwise” clause. This is because the method claims at issue here recite a binary logic configuration that must be implemented in a system to utilize the claimed methods.

36. For example, in the context of the computer-implemented method of claim 13, the configuration of the first and second haptic effects in the binary logic structure would be implemented in computer hardware or software. The language in claim 13 describes the required configuration containing both branches. For example, the “if” branch of the binary logic structure is configured such that a “first haptic effect” is provided. The “otherwise” branch is configured such that a “second haptic effect” is provided.

37. The specification makes clear that “the identifiers ‘first’ and ‘second’ are used” within the patent “to differentiate between *different* signals and effects.” Ex. 1101 at 3:33-36 (emphasis added). Accordingly, the “first haptic effect” and “second haptic effect” are necessarily distinct from one another and the relationships between inputs and these haptic effects are defined according to the binary logic structure. A POSITA would thus understand that a method utilizing the claimed invention makes use of a structure having a first haptic effect associated with the “if” branch of that structure, and a different, second haptic effect associated with the “otherwise” branch of that structure.

38. The “second haptic effect” of the “otherwise” branch derives meaning by being different from a “first haptic effect” associated with the “if” branch. Ex. 1101 at 3:33-36 (emphasis added). Because the claimed steps in both the “if” and “otherwise” clauses derive meaning by reference to each other, the “if” clause and “otherwise” clause cannot be read in isolation. Disconnecting the “if” and “otherwise” eliminates the binary logic structure and the capability of providing both of the alternative haptic effects that the claim language requires.

39. This plain meaning is consistent with the teachings of the ’710 patent. The specification discloses that, as to features for which a system designer has elected to provide haptic feedback and implement the binary approach, a “second haptic effect” is generated when the user input is not recognized or a command is not determined: “if the phone does not recognize the command, it generates a second haptic effect.” Ex. 1101 at 2:25-27 (Detailed Description); *see also* 2:16-29 (in “Call Home” embodiment, if the phone understands the user’s input seeking to call home but has no stored number for “home,” the phone generates a second haptic effect), 3:50-4:12 (explaining similar functionality in response to a command to “add an appointment to a calendar for Tuesday at 3 p.m.”), 3:21-27 (describing Figure 1, “if the speech information is not recognized, or if a command corresponding to the speech information is not found, the processor 110 ... then transmits the second actuator signal to the actuator 130, which outputs the second

haptic effect”), 6:33-37 (describing Figure 2, “if the speech information or a corresponding command is not recognized, the processor 160 generates a second actuator signal configured to cause the actuator 130 to output a second haptic effect”), 9:37-47 (describing Figure 5, “if the processor is unable to recognize the speech information, or is unable to determine a command associated with the speech information ... the processor 110 generates a second actuator signal configured to cause an actuator to output a second haptic effect”); 12:25-52 (describing Figure 7, “the processor 620 generates an actuator signal corresponding to a haptic effect configured to indicate that a command was not recognized”). A POSITA would thus understand that a method utilizing the claimed invention makes use of the described binary logic structure.

B. “[A] haptic effect is configured to emulate the command” (Claim 20)

40. In my opinion, the plain meaning of this limitation is consistent with the examples in the ’710 patent of “haptic effects that emulate the command determined by the processor or the function performed by the processor,” such as a haptic effect including “a vibration that begins in the middle of the back of the wheelchair and moves to the right” in response to a command to turn a wheelchair to the right. Ex. 1101 at 6:55-67, 12:6-24.

VIII. GROUND 1: MARTIN AND MAKELA DO NOT RENDER CLAIMS 13 AND 19-20 OBVIOUS UNDER 35 U.S.C. § 103(A)

41. It is my opinion that Apple has failed to establish that Martin and Makela render the challenged claims obvious for at least the reasons expressed below.

A. Overview Of Martin

42. The conditional structure described by the “if ... otherwise” language of claim 13 of the ’710 patent is not rendered obvious by a structure wherein a processor produces haptic effects in response to user input by simply looking up the user input in a database such as a table described by Martin Fig. 9:

INPUT DEVICE	INPUT SIGNAL	POSITION DATA	PRESSURE DATA	FUNCTION	TACTILE SENSATION
1	--	Location 1	< Pressure 1	Search	Sensation 1
	Input 1	Location 1	Pressure 1 <=	Select	Sensation 2
2	--	Position 1	--	On	Sensation 3
	--	Position 2	--	Off	Sensation 4
3	Input 2A	--	Pressure 1	9	Sensation 5
	Input 2B	--	Pressure 2	W	Sensation 6
	Input 2C	--	Pressure 3	X	Sensation 7
	Input 2D	--	Pressure 4	Y	Sensation 8
	Input 2E	--	Pressure 5	Z	Sensation 9
4	Input 3	--	Pressure 1	Menu 1	Sensation 10
		--	Pressure 2	Menu 2	Sensation 11
		--	Pressure 3	Menu 3	Sensation 12
5	--	--	Pressure 1	2	Sensation 13
		--	Pressure 2	A	Sensation 14
		--	Pressure 3	B	Sensation 15
		--	Pressure 4	C	Sensation 16
6	Input 4	Position 1	Pressure 1	Function 1	Sensation 17
	Input 5	Position 2	Pressure 2	Function 2	Sensation 18
	Input 6	Position 3	Pressure 3	Function 3	Sensation 19
7	Input 7	Location 1	Pressure 1	Function 1	Sensation 20
	Input 8	Location 2	Pressure 2	Function 2	Sensation 21
--	AMBIGUOUS	--	--	--	Sensation 22
--	Function Failure	--	--	--	Sensation 23

FIG. 9

43. This figure discloses a system with twenty-one tactile sensations (Sensations 1-21) associated with different user inputs and entries in the FUNCTION column and at least two other tactile sensations (Sensations 22 and

23) provided when a given user input is not associated with an entry in the FUNCTION column. Ex. 1106 at Fig. 9. A POSITA would understand that Martin's system in response to the user input determines which, if any, of twenty-three possible haptic effects to play. In my opinion, this is far from the binary logic structure and the associated first and second haptic effects described in claim 13 and all challenged claims.

44. Martin teaches that after user inputs are recognized, the inputs are used to identify an associated entry in the FUNCTION column and an associated tactile sensation (Sensations 1-21) in Figure 9. Ex. 1106 at 14:22-32; Fig. 8 (Step 55 "Obtain Function and Feedback Info."). In the context of the '710 patent, a "command" means "an instruction to a computer program that actually causes an action to be carried out." Petitioner incorrectly equates at least one of the listed entries in the FUNCTION column to "commands" in the '710 patent. Pet. at 22.

45. At least some of Sensations 1-21 in Martin play when no action is performed and thus no command has been determined. For example, if a user input is matched to the "SEARCH" entry in the "FUNCTION" column of Figure 9, the associated sensation is Sensation 1. *See, e.g.*, Ex. 1106 at Fig. 9 (first entry showing "Sensation 1" associated with a "SEARCH" entry in the "FUNCTION" column). The Martin specification discloses that the "SEARCH" entry means the user is "simply searching or feeling for the location of the desired button or key ...

therefore, the controller *does not provide a function input* to the electronic device.” Ex. 1106 at 15:38-42 (emphasis added). In this case, “the controller does not provide a function input to the electronic device,” but the system still produces a tactile sensation. *Id.* at 15:39-45. Entries such as SEARCH, for which there is no associated command, cannot correspond to the “if” branch of claim 13 in the ’710 patent, which requires a command to be determined.

46. In addition to “SEARCH,” another example of a scenario in which no command is determined for a given user input is the “AMBIGUOUS” determination. Ex. 1106 at 16:3-21; Fig. 8 (step 71). An “ambiguous input can represent a [user input] that is not represented [in] the data contained in memory,” or it “can represent input simultaneously from two input devices or an input from a portion of a touchpad that is not associated with an input device.” *Id.* at 16:4-10. If the input in Martin is deemed AMBIGUOUS, the tactile sensation associated with an AMBIGUOUS input, sensation 22, is obtained from memory, and that tactile sensation is provided to the appropriate input device. *Id.* at 16:10-14. In this path, any preliminary sensation information obtained in step 55 is replaced by the AMBIGUOUS tactile sensation at step 72, which is output to the user in step 56.

47. This is one of many alternative paths in Martin leading to different outcomes and different tactile sensations. For example, Martin also describes

proceeding through the “update memory” step 57. Ex. 1106 at Fig. 8. This is an optional step, because Martin teaches that “the function corresponding to the input signals, positions, and pressures detected by the controller may involve modifications of the functions associated with a given combination, the controller can also update the database stored in memory 57.” *Id.* at 16:26.

48. After step 57 comes optional step 70, “Deliver Function Input.” *See* Ex. 1106 at Fig. 8. In this step, Martin delivers prerequisite function information to the controller. *Id.* at 14:50-43 (“The controller delivers the function information to the electronic device 80 ...”). This step is also optional for several reasons. First, this step does not occur when the “FUNCTION” entry in Figure 9 does not correspond to an action to be performed (*e.g.*, SEARCH). Second, this step is an alternative to the “Function Failure” step 58.

49. Another path in the multi-path approach described in Martin is that an input may be classified as “Function Failure” and Sensation 23 played. As illustrated in Figure 9, inputs classified as “Function Failure” have no associated function. *See* Ex. 1106 at Fig. 9 (“Function” column empty for “Function Failure”). One type of “Function Failure” is where no function has been assigned at all. *Id.* at 17:3-6. Another is where a function was preliminarily associated at step 55 but not available. *Id.* at 18:7-11.

50. Martin teaches that a rocker switch can be assigned to a variety of functions, but if the rocker switch is activated when no function is assigned to it, it “will not provide any function in the mobile phone since no function is currently assigned and a function failure tactile sensation ... will be output through the rocker switch.” Ex. 1106 at 16:59-17:6. Alternatively, the function assigned to a user input may not be available for execution, because for example, the user may not have authority to access the function. *Id.* at 18:11-16.

51. If the indicated function is not available or assigned for a given user input, “the controller obtains the tactile sensation associated with function failure 59, Sensation 23, and produces that sensation in the appropriate input device.” Ex. 1106 at 18:7-11. In this path, any preliminary tactile sensation information obtained in step 55 is replaced by the failure haptic feedback information in step 59, which is output to the user in step 56.

B. Martin Does Not Disclose The Binary Logic Structure Required By Claim 13

52. As illustrated in Figure 9, there are at least two sensations (the AMBIGUOUS Sensation 22 and the Function Failure Sensation 23) that have no associated function. *See* Ex. 1106 at Fig. 9 (“FUNCTION” column empty for AMBIGUOUS and Function Failure lines). Only if the user input does not meet the criteria for AMBIGUOUS or Function Failure can a tactile sensation associated

with the entry in the FUNCTION column in Figure 9 be output. *Id.* at 16:3-21, 17:3-6, 18:7-10; Fig. 8 (steps 71, 58).

53. Moreover, at least some of the entries in the FUNCTION column and their corresponding tactile sensations also result when there is no command determined. For example, the Martin that the “SEARCH” entry in the “FUNCTION” column simply means the user is “simply searching or feeling for the location of the desired button or key ... therefore, the controller does not provide a function input to the electronic device.” Ex. 1106 at 15:13-45 (emphasis added). The SEARCH entry cannot be a command because it is not an instruction to cause an action to be carried out. In other words, “SEARCH” is not a command that can be executed by Martin’s system, but rather describes what the user is doing—namely, searching for a button or key. In this circumstance, no command is determined and Sensation 1 is provided to the input device. *Id.* at 15:43-45.

54. Petitioner relies on the AMBIGUOUS determination as a basis for arguing that Martin discloses the “otherwise” branch of the challenged claims and relies on Sensation 22 as disclosing the second haptic effect. Pet. at 26. Petitioner fails to address other permutations addressed above where a command is not determined and different haptic effects are provided, including at least Function Failure and SEARCH and their associated Sensations 1 and 23.

55. Martin specifically teaches that Function Failure occurs when no entry in the FUNCTION column has been assigned to a given user input or when a function is unavailable (*e.g.*, the user lacks authorization). Ex. 1106 at 17:3-6, 18:7-11. Because no function is determined to be associated with a given user input in such circumstances, Petitioner may not argue that the “Function Failure” discussion in Martin teaches the “if” branch of the ’710 patent.

56. For the reason’s presented above, a POSITA would recognize that the multipath system of Martin does not teach the binary logic structure required by claim 13 of the ’710 patent.

C. Martin Does Not Disclose Or Render Obvious Claim 20

57. Claim 20 depends upon Claim 13, and recites the additional limitation that “the first haptic effect is configured to emulate the command.” Ex. 1101, cl. 20. The ’710 patent gives several examples of emulation of a command, including where a phone “call home” command is emulated by “a series of haptic effects corresponding to each number dialed and each ring of the phone being called,” and a “right turn” command is emulated by a vibration that “moves to the right.” Ex. 1101 at 6:55-66, 12:6-19.

58. Petitioner argues that Martin’s disclosure of a “pop” haptic effect renders obvious emulating a command resulting in the display of a menu “because a POSITA would find it obvious to select a ‘pop’ haptic effect when ‘popping up’

of a menu.” Pet. at 32. Petitioner relies strictly on the similarity of its own words “pop” and “popping up” and never explains how a “pop” haptic effect in any way emulates the display of a menu.

59. Petitioner further suggests that Martin’s disclosure where “the number of occurrences of a distinct vibrotactile sensation, such as a pop, corresponds to the index number of the menu option within a list of options ... because the number of pops corresponds to the position of the command in the menu.” Pet. at 33. But the index number of a menu option is not a command and the index number of a menu option is not an instruction that causes an action to be carried out.

D. Martin In View of Makela Does Not Render The Challenged Claims Obvious

60. Claim 13 has the additional requirement that the user input be in the form of “speech information.” Ex. 1101, cl. 13 (“... recognizing the user input and determining a command associated with the speech information”). Petitioner acknowledges that “Martin does not expressly disclose the input device (sensor) as comprising a sensor for sensing user inputs comprising speech information, as recited in limitation 13.” Pet. at 16. Petitioner relies on the Makela reference (Ex. 1107) as disclosing input of speech information and incorrectly argues that it would have been obvious to combine these teachings of Makela with Martin. Pet. at 17.

61. Makela does not relate to providing haptic effects for confirmation of commands. Instead, Makela discloses the use of “trigger events” to cause generation of “presentation tokens” associated with outputs from a device. Ex. 1107, Abstract. Makela teaches that a “microphone 24 may be coupled with the speech recognition functionality of the device 10 (the VR 24A)” to receive such trigger events. *Id.* at ¶ 17.

62. Petitioner relies on the example in Makela of a voice output of a “Caller ID.” Pet. at 20 (citing Ex. 1107 at ¶ 38). In this example, “the user receives a call in a mobile context ... indicated with a ringing tone. To hear the caller name via the speech synthesizer 20 the user triggers a voice output token with a speech command: ‘who’.” Ex. 1107 at ¶ 38. This disclosure has nothing to do with confirmation of a command using haptic output. Instead, the user input (the trigger “who”) merely causes a function to take place (output of the “Caller ID” on the voice synthesizer), with no corresponding haptic output

63. Petitioner erroneously asserts that a person of skill in the art would be motivated to combine Makela’s speech input functionality with the system disclosed in Martin (which does not include speech recognition functionality, much less any system for providing haptic feedback to confirm whether or not speech inputs are recognized). Pet. at 17. Petitioner’s analysis is flawed because it is my understanding that obviousness is based on the claim as a whole, not on an element

by element basis.

64. Martin is directed to input device that is more efficient and easier to use through the incorporation of pressure detection and haptic functionality, and contains a detailed discussion of how detecting pressure variance as a user interacts with a device, and providing corresponding tactile sensations, aids the user experience and addresses limitations of the prior art. *See, e.g.*, Ex. 1106 (*e.g.*, a “first pressure” and a “second pressure” in claim 1). Martin explains that the inventions help to address a problem with prior art devices, which is that users cannot always rely on visual feedback when providing pressure input to electronic devices (*e.g.*, has a button been selected when they need to be watching the road while driving, in a distracting environment, or the user interface screen is not visible). *Id.* at 1:60-2:5. The specification states that the input device thus has “multiple positions” resulting from the user’s pressure input. *Id.* at 3:14-17.

65. The speech input of Makela is an entirely different approach for a different purpose. Petitioner has not established why the system in Martin is deficient such that a person of ordinary skill would be motivated to add speech inputs as part of generating haptic effects or what benefit such an addition would be in the context of a device focused on the application of pressure by a user. Further, a person of ordinary skill in the art would find that adding such additional inputs would make the system needlessly more complex.

66. Petitioner asserts that the Martin device “was ready for improvement (as taught by Makela),” but fails to explain how speech input could be used in the Martin system. *See* Pet. at 19. Petitioner thus fails to explain how a POSITA would have a reasonable expectation of success or predictable results in incorporating the speech inputs of Makela into the Martin system. Petitioner also argues that the inputs in Figure 9 of Martin could be modified to include speech inputs. Pet. at 22-23. Petitioner fails to explain any motivation for making such a modification or what use such additional inputs would serve in Martin’s system.

67. Petitioner relies on examples in Martin relating to “missed phone calls” and a “mobile phone” implementation arguing that the associated microphones could be used for speech input. Pet. at 18 (citing Ex. 1106 at 16:33-37 and 16:59-61). The cited examples expressly involve the pressure inputs disclosed in Martin: “the function corresponding to the input signals, positions, and pressures detected by the controller” Ex. 1106 at 16:22-26; *see also* 16:67-17:2 (“Light searching pressure applied to the assignable input device and the rocker switch will produce first and second distinct tactile sensations”). A POSITA would therefore not have been motivated to combine Martin and Makela in the way described.

IX. GROUND 2: THEODORE AND SHAHOIAN DO NOT RENDER CLAIMS 13, 18 AND 19 OBVIOUS UNDER 35 U.S.C. § 103(A)

68. Ground 2 of the Petitioner is based primarily on Theodore. *See* Pet. at 33. It is my opinion that Petitioner has failed to establish that Theodore in view of Shahoian renders these claims obvious for at least the reasons expressed below.

69. Theodore is not directed to confirmation of commands associated with user input using haptic effects. Instead, Theodore discloses “a speech recognition system and an input device.” Ex. 1104 at Abstract. In Theodore, “the apparatus 10 includes a computer 12 programmed to carry out voice recognition based on voice data produced from sound spoken by a user through an input device 14.” *Id.* at 2:20-23. The input device is “remote from the computer [and] ... includes a microphone, an indicator and a user operated switch [for] input[ting] speech.” *Id.* at Abstract. “[T]he user operates the user operated switch wherein an activation signal is transmitted from the input device to the computer” and the computer readies for speech input. *Id.* at 1:57-59.

70. After the user provides speech input to the microphone, “the speech recognition module 98 [in the computer] evaluates the input voice instruction against the set of valid instructions. If the voice instruction received from the user does not correspond with any of the expected instructions in the set of valid instructions, program flow continues to step 122 whereat a ‘Not Recognized

Signal’ is transmitted to the user indicating that the voice instruction received was not recognized.” Ex. 1104 at 6:62-7:2. In the described embodiment, “the Not Recognized Signal is generated as a tone and transmitted through the speaker 66 of the handset 18 to the user.” *Id.* at 7:2-4. “If at step 120, the speech recognition module 98 does determine that the received voice instruction corresponds to one of the set of valid voice instructions, the system generates a ‘Recognized Signal’ that is transmitted to the user through the input device 14 at step 124 ... the Recognition Signal is used to initiate an audible tone provided to the user.” *Id.* at 7:11-18.

71. Theodore also includes a general statement that “visual indicators such as lights, or tactile indicators such as buzzers” may be used in lieu of, or in addition to, the audio signals. Ex. 1104 at 7:34-36. Theodore does not further describe any “tactile indications” or describe how “buzzers” would be implemented in the described system. Theodore only states that “[i]f the signals are inaudible, suitable circuitry is provided in the telephone 130 to generate audible tones, or activate other indicating devices such as lights, buzzers, etc. on the telephone 130.” *Id.* at 8:2-5.

72. Neither Theodore nor any reference cited by Theodore mentions providing different first and second haptic effects or a binary structure for providing haptic effects, as required by claim 13. Indeed, the only reference cited

on the face of Theodore that provides any discussion of a “buzzer” refers to only a single sound or tone, and only in response to “questionable recognition” of a user input. Ex. 2005 (U.S. Patent No. 5,774,841 (’841 patent’)) at 4:5-8 (“a buzzer is sounded upon questionable recognition of a spoken command as a query to ascertain the correct spoken word”), *see also* 14:49-57 (“if “the word spoken has a low degree of confidence” the system “send[s] the query buzzer tone back to the user”). Like Theodore, this reference does not discuss whether its buzzer even has the capability of providing distinct haptic effects, let alone the different confirmatory haptic effects (“first haptic effect” and “second haptic effect”) in the challenged claims of the ’710 patent.

73. Petitioner’s arguments regarding Theodore boil down to an argument that the claims are obvious because speech is a known input to certain devices. Put another way, Petitioner essentially contends that the field of haptics, and how to apply haptic effects to improve user interactions, is obvious in view of prior audio feedback techniques. Such arguments ignore the industry acknowledged benefits of advances in haptics by expanding integration of haptics into electronic devices to improve the functionality. Such arguments are also belied by Patent Owner’s extensive portfolio of haptics patents.

A. Theodore In View Of Shahoian Does Not Disclose The Claimed Binary Logic Structure Disclosed In The '710 Patent

74. As discussed above, the “if ... otherwise” clause in the challenged claims describe a binary logic structure that can be used for a given user input: *if* a user input is recognized and a command is determined, a first confirmatory haptic effect is output; *otherwise*, a second haptic effect is output. Ex. 1101, cl. 13. This functionality is implemented in a computer and the claimed method carried out via two paths corresponding to two haptic effects. The Petition’s arguments regarding Ground 2 fail to demonstrate how Theodore and Shahoian disclose or render

75. The “if” portion of the “if ... otherwise” clause requires that a “first haptic effect” be provided if (1) “user input is recognized” and (2) a “command is determined.” Ex. 1101, cl. 13. Petitioner relies on the disclosure in Theodore of a speech recognition module on a computer providing a “Recognized Signal” to the remote input device when speech information “corresponds to one of the set of valid voice instructions.” Pet. at 35 (citing Ex. 1104 at 7:11-18). Petitioner does not address, and Theodore does not disclose, what happens when the input speech information is not recognized.

76. As a result of the “if” clause returning true, the challenged claims also require the system to “generate a first actuator signal configured to cause the actuator to output a first haptic effect.” Ex. 1101, cl. 13. Petitioner acknowledges

that Theodore discloses the use of audible tones to provide “indications of whether the voice input was ‘Recognized.’” Pet. at 35 (citing Ex. 1104 at 6:62-7:18).

Petitioner relies on a general statement in Theodore that a “tactile buzzer” can be used in lieu of audio tones as disclosure of this portion of the limitation. *Id.* (citing Ex. 1104 at 7:30-36). The cited disclosures, however, do not reference confirmatory haptic effects.

77. For example, Theodore is silent on having differential haptic effects indicating whether or not the speech input was recognized and a command was determined. Any such differentiated feedback would require specialized drive circuitry and programing that is not addressed in Theodore. Theodore also fails to disclose the subsequent limitations regarding “a first actuator signal” and “a first haptic effect.”

78. While Theodore indicates that certain audible indications to a user can be replaced by an indication from a buzzer, Theodore does not teach that a “Recognized Signal” and a “Not Recognized Signal” that is distinguishable from the “Recognized Signal” would be or even could be provided using a buzzer.

79. Petitioner’s reliance on the mention of a piezoelectric buzzer in Shahoian to cure this deficiency is misplaced. First, Theodore does not mention “piezoelectric” buzzers. Second, such buzzers are typically driven at a resonant frequency, and produce poor results if driven at a different frequency. For

example, they become horribly inefficient at other frequencies compared to resonance. Third, to produce differential haptic effects, a buzzer would require a specialized driving circuit and programming. Theodore does not describe such driving circuit and programming.

80. The fact that tactile buzzers were not considered for providing distinct haptic effects to indicate both (1) recognition of user input and determination of a command and (2) failure to recognize the user input or determination of a command is shown by the references cited on the face of Theodore. Of all of these references, only one discusses the use of a “buzzer,” and it is similarly ambiguous regarding what any such “buzzer” might entail. *See* Ex. 2005 (’841 patent discussed above). The ’841 patent reference teaches only that the buzzer is used to indicate to the user when a user input is *not* fully recognized—no teaching is provided that the buzzer can also be used to indicate to the user when the input *is* recognized. *Id.* at 11:33-35 (“A single tone indicates good recognition. A double tone indicates vocabulary node transition. A buzzer indicates a questionable recognition.”). This teaching would confirm to a POSITA that Theodore’s tactile buzzer would not be used to provide distinct haptic effects corresponding to both (1) a confirmation that an input is recognized and a command determined, and (2) an indication that an input was not recognized or a command not determined, as required by claim 13. The prior art does not teach or suggest using a buzzer to

provide effects for *both* branches of a binary logic structure, and Petitioner provides no explanation why such a solution would have been obvious in view of the difficulties in adapting Theodore's buzzer to accomplish such an implementation.

81. Petitioner argues that "the European Patent Office found that the PCT application of Theodore (WO 99/45531 A1) anticipated all claims of the '710 patent's corresponding PCT application" and that the same reasoning should apply here. Pet. at 36. The initial findings of the European Patent Office addressed different claims with different limitations. *See* Ex. 1112 (Patent Cooperation Treaty, International Search Report, Application No. PCT/US2010/054967); Ex. 1114 (PCT/US2010/054967, claims). While Petitioner argues that the claims are substantially similar to the challenged claims in the '710 patent, the examiner was aware of the corresponding PCT application and findings of the European Patent Office during the prosecution of the challenged claims and allowed the claims over the Theodore reference. *See* Ex. 1112 ('710 patent file history). Moreover, the corresponding European application is still undergoing prosecution and the prior art, including the foreign counterpart to Theodore, has been differentiated, for example, on the basis that the prior art does not address the steps of both "recognizing" the user input and "determining a command." Ex. 2007 (1/28/2013 Annotated Amended Claims in Application EP2497004).

82. Petitioner relies on the Shahoian reference (Ex. 1105) as disclosing the generation and transmission of an actuator signal and mistakenly argues that it would have been obvious to combine these teachings of Shahoian with Theodore. Pet. at 44-47. Shahoian, however, has nothing to do with haptic confirmation of commands.

83. Shahoian discloses a computer system with a touch input device and an actuator that can provide haptic feedback in response to user inputs on the touch input device. Ex. 1105 at [0008]. The touch input device provides coordinate data to a processor based on the sensed location of an object near the touchpad. *Id.* at [0041]. Capacitive or resistor sensors can be used to determine the location of the object. *Id.* The system may include a local microprocessor that receives input signals from the sensors and provides output signals to actuators in accordance with instruction from a host processor. *Id.* at [0066]. The actuator provides haptic feedback to the user. *Id.* Haptic feedback is provided in response to detection of contact by the user on the touch input device. *Id.* at [0077]. In other words, Shahoian addresses providing haptic feedback to a user based upon user inputs, not based upon whether or not such inputs are associated with a command.

84. Petitioner mistakenly asserts that it would have been obvious to combine the buzzer of Theodore with the more complex actuator drive systems of Shahoian. Pet. at 43. Theodore is focused primarily on audio inputs and

feedback. Ex. 1104 at 7:11-18 (feedback as “audible tone”). Theodore includes a single general statement that “visual indicators such as lights, or tactile indicators such as buzzers” may be used in lieu of, or in addition to, the audio signals. *Id.* at 7:34-36. There is no need in the system of Theodore for a complex system of haptic feedback providing positive a negative confirmation of commands.

Petitioner provides no motivation to combine the two systems.

85. Petitioner argues that a POSITA would be motivated to combine the references because both references disclose “tactile buzzers.” Pet. at 44-45. The “tactile buzzer” disclosed in Theodore is disclosed as merely providing a single response to the user. Ex. 1104 at 7:34-36. Shahoian, on the other hand, discloses a more complex system of haptic feedback directed at producing different types of haptic sensations. Ex. 1105 at [0106] (“To provide the desired haptic sensations, a large piezo buzzer should provide large sustainable displacements (accelerations) of the mass and the carrier frequency (the frequency at which it oscillates) should be modulated with the haptic signal.”) (emphasis added). There is no need for such a complex tactile feedback mechanism in the speech recognition system of Theodore.

86. Petitioner also argues that Theodore combined with Shahoian disclose the “otherwise” limitations. Pet. at 46-47. There are several problems with Petitioner’s arguments.

87. First, as discussed above, Petitioner fails to provide motivation for combining the “speech recognition” system of Theodore with a haptic feedback system like Shahoian.

88. Second, Petitioner fails to identify disclosure in either reference of having a “first haptic effect” and an “otherwise” path with a “second haptic effect,” wherein the first haptic effect is distinct from the second haptic effect as required by claim 13. *See* Pet. at 46-47; Ex. 1101 at 3:33-36 (“the identifiers ‘first’ and ‘second’ are used here to differentiate between different signals and effects”). Neither reference discloses such first and second haptic effects at all, much less an “otherwise” path in which a distinct, second effect is output. Theodore discloses only that a tactile buzzer can be used, and as described above does not describe the tactile indications that might be created by the buzzer, or even whether its buzzer would be capable of generating distinct effects. Ex. 1104 at 7:34-36.

89. Third, the only reference cited by Theodore that discusses a buzzer implemented a buzzer to provide a single indication that a user input was *not* fully recognized, and did not also use the buzzer to provide a confirmation under different circumstances such as an input being recognized. Ex. 2005 (’841 patent) at 11:33-35 (“A single tone indicates good recognition. A double tone indicates vocabulary node transition. A buzzer indicates a questionable recognition.”).

90. Fourth, as discussed above, Shahoian is not directed at confirmation of commands and thus does not tie the haptic effects to such confirmation.

X. CONCLUSION

91. In sum, it is my opinion that Grounds 1 and 2 advanced in the Petition have failed to demonstrate that the challenged claims of the '710 patent are disclosed or rendered obvious by the cited prior art.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of the Title 18 of the United States Code.

Executed on the 24th day of August 2017 in London, United Kingdom.



Professor Yon Visell, Ph.D.