

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.

Petitioner,

v.

IMMERSION CORPORATION

Patent Owner.

Case IPR2023-00943

U.S. Patent No. 8,896,524

EXHIBIT 2002

DECLARATION OF GREGORY ABOWD, D.PHIL.

I, Gregory Abowd, declare as follows:

1. I have been retained by Folio Law Group PLLC, counsel for Patent Owner Immersion Corporation (“Immersion”) to assess the challenged claims of U.S. Patent No. 8,896,524 (“the 524 patent”). I am being compensated for my time. My compensation is not dependent in any way upon any outcome of the Petition for *Inter Partes* Review of the ’806 patent (“the Petition”).

I. BACKGROUND AND QUALIFICATIONS

2. I have more than 30 years of experience in the field of computer science. In 1986, I received a Bachelor of Science (“B.S.”) with Honors in Mathematics from the University of Notre Dame. In 1987, I obtained a Master of Science (“M.Sc.”) from the University of Oxford in the United Kingdom in Computation. In 1991, I received a D. Phil. from the University of Oxford in Computation. At the University of Oxford, the term “Computation” referred to the field that is known in the United States as “Computer Science.”

3. I am employed by Northeastern University (“Northeastern”), where I am the Dean of the College of Engineering and Professor of Electrical and Computer Engineering.

4. I have extensive experience in Human Computer Interaction (HCI), with specific expertise in the technologies of interaction, including haptics and touch interfaces. My D. Phil. thesis was entitled *Formal Aspects of Human-*

Computer Interaction. I am co-author of one of the first textbooks in HCI, first published in 1994. I have won numerous Best Paper awards at a number of conferences related to user interfaces and wireless networks. I have also received several “test of time” awards for my publications, which is usually awarded to papers 10 years after publication and based on long-term impact. I am the most cited academic author in the world in the area of mobile and ubiquitous computing technologies.

5. My contributions to the fields of Human-Computer Interaction (“HCI”) and Ubiquitous Computing have been recognized through numerous awards. In 2008, I was named a Fellow of the Association for Computing Machinery. That same year, I was inducted into the ACM CHI Academy, the most prestigious honor for researchers in HCI. In 2023, I was awarded the Lifetime Research Achievement award by ACM SIGCHI, the leading academic professional society in HCI.

6. A detailed record of my professional qualifications, including a list of patents and academic and professional publications, is set forth in my curriculum attached as an appendix to this declaration.

II. BASES OF OPINIONS

7. In the course of performing my analysis and forming my opinions, I have reviewed the materials listed below, which are part of Exhibits 1001-1011:

- U.S. Patent No. 8,896,524 (“the 524 Patent”) (Ex. 1001)

- IPR Petition IPR2023-00944
- Declaration of Dr. Jeremy Cooperstock (Ex. 1002)
- US Patent No. 7,952,556 (“Poupyrev”) (Ex. 1003)
- US Patent App. Pub. 2009/0322498 (“Yun”) (Ex. 1004)
- U.S. Patent No. 6,300,936 (“Braun”) (Ex. 1005)
- U.S. Patent No. 6,196,540 (“Rosenberg”) (Ex. 1007)
- Prosecution History of the 524 Patent. (Ex. 1009)
- Claim Construction Order (Ex. 2001)
- Tierling Reference (Ex. 2003)

III. APPLICABLE LEGAL STANDARDS

A. Ordinary Skill in the Art

8. My opinions in this declaration are based on the understandings of a person of ordinary skill in the art—sometimes referred to as an “ordinary artisan” or by the acronyms “POSITA” (person of ordinary skill in the art) or “PHOSITA” (person having ordinary skill in the art)—as of the time of the invention, which I understand to be the filing date (August 24, 2012) of the provisional application, to which the utility patent application of the 524 Patent asserts priority. I understand that the person of ordinary skill in the art is a hypothetical person who is presumed to have known the art relevant to the challenged claims of the 524 Patent at the time of the invention.

9. I understand that, in assessing the level of skill of a person of ordinary skill in the art, one should consider the type of problems encountered in the art, the prior solutions to those problems found in the prior art references, the rapidity with which innovations are made, the sophistication of the technology, the level of education of active workers in the field, and my own experience working with those of skill in the art at the time of the invention.

10. I understand that the Petitioner and Patent Owner have proposed that the level of skill in the art at the time of the 524 patent is as follows:

A person of ordinary skill in the art would have possessed a bachelor's degree in electrical engineering or computer science (or an equivalent degree), and two years of practical or industry experience in the field of human computer interaction, including implementation of computer-based systems and software for providing haptic feedback effects to a user. A person could also have qualified as an ordinarily skilled artisan with more formal education and less practical or industry experience, or vice versa.

11. Consistent with this definition, I was at the time of invention, and am, a POSITA through my education, research experience and work experience. As of the date of the invention, I was familiar with the types of problems encountered in systems that use haptic feedback and the rapidity at which innovations are made.

B. Claim Construction

12. I understand that claims of the 524 Patent in this IPR are generally

interpreted according to their ordinary and customary meaning taking into consideration the so-called “intrinsic evidence” of the patent consisting of (1) the claim language; (2) the specification; and (3) the prosecution history.

13. I understand that claim terms may be explicitly defined in the patent specification or they may be implicitly defined through consistent usage in the specification. I also understand that the scope of claim terms may be limited by statements in the specification or prosecution history where the applicant clearly disavows or disclaims subject matter.

14. In this matter, I understand that neither the Petitioner nor Patent Owner is proposing that any particular terms require construction beyond plain and ordinary meaning.

C. Obviousness

15. Counsel has informed me, and I understand, that an issued patent claim is invalid as obvious if it can be shown that the differences between the patented subject matter 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. Relevant considerations include the level of ordinary skill in the art; the scope and content of the prior art; differences between the prior art and the claims at issue; and the objective indicia, or secondary considerations, of nonobviousness.

16. In this regard, I am informed and I understand that the secondary considerations of nonobviousness could include factors such as commercial success, long felt but unresolved needs, the failure of others, skepticism by experts, praise by others, award and accolades, and copying.

17. Counsel has informed me, and I understand, that in order to evaluate the obviousness of any claim of the 524 Patent over a given prior art combination, I should analyze whether the prior art references, included collectively in the combination, disclose each and every element of the allegedly invalid claim as those references are read by the person of ordinary skill in the art at the time of the invention.

18. Counsel has informed me, and I understand, that even where all of the claim limitations are expressly disclosed in the prior art references, there must be some showing that a person of ordinary skill in the art would have been motivated to combine such prior art references, and explanation of how the combination would be achieved, and that there would have been a reasonable expectation of successfully achieving the claimed invention from such combination.

19. Counsel has informed me, and I understand, that absent some additional reasoning, mere routine optimization for a person of ordinary skill in the art to arrive at the claimed invention through combination of prior art references is insufficient to support a conclusion of obviousness.

20. Counsel has informed me, and I understand, that to rely on a reference it must be analogous prior art. Counsel has informed me and I understand that a reference is considered analogous prior art: (1) if the reference is from the same field of endeavor as the claimed subject matter, or (2) if the reference “is reasonably pertinent to the particular problem with which the inventor is involved,” even though the reference is not within the field of the inventor’s endeavor.

21. Counsel has informed me, and I understand, in considering the obviousness of a claimed invention, one should not view the invention and the prior art with the benefit of hindsight. In an obviousness analysis, one must be aware of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning. Counsel has instructed me and I understand that when considering obviousness, I should not consider what is known today or what was learned from the asserted patents. Instead, obviousness is assessed by the person of ordinary skill in the art at the time the invention was made.

22. In this regard, I am informed and I understand that the ’806 Patent may not be used as a guide to select and understand the prior art, because such an approach, at a minimum, discounts the value of combining various existing features or principles in a new way so as to achieve a new result.

23. Counsel has informed me, and I understand, that obviousness cannot be predicated on what was unknown at the time of the invention, even if the inherency

of a certain feature is later established. Counsel has also informed me, and I understand, that unknown properties of the prior art may not be relied upon to provide the rationale for modifying or combining the prior art to reach the claimed subject matter.

24. Counsel has informed me, and I understand, that a reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant of the 524 Patent.

IV. OVERVIEW OF THE 524 PATENT

25. The 524 Patent describes techniques for providing richer and more realistic tactile or haptic feedback as confirmation of a user's desired input to a device. EX1001, 1:10-38. "[I]n contrast to known haptic systems, where confirmation haptic effects for user interface elements are generally on confirmation type per element, embodiments of the invention can provide for multiple possible confirmation haptic events for a single user interface element, based on context metadata." *Id.*, 11:7-12.

26. The 524 Patent describes tailoring haptic feedback based on information related to the context in which the user has made a command input. This context information is described by the patent as "context metadata." "The

haptic confirmation system can generate multiple possible confirmation haptic events for a single user interface element where each confirmation haptic event is individually customized based on context metadata.” *Id.*, 2:20-24.

27. The 524 Patent describes five different types of context metadata associated with confirmation haptics, although not all are recited by the Challenged Claims: (1) physical properties of the user interface, such as the size and shape of the user interface, “a small button can feel different (e.g. lighter) to a user than a big button” (EX1001, 4:27-48); (2) functionality of the user interface such as “the inputting of a character within a field displayed within a touchscreen can generate a confirmation haptic effect that is different from a confirmation haptic effect that is generated when a word is input within the field” (*Id.*, 4:48-5:2); (3) history of use of the user interface element, such as typing speed (*Id.*, 5:3-31); (4) sensor input data such as a pressure produced by a user touching a user interface element (*Id.*, 5:32-59); and other context metadata can be any kind of data that is associated with a user interface element (*Id.* at 5:60-64).

28. Claims 1 and 11 contain the language specifically requiring this context metadata: “context metadata . . . compris[ing] at least one of data indicating a functionality of the user interface element, or data indicating a history of the user interface element”. *See* EX1001, 11:47-51.

29. The system maps the context metadata to one or more haptic parameters

such as “magnitude, frequency, duration, amplitude (i.e., strength), waveform, or any other kind of quantifiable haptic parameter.” EX1001, 6:2-25. The user can provide their own customization of haptic effects: “As part of the customized mapping, the one or more haptic parameters can be modified based on one or more multipliers defined by the user. More specifically, a value for the one or more haptic parameters can be modified based on the one or more multipliers defined by the user. The one or more multipliers defined by the user can be based on the one or more sliders that are part of a slider user interface.” EX1001, 6:53-59

V. THE ASSERTED PRIOR ART

A. The Poupyrev Reference (Ex. 1003)

30. The Poupyrev Reference is a patent application publication from 2008 bearing serial number U.S. 2008/0024459. This publication describes a system for determining when a user has taken an action that is consistent with a command input and proposes different techniques for distinguishing between a user’s intended command input and a casual touches or brushes of a pressure-sensitive touch screen. EX1003, ¶ 0068. According to the reference, Poupyrev describes “providing tactile notification when a user touches a user interface element on a touchscreen without executing functionality of the user interface element”; and “providing tactile feedback notification to a user when the functionality of the user interface is executed.” EX1003, ¶¶ 0005-0007.

31. The Poupyrev reference is concerned with distinguishing between touches that are intended by the user to actuate or execute a GUI element, e.g. press a button on a touch screen, or other touches not intending to execute a GUI element. Poupyrev determines which type of touch has occurred based on “a) the current state of GUI object and b) the pressure value applied to the GUI object . . . For example, if the GUI object is a graphical button, the GUI controller 112 can calculate if there was enough pressure applied on the graphical button on the screen to change the state of the button from ‘free’ to ‘pressed’ or ‘non-actuated’ to ‘actuated’.” EX1003, ¶ 0068.

32. Poupyrev describes providing multiple pressure thresholds including both an “activation” threshold and a greater pressure “confirmation” threshold to distinguish between when a user is intending to actuate or active a GUI control, and when the touch is casual and not intended to actuate or active the control, such as dragging a finger across a touch screen to “avoid accidental activation of the GUI objects.” EX1003, ¶120. Poupyrev only considers the user to intend to provide a command input when the user presses the GUI hard enough to reach this confirmation threshold. If the pressure does not reach the confirmation threshold, the system does not consider the user’s action to be a command input. EX1003, ¶ 81.

33. Fig. 11 of the Poupyrev reference illustrates these various pressure

thresholds and charts the pressure a user is exerting on the surface of the touch screen in two curves. Curve (a) represents a slow increase of pressure on the GUI object whereas Curve (b) is rapid increase. Points 1 and 2 on Curve (a) do not result in a command input or activation, but rather a command input is only recognized when the pressure reaches the confirmation pressure threshold at Point 3, at which point a tactile feedback is presented to the user to confirm the activation. EX1003, ¶0119. Other tactile feedbacks are associated with Points 1 and 2, but those points are not command inputs as the pressure on the device has not reached the “confirmation” threshold, and in fact if the user ceases pressing on the GUI object, no command input occurs for those two points.

34. Poupyrev separately recognized that when a user applies pressure quickly, having tactile feedback occurring at Points 1 and 2 would be “distracting or hamper the user interaction” and therefore the system only presents tactile feedback when the confirmation pressure threshold is exceeded, and a command input is signaled. EX1003, ¶121. This makes sense in that if the pressure is allowed to increase rapidly to the confirmation threshold, it is likely that the user intended the action.

B. The Yun Reference (Ex. 1004)

35. The Yun reference is a published application from 2009 with serial number US 2009/0322498. Yun describes deploying haptics within a device with

a space-constrained touchscreen. EX1004, ¶¶ 0005, 0007. Yun suggests that users are able to perform some basic customization of the haptic effect. *Id.*, ¶0007. Yun described dividing the screen into various regions, each region having its own haptic effect.

wherein the input mechanism has a surface that is divided into at least two separate regions, wherein the two separate regions provide a tactile sensation such that the first region provides a first tactile sensation and the section region provides a second tactile sensation, where in a user in response to touch the first region and second region recognizes a difference in the first region and the second regions, wherein said difference in sensations allows a user to detect a change in the functionality of the mobile terminal or an output generated by the mobile terminal. EX1004, ¶ 0008.

36. Yun also describes dividing UI objects into regions and having different haptic effects for each region of the UI object. *Id.*, ¶¶ 0009, 0011. Fig. 36 illustrates a number of GUI buttons representing menu items. Yun describes each menu item having its own unique haptic effect. *Id.*, ¶ 0110.

Referring to FIG 36, if a user touches or approaches and thus chooses one of the menu icons, the name of the chosen menu icon may be analyzed and a haptic effect corresponding to the name of the chosen menu icon may be generated. For example, if the user chooses a menu icon ‘setting’, haptic effect (such as vibration effects) respectively corresponding to alphabet letters ‘s’, ‘e’, ‘t’, ‘t’, ‘I’, ‘n’, and ‘g’ may be sequentially output. Alternatively, the

user may set a haptic effect for the word ‘setting’ in advance. In this case, the haptic effect corresponding to the word ‘setting’ may be generated.” Ex. 1004, ¶ 0109.

VI. CLAIM CONSTRUCTION

37. I have not provided any specific opinions regarding the construction of any terms in the 524 Patent at this stage.

VII. POUPYREV DOES NOT TEACH “CONTEXT METADATA COMPRIS[ING] AT LEAST ONE OF: DATA INDICATING A FUNCTIONALITY OF THE USER INTERFACE ELEMENT, OR DATA INDICATING A HISTORY OF THE USER INTERFACE ELEMENT.”

38. I have reviewed the Petition and Declaration of Dr. Jeremy Cooperstock (Ex. 1002). My understanding is that Petitioner and Dr. Cooperstock are mapping the claimed "data indicating a functionality of a user interface element" to the amount of pressure and the position of a user's touch of the screen. Pet. at 19. They also appear to be mapping "data indicating a history of the user interface element" to "previous states of the GUI object", "prior touch positions and pressure values associated with the GUI object." Pet. at 23. Neither of these mappings are supported by the text of the 524 Patent or claims.

39. As I mentioned above, the 524 Patent divides context metadata into several specific categories, and only claims two of the categories. For example, both independent claims 1 and 11 require the context metadata to be "data indicating a functionality of a user interface element" or "data indicating a history of a user

interface element." However, types of metadata relating to "Physical Properties" or "Sensor Input Data" are not claimed, and therefore cannot be used to show that a reference meets the claim language. The 524 Patent expressly identifies "pressure" data as belonging to the unclaimed "Sensor Input Data" category, and therefore is not related to the required "functionality" or "history" data from the independent claims. EX1001, 5:32-59. Similarly, it is my opinion that the position of the user's finger on the screen would be a type of physical data or fall under the "Other" metadata category. EX1001, 4:27-48, 5:60-64. Because neither of these are examples of context metadata that relates to functionality of history, these examples from the Petition fail to demonstrate that Poupyrev meets the language of independent claims 1 and 11.

40. Regarding the Petition's identification of "history" metadata as "previous states of the GUI object", "prior touch positions and pressure values associated with the GUI object," none of these correspond to the description of history metadata in the 524 Patent, but rather fall within the aforementioned "Physical," "Sensor Data," or "Other" categories, which are not claimed. Rather, the 524 Patent describes the problem of having multiple haptic responses in succession interfere with each other, muddling the response, particularly when typing quickly. EX1001, 5:3-31. The 524 Patent expressly states that history is be "typing speed" and by considering this in forming the haptic response, such

unwanted or undesirable interactions can be avoided. *Id.* The Petition's identified "prior positions, pressure values" or GUI object states would not provide any information to adjust the haptic response in this way, and are clearly not what is contemplated by the 524 Patent when it describes "context metadata comprises . . . data related to the history of a user interface element." Additionally, during prosecution, the Examiner rejected claims based on the Tierling reference because Tierling discloses using data from sensors such as the data types described in the Petition. EX1009, ¶65, EX2003, ¶43. The 524 Patent describes sensor data as belonging to the "Sensor Input Data" category of metadata, not the "history" or "functionality" categories as recited in the claim. In response the applicants added the claim language "wherein the context metadata comprises at least one of: data indicating a functionality of the user interface element, or data indicating a history of the user interface element" and in response, the Examiner allowed the claims. As such, in my opinion, these various citations to Poupyrev do not meet the context metadata claims language of claim 1 and 11.

VIII. YUN DOES NOT TEACH "CONTEXT METADATA COMPRIS[ING] AT LEAST ONE OF: DATA INDICATING A FUNCTIONALITY OF THE USER INTERFACE ELEMENT."

41. For Yun, Petitioner and Dr. Cooperstock assert that Yun discloses "data indicating the functionality of the user interface element when it describes providing haptics corresponding to the name of a GUI button, in this case "settings".

However, in the context of the 524 Patent, the reference to “settings” does not indicate the type of functionality that is claimed.

42. Rather, the ‘524 Patent describes the “data indicating the functionality” to be the underlying system action taken by the system upon actuation of the GUI element. Examples in the patent include have one haptic response to indicate that the user has selected a GUI element that signifies the creation of an email, and other haptic response to indicate that the user has selected the same GUI element, but this time corresponding to the creation of a text. EX1001, 4:55-58. At best, the “settings” example in Yun teaches using different haptic responses for different buttons, not the same button, and not based on underlying function the button has, but rather on whatever its arbitrary title is.

43. In contrast, playing a particular sequence of haptics for the “settings” button in Yun is not the same as modifying the haptic response based on the functionality of the button, such creating an email or alternatively creating a text. It at best only represents the name of a menu item, “settings” which does not itself provide any sort of functionality but likely sends the user to another set of menu items.

44. Thus, in my opinion Yun does not teach context metadata related to the functionality of a user interface element as required by the independent claims 1 and 11.

I declare under penalty of perjury that the foregoing is true and correct. I acknowledge that willful false statements and the like are punishable by fine and/or imprisonment, that all statements made of my own knowledge are true, and that all statements made on information and belief are believed to be true.

Executed September 8, 2023, in Boston, Massachusetts.

By: 

Gregory Abowd