

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION
Petitioner,

v.

IMMERSION CORPORATION
Patent Owner.

Case No. IPR2024-00557
U.S. Patent No. 10,665,067

EXHIBIT 2001

**DECLARATION OF CRAIG ROSENBERG, Ph.D.
IN SUPPORT OF IMMERSION CORPORATION'S
PATENT OWNER PRELIMINARY RESPONSE**

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I, Craig Rosenberg, 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. 10,665,067 (“the ’067 Patent”) in connection with this case which is the Petition for Inter Partes Review of the ’067 Patent (“the Petition”).

2. I am being compensated for my work on this case and my fee is not contingent on the outcome of this case or on any of my opinions or the technical positions I explain in this report. In addition, I have no financial interest in the outcome of this case or any of the parties involved in this case.

3. I believe I am qualified to serve as a technical expert in this proceeding based on my educational and work experience, including my 30+ years of experience in human factors, user interface design, user interaction design, human-computer interaction, and software engineering from 1988 through today.

4. This declaration sets forth my opinions, which I formed based on my study of the evidence; my understanding as an expert in the field; and my training, education, research, knowledge, and personal and professional experience. All of my opinions stated in this declaration are based on my own personal knowledge, expertise, training, education, and professional judgment. In forming my opinions, I have relied on my knowledge and experience in human factors, user interface

design, user interaction design, human-computer interaction, and software engineering.

5. If I am called upon to do so, I would be competent to testify to the matters set forth herein. My qualifications to testify about the technical subject matter in this case and the relevant technology are outlined in my curriculum vitae and this section of this declaration. A copy of my current curriculum vitae is provided for this proceeding as Exhibit 2002.

6. This declaration is based on the information currently available to me. If additional information becomes available to me, I reserve the right to continue my analysis, which may include a review of documents and information that may be provided to me, as well as testimony from depositions that have not yet been taken at this time.

I. BACKGROUND AND QUALIFICATIONS

7. I earned my Bachelor of Science degree in Industrial Engineering, my Master of Science degree in Human Factors, and Doctor of Philosophy in Human Factors from the University of Washington School of Engineering. For over 30 years, I have worked in human factors, user interface design, software development, software architecture, systems engineering, and modeling and simulation across various application areas, including aerospace, communications, entertainment, and healthcare.

8. I graduated from the University of Washington in 1988 with a Bachelor of Science in Industrial Engineering. After graduation, I continued my studies at the University of Washington College of Engineering. In 1990, I obtained a Master of Science degree in Human Factors. Human Factors is an engineering discipline that studies the design of products, processes, equipment, and systems to work more efficiently with humans. Human factors is concerned with reducing human error, increasing productivity and efficiency, and enhancing safety and comfort with a specific focus on the interactions and interfaces between humans and the products, processes, or systems with which they interact. In 1994, I graduated with a Doctor of Philosophy in Human Factors, focusing on advanced interface design. My Bachelor of Science, Master of Science, and Doctor of Philosophy degrees were all obtained at the University of Washington College of Engineering.

9. During my doctoral studies, I worked as an Associate Assistant Human Factors Professor at the University of Washington Industrial Engineering Department. My duties included teaching, writing research proposals, designing and conducting funded human factors experiments for the National Science Foundation, and hiring and supervising students. While studying at the University of Washington, I also worked as a human factors researcher. I designed and performed advanced human factors experiments relating to virtual environments and interface design, stereoscopic displays, and advanced visualization research, which the

National Science Foundation funded. My duties included user interface design, systems design, software development, graphics programming, experimental design, and hardware and software interfacing.

10. I have published twenty-one research papers in professional journals and proceedings in user interface design, computer graphics, and the design of spatial, stereographic, and auditory displays. I also authored a book chapter on augmented reality displays in the book “Virtual Environments and Advanced Interface Design” (Oxford University Press, 1995). In addition, I created one of the first virtual spatial musical instruments called the MIDIBIRD that, utilized the MIDI protocol, two six-dimensional spatial trackers, a music synthesizer, and a computer graphics workstation to create an advanced and novel musical instrument.

11. For the past 21 years, I have been a consultant for Global Technica, Sunny Day Software, Stanley Associates, Techrizon, CDI Corporation, and the Barr Group. In this capacity, I have provided advanced engineering services for many companies.

12. I consulted for the Boeing Company for 15 years as a senior human factors engineer, user interface designer, and software architect for various advanced commercial and military programs. Many of the projects that I was involved with at Boeing involved advanced software development, user interface design, agent-based software, and modeling and simulations in the areas of missile defense,

homeland security, battle command management, computer-aided design, networking and communications, air traffic control, location-based services, flight simulation, and Unmanned Aerial Vehicle (“UAV”) command and control. Additionally, I was the lead system architect developing advanced air traffic controller workstations and air traffic control analysis applications, toolsets, and trade study simulations for Boeing Air Traffic Management.

13. I was also the architect of the Boeing Human Agent Model. The Boeing Human Agent Model is an advanced model for the simulation of human sensory, cognitive, and motor performance as applied to the roles of air traffic controllers, pilots, and UAV operators. In another project, I was the lead human factors engineer and user interface designer for Boeing’s primary vector and raster computer-aided drafting and editing system that produces the maintenance manuals, shop floor illustrations, and service bulletins for aircraft produced by the Boeing Commercial Aircraft Company. Additional responsibilities in my time as a consultant include system engineering, requirements analysis, functional specification, use case development, user stories, application prototyping, modeling and simulation, object-oriented software architecture, graphical user interface analysis, and design, as well as UML, C++, C#, and Java software development.

14. In 1995 and 1996, I was hired as the lead human factors engineer and user interface designer for the first two-way pager produced by AT&T. Before this

technology, individuals could receive pages but had no way to respond utilizing their pager. This new technology allowed users to use a small handheld device to receive and send canned or custom text messages, access and update an address book, and access and update a personal calendar. This high-profile project involved designing the entire feature set, user interface/user interaction design and specification, and all graphical design standards. In addition, I designed the notification alerts for the pager associated with receiving messages, timers, alarms, etc.

15. From 1999 to 2001, I was the lead human factors engineer and user interface designer for a company called Eyematic Interfaces, where I was responsible for all user interface design and development activities associated with real-time mobile handheld three-dimensional facial tracking, animation, avatar creation, and editing software for a product for Mattel. My work involved user interface design, human factors analysis, requirements gathering and analysis, and functional specifications.

16. I was the lead user interface designer for a company called ObjectSpeed, which developed a portable handheld telephone for use in homes and businesses with many of the same capabilities we take for granted in mobile cellular phones. This portable multifunction device supports voice, email, chat, video conferencing, internet radio, streaming media, Microsoft Outlook integration, photo taking, sharing, notifications, etc. I designed all the user interface elements for this

device. The ObjectSpeed device was specifically designed and developed as a portable handheld device.

17. I was the lead user interface designer for Ahaza, which was building IPv6 routers. I designed the user interfaces to configure and control these advanced network hardware devices. My responsibilities included requirements analysis, functional specification, user interface design, user experience design, and human factors analysis.

18. I am the founder, inventor, user interface designer, and software architect of WhereWuz. WhereWuz is a company that produces advanced mobile software running on GPS-enabled smartphones and handheld devices. WhereWuz allows users to record exactly where they have been and query this data for subsequent retrieval based on time or location. WhereWuz was designed and developed to run on handheld devices.

19. I am the co-founder of a medical technology company called Healium. Healium developed advanced wearable and handheld user interface technology to allow physicians to interact more effectively with electronic medical records.

20. I am the co-founder of a medical technology company called StratoScientific. StratoScientific is developing an innovative case for a smartphone that turns a standard handheld smartphone into a full-featured digital stethoscope

that incorporates visualization and machine learning for telemedicine and automated diagnosis.

21. I designed and developed a large software project for Disney World called xVR that allowed the operational employees of Disney World to utilize a handheld device to view the current and historical status of all of the guests of Disney World within multiple attractions and one of their restaurants. The application could run in a real-time/live mode where it would display data collected from sensors that showed the location and status of all guests within the attraction; the application could also be run in a fast-time/simulated mode. The application was developed on a laptop computer and designed to run on various devices, including laptops, personal computers, smartphones, and tablets. In addition, I investigated the use of notifications for MagicBand.

22. I have worked on multiple user interface projects involving haptics for AT&T, Boeing, Disney, and ObjectSpeed. For AT&T, I designed and developed the entire user interface for AT&T's first two-way pager, including vibratory alerts associated with new messages. For Boeing, I worked on improving realism of flight simulators, including the fidelity of vibratory alerts associated with their stick shakers. For Disney, I investigated the use of vibrotactile alerting for MagicBand users. For ObjectSpeed, I designed the vibratory alerting associated with notifications.

23. I have worked on many projects that utilized touchscreen interfaces, including projects for ObjectSpeed, WhereWuz, Disney, US ARMY, Healium, and StratoScientific.

24. I have received several awards for my engineering work relating to interface design, computer graphics, and the design of spatial, stereographic, and auditory displays, including a \$10,000 scholarship from the I/ITSEC for advancing the field of interactive computer graphics for flight simulation and a Link Foundation award for furthering the field of flight simulation and virtual interface design. I have also created computer graphic illustrations for several popular book covers and animations for a movie produced by MIRAMAR.

25. More information about my educational and professional background can be found in my curriculum vitae, Exhibit 2003.

26. The combination of my education, research, training, and work experience in software development, human factors, user interface design, user interaction design, and human-computer interaction enables me to provide analysis and opinions on the subject matter of this litigation.

II. BASES OF OPINIONS

27. In the course of performing my analysis and forming my opinions, I have reviewed the Petition and its Exhibits 1001–1037 including the materials listed below:

- IPR Petition IPR2024-00557
- U.S. Patent No. 10,665,067 (“the ’067 Patent”) (Ex. 1001)
- Prosecution History of the ’067 Patent. (Ex. 1002)
- Declaration of Gregory Welch (Ex. 1003)
- U.S. Patent Appl. Publ. No. 2017/0354864 (“Rogers”) (Ex. 1010)
- U.S. Patent Appl. Publ. No. 2017/0108930 (“Banerjee”) (Ex. 1011)
- U.S. Patent Appl. Publ. No. 2012/0045742 (“Meglan”) (Ex. 1012)

III. SUMMARY OF OPINIONS

28. The Petition raises three grounds of invalidity:

- Ground 1 of the Petition argues that claims 1-8, 11-12, 15-21 are anticipated and/or obvious over Banerjee.
- Ground 2 argues that claims 1-8, 11-12, 15-21 are anticipated and/or obvious over Meglan.
- Ground 3 argues that 1-8, 11-12, 15-21 are anticipated and/or obvious over Rogers.

29. Based on my analysis of the Petition and the exhibits cited in the Petition, it is my opinion that none of the asserted prior art references anticipate and/or render obvious the claims of the ’067 Patent.

IV. APPLICABLE LEGAL STANDARDS

A. Ordinary Skill in the Art

30. 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” or “POSITA” (person of ordinary skill in the art)—as of the time of the invention, which I understand to be the earliest priority date (June 15, 2018) of the ’067 Patent. 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 ’067 Patent at the time of the invention.

31. 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. I have considered these factors in reaching my opinion as to the hypothetical POSITA that I set forth below.

32. I understand that the Petitioner has proposed that the level of skill in the art at the time of the ’067 Patent is as:

one who would have possessed a bachelor’s degree in electrical engineering, computer science, or a related field, plus at least two years of industry or graduate level experience with human-computer

interaction. More education could substitute for experience, and *vice versa*.

Pet. at 6 (citing Ex. 1003, ¶¶ 39).

33. In my opinion, the definition of a POSITA should be one with:

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 (HCI), including implementation of computer-based systems and software for providing haptic feedback effects to a user.

34. Consistent with either 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

35. I understand that Petitioner has identified claim terms in the '067 Patent that are dispute by Petitioner and Patent Owner in the current parallel district court litigation in the Western District of Washington. Pet. at 7-9. However, my opinions and analysis in this declaration apply equally under either of the competing claim constructions in dispute in the district court. In other words, my opinions do not require any special construction of the terms discussed in this declaration.

36. Therefore, in my analysis of the challenged claims throughout this Declaration, I apply the plain and ordinary meaning of each claim term as understood by a POSITA in the context of the '067 Patent specification.

37. I understand that in interpreting the claims of the '067 Patent in this IPR according to their plain and ordinary meaning, one must take into consideration the so-called “intrinsic evidence” of the patent consisting of (1) the claim language; (2) the specification; and (3) the prosecution history.

38. 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 unambiguously disavows or disclaims subject matter.

C. Anticipation

39. Counsel has informed me, and I understand, that a showing of anticipation involves a comparison of the construed claims to the alleged prior art and, to anticipate a patent claim, a single prior art reference must disclose each element of the claimed invention, either expressly or inherently. The prior art reference must also have disclosed each element prior to disclosure of the claimed invention.

40. Further, a party claiming inherency must prove that the alleged inherent element or feature necessarily is present by clear and convincing evidence. The fact that the feature is likely to have existed is not sufficient. It must be shown that the feature was necessarily present in the reference to show inherency.

D. Obviousness

41. 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 non-obviousness.

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

43. Counsel has informed me, and I understand, that in order to evaluate the obviousness of any claim of the '067 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.

44. 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.

45. 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 the combination of prior art references is insufficient to support a conclusion of obviousness.

46. 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.

47. 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 what was learned from the invention of the '067 Patent itself. Instead, obviousness is assessed by the person of ordinary skill in the art at the time the invention of the '067 Patent was made, but without the knowledge of the invention.

48. In this regard, I am informed and I understand that the '067 Patent may not be used as a guide or roadmap to select, understand, and combine or modify the prior art, because such an approach would improperly apply hindsight bias to the obviousness analysis. Also, at a minimum, this approach discounts the value of combining various existing features or principles in the prior art in an inventive way so as to achieve a novel result.

49. 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 or undisclosed properties of the prior art (such as features in the prior art that the obviousness combination or rationale to combine might rely on, but are not disclosed or taught by the reference) may not be relied upon to provide

the rationale for modifying or combining the prior art to reach the claimed subject matter.

50. 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 '067 Patent.

V. OVERVIEW OF THE '067 Patent

51. The '067 Patent is directed to techniques for “integrating haptics overlay in augmented reality.” Ex. 1001 at Abstract. More specifically, the '067 Patent provides for the visual and the modification of a proxy object by transmitting both a modified visual effect to an augmented reality display and a haptic effect to a haptic output device. *Id.* at 1:31-40. The inventors of the '067 Patent recognized that VR applications allow users to experience visuals and haptics simultaneously, such as when shooting a virtual gun. *Id.* at 1:14-16. In this example, the user is provided with both the visual and haptic experience of shooting the gun. *Id.* at 1:18-20. On the other hand, the inventors recognized that the same visual-haptic experience was more difficult to provide in the augmented reality (AR) context. *Id.* at 1:20-23.

52. Accordingly, the '067 Patent introduced techniques for “provid[ing] haptic feedback on virtual objects in AR space.” *Id.* at 2:30-31. In one embodiment, the '067 Patent describes allowing a “user to see and feel a texture on a real world

object using haptics overlay on that object.” *Id.* at 2:31-33. In such an embodiment, “a user is wearing an AR headset and is looking at a proxy object, e.g., a shoe, in real space.” *Id.* at 2:39-41. Then, “[t]he user may choose a material from a library of materials (e.g., materials such as one or more of leather, plastic, rubber, metal, burlap, suede, denim, wood, cloth, ceramic, foamed material, or glass)” which “will then be displayed on the proxy object via the AR headset[.]” *Id.* at 2:39-45. To provide the user with the corresponding feel of the material, the embodiment includes “a haptic effect associated with the proxy object[.]” which “simulates a texture of the material selected” 2:53-57. Therefore, the user is provided with both the visual and the haptic experience of the selected texture in AR space.

53. The flow chart below illustrate this process:

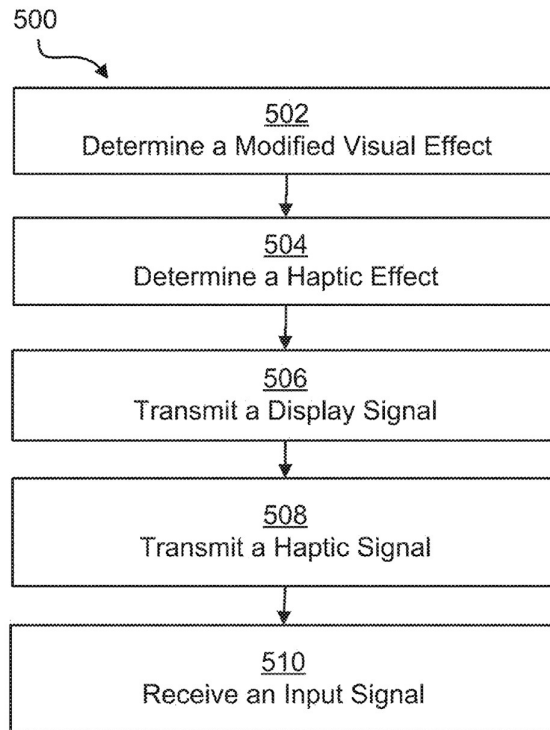


Figure 5

Id. at FIG. 5.

VI. EXEMPLARY CLAIM OF THE '067 Patent

54. Independent claim 1 is recited below:

1[pre]. A system comprising:

- [1A]** a proxy object comprising one or more haptic output devices;
- [1B]** a display configured to output a visual effect onto a surface of the proxy object;
- [1C]** a sensor for tracking a position of the proxy object; and
- [1D]** a processor configured to:

- [1D1] determine a modified visual effect based in part on data received from the sensor; and
- [1D2] determine a haptic effect based in part on data received from the sensor;
- [1D3] transmit a display signal associated with the modified visual effect to the display, the modified visual effect to be displayed on the proxy object via the display
- [1D4] transmit a haptic signal associated with the haptic effect to the one or more haptic output devices; and
- [1D5] output the haptic effect using the one or more haptic output devices.

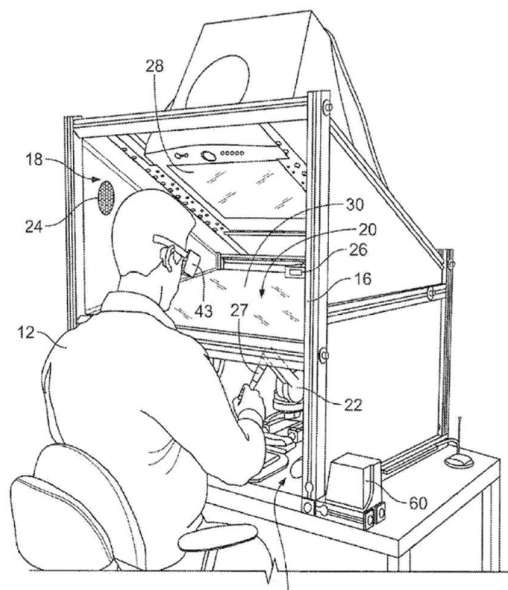
Ex. 1001, claim 1.

VII. GROUND 1: BANERJEE

A. Overview of Banerjee (Ex. 1011)

55. Banerjee is directed to methods, devices, and systems for haptically-enabled simulation of cerebral aneurysm clipping using a haptic augmented and virtual reality system. It includes detailed descriptions of an open surgery station that simulates the performance of open surgery steps and a microsurgery station for simulating the performance of microsurgery steps. The technology allows for interactive and immersive training and planning experiences for medical professionals, facilitating the practice of complex surgical procedures in a virtual environment before performing them on actual patients.

56. Banerjee addresses the challenge of providing a realistic, interactive training environment for neurosurgery, specifically focusing on the simulation of cerebral aneurysm clipping procedures. It aims to solve the problem of safely and effectively training surgeons in the complex skills required for both open surgery and microsurgery steps involved in treating cerebral aneurysms. By utilizing haptic feedback, augmented and virtual reality technologies, the system offers a detailed, immersive simulation that allows for hands-on practice without the risks associated with real-life surgery. This includes simulating the tactile feedback of surgical instruments and the visual and physical interaction with brain anatomy, enabling quantitative assessment of surgical outcomes such as blood flow changes post-aneurysm clipping.



B. Petitioner Has Not Shown That Banerjee Discloses “a proxy object comprising one or more haptic output devices”

57. The Petitioner has not demonstrated that Banerjee discloses a proxy object comprising a haptic output device in accordance with the claims of the '067 Patent. According to three express requirements of Claim 1 with regard to the proxy object:

- (1) the proxy object must comprise one or more haptic output devices—i.e., the proxy object must include a haptic output device as part of the overall structure of the proxy object. Ex. 1001 at claim [1A].
- (2) the proxy object's position is tracked by a sensor such that haptic feedback is based on this position sensor data. *Id.* at claim [1C].
- (3) the proxy object must have a modified visual object display onto its surface. *Id.* at claim [1D3]

58. I understand Petitioner argues that the proxy object comprising a haptic output device is met by two alternative components in Banerjee: (a) “haptic device 22” (Pet. at 14-16) or (b) “stylus 27” (Pet. at 17). As I explain below, neither of these components can be the proxy object as claimed by the '067 Patent.

1. Petitioner has not shown that Banerjee's haptic device 22 meets the claimed proxy object comprising a haptic output device

59. Petitioner argues that Banerjee's haptic device 22 is the claimed proxy object because of the following three reasons:

(1) Haptic device 22 comprises a haptic output device since it outputs force feedback;

(2) Haptic device 22 comprises a haptic output device, which Petitioner argues is a haptic stylus 27 since the user feels the haptic sensations through the stylus;

(3) Haptic device 22 comprises a haptic output device, as it is equipped with actuators that output force feedback.

Pet. at 16.

60. With regard to Petitioner’s first reason, as further explained in detail below, haptic device 22 cannot be the claimed proxy object because its position is not tracked per one of the express requirements recited by the ’067 Patent claim, setting aside whether or not device 22 includes a haptic output device. Indeed, the claim expressly requires that the proxy object’s position must be tracked.

61. Further, a POSITA would understand that there is no need to track the position of haptic device 22 since it is a stationary object fixed to the “physical desktop workspace 14” of the open surgery station in Banerjee. Ex. 1011 at ¶¶[0032]-[0035]. Referring to the reproduced Figure 1 of Banerjee shown below for the surgery station, Petitioner also confirms my conclusion by stating that the “position and orientation of the user’s hand as it moves the stylus” is tracked. Pet. at 14. The position of haptic device 22 is not tracked as it does not move along with

the user's hand. This shows that Banerjee discloses that the hand is tracked, not the haptic device. The claim limitation of Claim 1 of the 067 patent requires "a sensor for tracking a position of the proxy object," which shows that the proxy object is tracked.

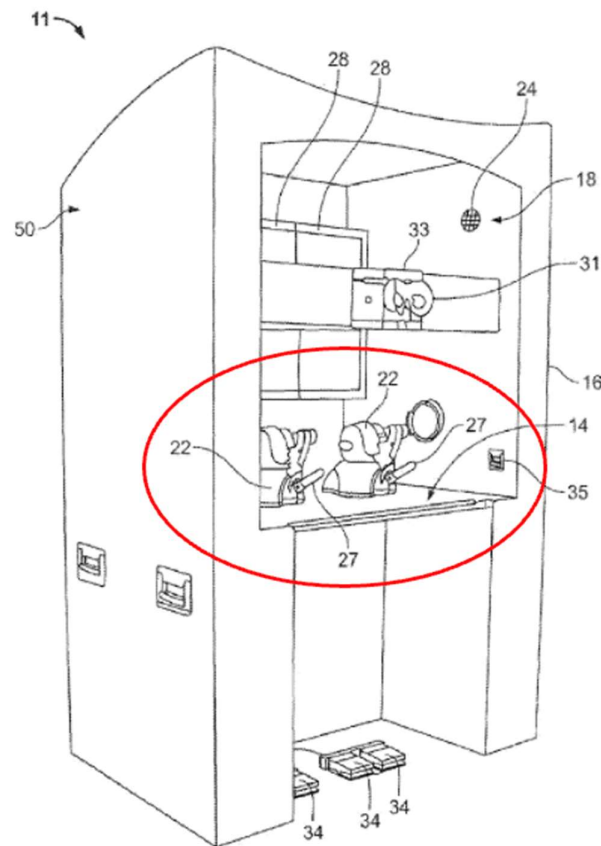


FIG. 4

Ex. 1011 at Fig. 4 (haptic device 22 and stylus 27 arrangement highlighted in red).

62. As to Petitioner's argument that haptic device 22 supposedly comprises haptic stylus 27, it is clear from Figure 1 shown above that haptic device 22 and stylus 27 are two distinct and separate components. They are only mechanically

coupled to each other. But based on my review of the File History of the '067 Patent, I understand that the Patent Owner originally proposed a claim limitation saying “a haptic output device mechanically coupled to the proxy object” but then deliberately altered the claim scope and disclaimed the type of arrangement exhibited by haptic device 22 and stylus 27 in Banerjee in order to get around the Gonzalez prior art reference (US 2018/0144549) in view of prior art reference Rimón. This is shown in the excerpt from the File History shown below.

<u>AMENDMENTS TO THE CLAIMS</u>	
1.	(Currently amended) A system comprising: a proxy object <u>comprising one or more haptic output devices;</u> ~~a haptic output device mechanically coupled to the proxy object;~~ a display configured to output a visual effect onto a surface of the proxy object; a sensor for tracking a position of the proxy object; and a processor configured to: determine a modified visual effect based in part on data received from the sensor; determine a haptic effect based in part on data received from the sensor; transmit a display signal associated with the modified visual effect to the display, <u>the modified visual effect to be displayed on the proxy object via the display;</u> transmit a haptic signal associated with the haptic effect to the <u>one or more</u> haptic output devices; and

Ex. 1002 at 280.

63. I understand that the Patent Office Examiner had issued an Office Action asserting that the Gonzalez prior art reference (US 2018/0144549) in view of

prior art reference Rimon rendered the claims obvious. Ex. 1002 at 139. The Examiner stated that Gonzalez “discloses ‘a proxy object,’ ‘a haptic output device,’ and ‘a display configured to output a visual effect.’” In response, the Applicant submitted the claim amendment shown above and replied that “[h]owever, Gonzalez does not disclose ‘a proxy object **comprising one or more haptic output devices**’ with ‘**the modified visual effect to be displayed on the proxy object,**’ as recited in amended claim 1.” Ex. 1002 at 286.

64. The Applicant explained that Gonzalez does not disclose a proxy object comprising one or more haptic output devices and a modified visual effect to be displayed on the proxy object as per the amended claims because the AR glove 196 in Gonzalez is the only device described as providing haptic feedback, but the virtual objects (which the Examiner asserted corresponds to a proxy object) and/or visible alterations to the vehicle (viewed through the AR headset) are not overlaid on the AR glove 196 as the purpose of the glove is to interact *with* the virtual objects as if they were real. Ex. 1002 at 287. The Applicant further explained that displaying the virtual objects on the AR glove would prevent the glove from being able to interact with the virtual objects as if they were real. According to the Applicant, the physical portions of the vehicle where visible alterations are overlaid do not include any haptic feedback devices. *Id.* Thus, the Applicant concluded that Gonzalez did not disclose a proxy object comprising a haptic output device. *Id.*

65. Therefore, the mechanically coupled arrangement of haptic device 22 and stylus 27 cannot meet the express requirement of the claim because haptic device 22 does not comprise stylus 27. This is further confirmed by the fact that Petitioner also identifies the two components as separate components that can each alternatively meet the claimed proxy object. In this way, Petitioner identifies haptic device 22 by itself, on pages 14-16 of the Petition, or in the alternative, identifies stylus 27 by itself, on page 17 of the Petition. This shows that the haptic device 22 and the stylus 27 are separate components that should each be considered separately.

66. As to Petitioner's second reason on page 16 of the Petition arguing that haptic device 22 comprises haptic stylus 27 because the user feels "tactile sensations" through the stylus, and thus the stylus is the allegedly the haptic output device, I do not agree with such reason. The stylus is not a haptic output device. It does not contain any haptic output hardware, such as actuators or motors. In fact according to Petitioner, having such hardware is what constitutes a haptic output device. Petition cites to the '067 Patent at 2:53-55 and 4:23-33 to support that actuators and motors constitute haptic output devices. Yet, according to Petitioner, haptic device 22 is what it argues as containing the actuator motors, not the stylus. Thus, Petitioner concedes on page 16 of the Petition that haptic device 22 is the haptic output device, and by that logic, the stylus cannot be a "haptic output device." However, as I've explained, haptic device 22 cannot be the proxy object for other

reasons, namely because it is a stationary object that is mounted to the “physical desktop workspace 14” as seen in Fig. 4 of Banerjee, and its position is not tracked.

67. Moreover, haptic device 22 does not have the “modified visual effect” overlaid on its surface as required by the claims, and therefore it cannot be the proxy object. To the contrary, Petitioner acknowledges that alleged modified visual effect is superimposed on the surface of the stylus, which is separate from haptic device 22. *See* Pet. at 33 (“Banerjee’s OSS 10 meets [1D3] because its display system “superimpose[s] an image of the tool over the real haptic stylus 27 visible through partially transparent mirror.” *See also* 1010 at ¶[0057].

68. A POSITA would also understand this because the stylus is moveable, unlike haptic device 22 that is affixed to the desktop as shown in the figure above. A POSITA would understand that in order to produce a virtual display of a virtual pen, the modified visual effect is displayed on the stylus rather than on haptic device 22. Petitioner confirms this at page 27 of the Petition: “As shown [...] in FIG. 2, below, ‘graphics rendering 46’ receives *the virtual tool’s* current position and orientation updated by ‘haptic rendering 44’ to coincide with *stylus 27’s current position and orientation.*”

69. I understand that Petitioner additionally argues tracking the position of the haptic device 22 “allows a *virtual tool* to be ‘collocated with [] haptic device 22’ in views shown to the user.” Pet. at 14-15 (citing Ex. 1010 at ¶¶[0032]-[0034]). But

a POSITA would understand that the virtual tool is “collocated” with haptic device 22 because the modified visual effect is superimposed on the stylus 27. They are not collocated because visual effects are superimposed on haptic device 22 itself and there is no display of a virtual haptic device 22. Therefore, in summary, Petitioner has not demonstrated that Banerjee’s haptic device 22 is the claimed proxy object because:

- (1) Haptic device 22 is not moveable as it is anchored to the workstation, and thus, it is not tracked, and there is no need to track its position since it’s stationary.
- (2) Although stylus 27’s position is tracked, haptic device 22 cannot be conflated with stylus 27 as they are physically separate components, and haptic device 22 ***does not comprise*** stylus 27.
- (3) Although Petitioner argues that haptic device 22 is a proxy object because it comprises stylus 27, which it claims is a haptic output device, the stylus is not a haptic output device because it does not contain any haptic output hardware such as actuators or motors.
- (4) No modified visual effects are displayed on haptic device 22, so it cannot be the proxy object as required by the claim.

2. Petitioner has not shown that Banerjee's stylus 27 meets the claimed proxy object comprising a haptic output device

70. I understand Petitioner's argues that the stylus 27 by itself can be a proxy object because the stylus is used for controlling a virtual tool. Petitioner also argues on page 17 of the Petition that the stylus comprises a haptic output device because "it is itself a '*haptic output device*' through which 'tactile sensations' are felt." Petitioner argues that "POSAs understood that haptic stylus 27 comprises the actuators." Pet. at 17. But Petitioner contradicts itself by stating that "Banerjee's haptic device 22 [] generates 'force feedback' include[ing] actuators (e.g., motors) to produce the disclosed 'force feedback.'" *Id.* As I've explained above, a POSITA would understand that the stylus is not a haptic output device. I have not seen any disclosure in Banerjee that the stylus contains any actuators or motors. A POSITA would understand that the stylus is a passive object. A user feels haptic effects through the stylus, but the effects are produced by a separate device, haptic device 22, not produced by the stylus itself. However, it should be noted that the claim requires that the "proxy object compris[e] one or more haptic output devices" such that the proxy object must include the haptics producing hardware, not merely mechanically coupled to the proxy object as the Applicant of the '067 Patent had disclaimed to traverse the Gonzalez prior art. Therefore, Petitioner fails to demonstrate that Banerjee's stylus 27 is the claimed proxy object.

C. Petitioner Has Not Shown That Banerjee Discloses “a sensor for tracking the position of the proxy object”

71. I understand Petitioner argues on page 22 of the Petition that “Banerjee’s system meets [1C] because haptic device 22 tracks the position of haptic stylus 27.” Petitioner offers three reasons for this argument:

- (1) “the tracked position/orientation of haptic stylus 27 is a ‘*position*’ of haptic device 22 (a claimed ‘*proxy object*’ [...]) of which the stylus is a part”
- (2) the haptic device 22 tracks a position of the of the proxy object by tracking the position of the stylus because it identifies haptic stylus itself as the proxy object
- (3) the position of the stylus is tracked because haptic device 22 includes sensors that track a position of haptic device 22 and by extension tracks the position of the stylus

72. As to reason nos. 1 and 3 above, I do not agree with the above reasoning based on Petitioner simply conflating the haptic device 22 and stylus 27 to argue that the position of either component is tracked. They are two separate components, and as I’ve explained above, Banerjee does not disclose tracking the position of haptic device 22, nor would there be a need to since the device is anchored to the table of the surgery station.

73. As for reason no. 2 above, I do not agree with Petitioner’s argument that the stylus is itself a proxy object and that its position is tracked. For the reasons

I've explained above in paragraph 70, Petitioner has not demonstrated that the stylus is the claimed proxy object. Therefore, Petitioner fails to demonstrate that Banerjee discloses a "sensor for tracking a position of the proxy object."

D. Petitioner Has Not Shown That Banerjee Discloses "the modified visual effect to be displayed on the proxy object via the display"

74. I note that even though Petitioner argues that both haptic device 22 and stylus 27 each can by themselves meet the claimed proxy object, Petitioner does not, and cannot, claim that a modified visual effect is displayed on the surface of haptic device 22 as required by this express limitation of the claim. This is made clear in Figures 20 and 21 of Banerjee that Petitioner points to on page 29 of the Petition for showing the display of a virtual tool corresponding to stylus 27. In these figures, only a stylus is shown as any depiction of haptic device 22 is entirely absent from these figures.

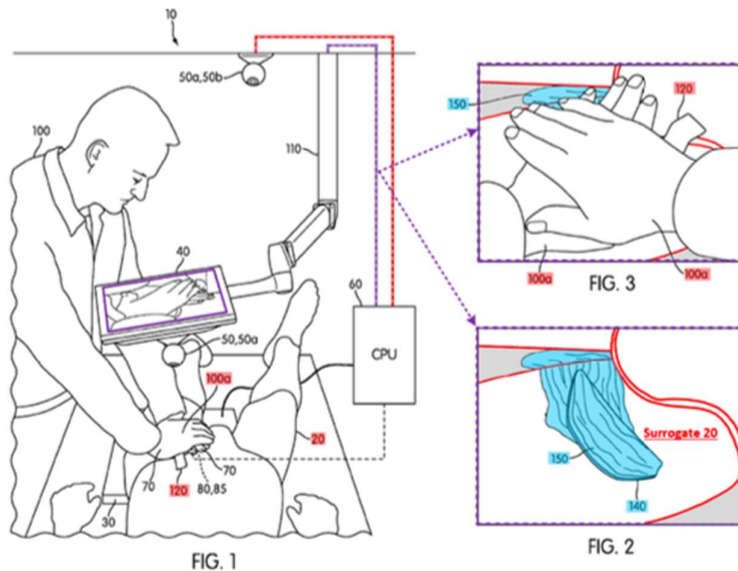
75. Instead, Petitioner can only point to stylus 27 for this limitation. *See* Pet. at 32-34. But stylus 27 cannot be the proxy object because stylus 27 does not comprise a haptic output device, which is required of the claimed proxy object. Instead, the haptic output device, including haptic-producing hardware such as actuators and motors, is inside haptic device 22, and not in the stylus. Thus, Petitioner also fails to demonstrate that this limitation for displaying a modified visual effect is met by Banerjee.

VIII. GROUND 2: MEGLAN

A. Overview of Meglan (Ex. 1012)

76. Meglan is directed to devices and methods for training individuals to treat individuals with hemorrhaging injuries. It discusses a hemorrhage control simulator that can measure the application of hemostatic agents and enable the extraction of objective measures of performance for assessing trainee proficiency. The simulator also supports real-time mentoring without the need for the presence of an instructor, making it a comprehensive tool for training in the treatment of bleeding injuries.

77. Meglan addresses the challenge of providing realistic, effective, and uniform hemorrhage control training without the need for an actual wound or the presence of an instructor. It solves the problem of training individuals to control bleeding in a simulated environment that can replicate complex scenarios. The simulation allows for the authoring and distribution of these scenarios to all users, regardless of their physical location, and enables objective assessment of trainee performance across different instructors and training institutions. This approach overcomes the limitations of traditional training methods, such as the lack of realism in simulated wounds, the difficulty of assessing performance uniformly, and the logistical challenges of coordinating training sessions with the physical presence of instructors and standardized materials.



B. Petitioner Has Not Shown That Meglan Discloses “determine a haptic effect based in part on data received from the sensor”

78. Petitioner has not demonstrated that Meglan discloses “determin[ing] a haptic effect based in part on data received from the sensor,” because such data is required to be position tracking data of the proxy object as claimed in the ’067 Patent. But Petitioner has failed to demonstrate that this is disclosed in Meglan.

79. As I previously explained, there are three express requirements of Claim 1 with regard to the proxy object:

(1) The proxy object must comprise one or more haptic output devices—i.e., the proxy object must include a haptic output device as part of the overall structure of the proxy object. Ex. 1001 at 10:42-43 (claim element [1A]).

(2) The proxy object's position is tracked by a sensor such that haptic feedback is based on this position sensor data. *Id.* at 10:46 (claim element [1C]).

(3) The proxy object must have a modified visual object displayed onto its surface. *Id.* at 10:52-54 (claim element [1D3]).

80. In accordance with requirement no. 2 above, the claim limitation “determine a haptic effect based in part on data received from the sensor” must use position tracking data of the proxy object from the sensor. I understand that the '067 patent explains this in, for example, the following passage:

Systems and methods for integrating haptics overlay in augmented reality are disclosed. One illustrative system described herein includes a haptic output device. The system also includes a display configured to output a visual effect. The system also includes a sensor for tracking a position of a proxy object. The system also includes a processor configured to: determine a modified visual effect based in part on data received from the sensor, determine a haptic effect based in part on data received from the sensor, transmit a display signal associated with the modified visual effect to the display, transmit a haptic signal associated with the haptic effect to the haptic output device; and output the haptic effect using the haptic output device.

Ex. 1001 at Abstract (emphasis added); *see also id* at 1:29-40.

81. With regard to the claim limitation, “determin[ing] a haptic effect based in part on data received from the sensor,” where the data reflects the proxy object's

position that is tracked by the sensor, Petitioner does not demonstrate that Meglan’s haptic effects are based on data indicating the position of the object that Petitioner argues is the claimed proxy object, which is surrogate 20 and/or substrate 2000 (*See* Pet. at 48-50). According to the Petition, Meglan bases haptic effects on the location of the trainee’s hands and fingers. At page 49 of the Petition, Petitioner states that “surrogate 20 and haptic substrate 2000, by themselves or together as a unit” meets the claimed proxy object.

82. Petitioner argues that, “‘sensorized substrate 2000’ (boxed in red in Fig. 8 below) provides haptic output via pulse and heat generators so that trainee 100 can feel characteristics of the virtual wound being treated. Figure 8 of Meglan, as highlighted in red by Petitioner is shown below. According to page 50 of the Petition, the “sheet-like” substrate 2000 acts as a proxy for the skin of the surrogate body 20 that the surgical trainee is performing a simulated surgery on. Petitioner states that this substrate 2000 also acts a proxy “for the virtual wound for which substrate 2000 provides haptic feedback.”

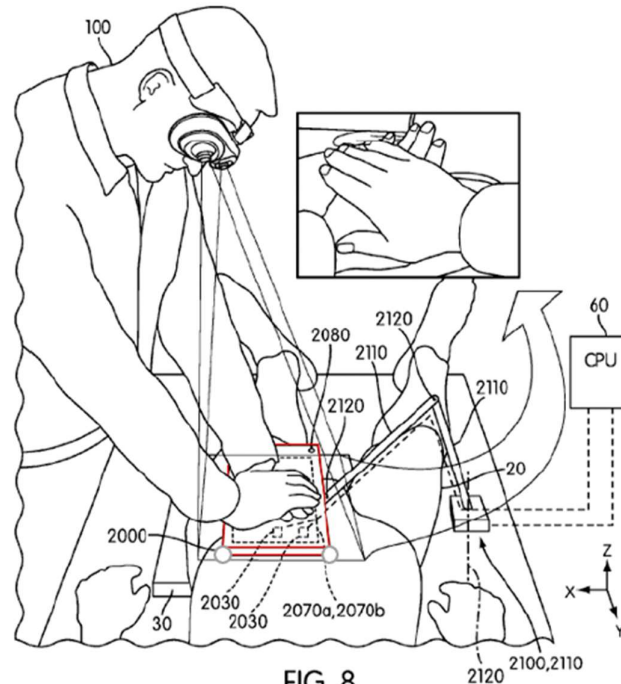


FIG. 8

83. Petitioner points to examples in Meglan to show the determination of haptic effects claimed by the '067 Patent. In one example on pages 57-58 of the Petition, Petitioner argues that Megan discloses determining a haptic effect based on sensor data since haptic effects provided by a pulse generator are based on the trainee's finger location that is detected by the camera sensor. Petitioner also provides another example on page 58 of the Petition, where haptics effects provided by a heat generator are based on the location of the trainee's hands as detected by the camera.

84. These examples do not show that haptic effects are based on sensed position data of the proxy object claimed by the '067 Patent. These examples rely on the fingers or hands of the surgical trainee. But these body parts are not the proxy

object, nor does Petitioner claim that they are. Moreover, a POSITA would understand that these body parts do not comprise a haptic output device, which is one of the express requirements of the claimed proxy object.

85. Petitioner argues that the claimed haptic output device is Meglan's "pulse generators" and "heat generators" in substrate 2000, and this substrate is what Petitioner argues is the proxy object, as highlighted by Petitioner in red in Figure 8 shown above. *See* Pet. at 50-51 (citing Ex. 1012 at ¶[0107]). Accordingly, I do not agree with Petitioner's assertion that Meglan's determination of haptic effects based on the location of the trainee's fingers or hands would meet the claim limitation "determination of haptic effects based on data received from the sensor."

86. Furthermore, regardless of whether or not the trainee's hands or fingers are the proxy object, the haptic effects are not dependent on the trainee's hands or finger location. Petitioner relies on ¶[0090] of Meglan to support its argument that haptic effects are based on the trainee's finger location. Pet. at 57-58. This passage describes the use of finger location combined with information from the load sensor underneath the surrogate 20 (which is the pressure sensor in the substrate 2000) for the purpose of modifying the pulse generator output. Meglan states:

By combining the information from the load sensor 30 beneath the surrogate 20 with the finger location(s) detected by the camera system 50, the status of the injury, and the hemodynamic state, the specific feel

of the pulse can be modified to reflect the strength of the trainee's pressing into the surrogate 20

EX1012 at ¶[0090].

87. I understand this to mean that the strength of the pulse generator output is based in part on a *load sensor*, which measures *how hard* the trainee is pressing on the surrogate body—rather than based on position. A POSITA would understand that haptics as a function of applied load or pressure is not the same as haptics based on the location of the surrogate or substrate. Here, it is important to note that Petitioner also does not identify the load sensor as the “sensor” recited in the ’067 Patent claims.

88. Also, a POSITA would understand that the location of the finger (setting aside for a moment that the trainee’s body parts such as the finger cannot be the claimed proxy object and it does not comprise a haptic output device) is only used in the modification of the injury status and the hemodynamic state as explained above in ¶[0090] of Meglan. In other words, the location of the finger is not used in producing haptics, rather, only the pressure measurement from the load sensor is used for haptics as explained in the previous paragraph (¶87). Therefore, Meglan’s pulse generator output is not based on position tracking sensor data as required by the claims of the ’067 Patent.

89. In summary Petitioner’s arguments that Meglan discloses the claims of the ’067 Patent fail for the following reasons:

(1) Petitioner identifies surrogate 20 and/or substrate 2000 as the proxy object, comprising one or more haptic output devices. However, the claims require a sensor for tracking the position of the proxy object to determine haptics. Petitioner fails to show that the location of the stationary surrogate and substrate are tracked to determine haptics. Instead, Petitioner points to the location of the surgical trainee's body parts such as the hands and fingers, which are *not* proxy objects, nor does Petitioner identify them as such. In other words, even though Petitioner points to the use of the location of the hands and fingers for determining haptics, it is the location of whatever Petitioner identifies as the proxy object (which in this case is the surrogate 20 and/or substrate 2000) that must be used for determining haptics.

(2) Even though Petitioner does not point to the trainee's hands and fingers as the claimed proxy object, it couldn't do so anyways because those body parts are not proxy objects for at least two reasons: (a) the claimed proxy object is required to comprise a haptic output device, but hands and fingers do not comprise such haptic producing hardware; and (b) the claim requires modified visual effects to be displayed on the proxy object, but here, no such visual effects are displayed on the hands and fingers, nor

does Petitioner argue that as Petitioner instead argues that visual effects are displayed on the surrogate 20.

- (3) Furthermore, in addition to all of the reasons listed above, Petitioner's argument that the finger location is used to determine haptics is still incorrect for yet another reason. A closer read of paragraph 90 of Meglan shows that the finger location is not used for determining haptics. Only the pressure measurement data from the load sensor is used for determining haptics. Instead, the finger location is used for the modification of the injury status and the hemodynamic state as explained above in paragraphs 86 and 88.

IX. GROUND 3: ROGERS

A. Overview of Rogers (Ex. 1010)

90. Rogers is directed towards the development and use of a directional interface object designed for interactive applications, such as video games. It discusses embodiments that include devices, methods, and systems for providing input through this directional interface object, which can be utilized in various computing environments, including hand-held devices, microprocessors, and distributed computing systems. The document outlines the technical aspects and potential configurations of the directional interface object, including the presence of

joysticks and how it can be held and operated by users to interact with video games or other interactive applications.

91. Rogers aims to address issues related to enhancing the interaction and immersion of users in virtual reality (VR) environments, particularly as experienced through head-mounted displays (HMDs). It outlines methods and systems for improving the way users interact with VR content, potentially through specialized interface objects or devices that are more responsive or intuitive for gameplay within VR settings. Rogers is focused on creating more engaging and seamless VR experiences by improving the interface between the user and the virtual environment, which can include improving the physical manipulation of virtual objects, enhancing the processing of multimedia content for VR gameplay, and providing more sophisticated methods for user interaction within a VR space.

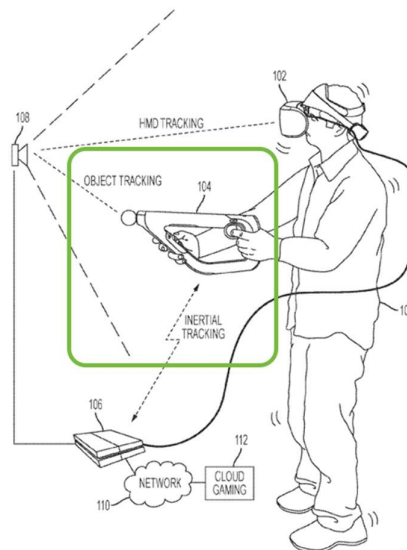


FIG. 1

B. Petitioner Has Not Shown That Rogers Discloses “a sensor for tracking a position of the proxy object”

92. I understand Petitioner, at pages 72-73 of the Petitioner, argues that either of the following components in Rogers meets this claim limitation: (1) “camera 108” alone *or* (2) the inertial sensor alone.

1. Petitioner has not shown that Rogers’ camera 108 is a “sensor for tracking a position of the proxy object” to “determine a haptic effect based in part on data received from the sensor”

93. I understand Petitioner argues that Rogers’ “camera 108” for “determin[ing] the location and movements of the...interface object 104” meets this claim limitation: “a sensor for tracking a position of the proxy object.” *See* Pet. at 72 (citing Ex. 1010 at ¶[0044]). But to meet this limitation, Petitioner points to an embodiment in Rogers directed to a use case that does not involve determining the location of the proxy object. Note that Petitioner argues the proxy object is the “virtual weapon” in Rogers. *See* Pet. at 69-70. Petitioner argues that Rogers provides haptic effects *based on direction* (i.e., orientation) of the interface object rather than on the position or the location of the object. On page 77 of the Petition, Petitioner’s argument relies on the embodiment described in ¶[0105], stating that:

When a user reloads their corresponding virtual weapon by, for example, *pointing the directional interface object 104 upward*, the moveable weight 800 may be caused to move so as to mimic the sensation of the weapon reloading mechanism of the virtual weapon.

94. But there is no disclosure whatsoever in Rogers that position tracking data from camera 108 is utilized for this weapon reload use case. Based on the disclosure of Rogers, a POSITA would understand that position tracking data is not used to sense whether the weapon is tilted upward.

95. Additionally, Petitioner' points to another embodiment in Rogers to argue that camera 108 can capture images to be used for determining the location and movements of the interface object. *See* Pet. at 72-73 (citing Ex. 1010 at ¶[0044])). First, a POSITA would understand that this is an entirely different embodiment that is not applicable to the weapon reload use case that Petitioner's mapping is based on. A POSITA would understand that there is no need to track the position of the weapon, i.e., the alleged proxy object, in the weapon reload use case that Petitioner identifies because that embodiment only depends on whether the weapon is tilted upward or not.

96. Second, not only does Rogers fail to disclose the use of position-sensing data for the weapon reload use case, a POSITA would understand that there is no need for a position-sensing camera to determine whether the weapon is titled upward. Ex. 1010 at ¶[0105]. A POSITA would understand that this embodiment does not depend on the position of the weapon, nor would there be a need for such location-based dependency because a weapon reload can occur anywhere. A haptic feedback only depends on tilting or movement in the upward direction. Therefore, a

POSITA would understand that specifically for the weapon reload use case, haptic feedback is based on “Inertial Tracking” (depicted in Fig. 1), which for this use case only needs to track direction rather than position. Even if the “Object Tracking” line in Figure 1 (i.e., which is based on data from camera 108) is used at all in this embodiment, a POSITA would understand that the camera sensor would only likely be used to aid in the placement of the visual overlay.

97. Thus, Petitioner has not demonstrated that Rogers discloses “a sensor for tracking a position of the proxy object” that is used to determine a haptic effect based on the position tracking data from that sensor as required by the claims of the ’067 Patent.

2. Petitioner has not shown that Rogers’ inertial sensor is a “sensor for tracking a position of the proxy object” to “determine a haptic effect based in part on data received from the sensor”

98. I understand that Petitioner also argues on page 73 of the Petition that “inertial sensor” meets this limitation because the inertial sensor determines “interface object 104’s ‘location and orientation.’” But for purposes of determining whether a weapon is tilted upward in place, a POSITA would understand that Rogers’ use of “inertial sensors” is to track movement, not position. For example, Rogers at ¶[0016] states: “In some implementations, the directional interface object further includes at least one inertial sensor for *sensing movement* of the directional interface object.” Rogers at ¶[0018] also states that “at least one inertial sensor

configured to generate inertial data indicative of *movement* of the directional interface object.” A POSITA would understand that movement is different from position. Position tracking (in three dimensions) is typically tracking the X, Y, and Z coordinates of an object. Sensing the movement can be as simple as determining if an object has moved in either translation or rotation (e.g., true or false), or may involve sensing the magnitude of translational or rotational movement.

99. On page 73 of the Petition, Petitioner’s citation to claim 9 of Rogers also acknowledges this. Claim 9 recites an “inertial sensor for *sensing movement* of the directional interface object.” On page 73, Petitioner also cites to Rogers describing “various kinds of motion sensitive hardware, such as a magnetometer 1210, an accelerometer 1212, and a gyroscope 1214.” Ex. 1010 at ¶[0111]. In the context of the weapon reload use case, in detecting whether a user tilts the gun upward, a POSITA would understand that the use of the inertial sensor is for tracking movement, not the location or position of the weapon.

C. Petitioner Has Not Shown That Rogers Discloses “determine a haptic effect based in part on data received from the sensor”

100. As I have explained above, the weapon reload use case mapped by Petitioner does not depend on position tracking sensor data for the weapon (which is what Petitioner identifies as the proxy object). A POSITA would understand that there would not be a need to use such *position sensor* data because that use case is based on tilting the weapon in the upward direction rather than on the location of the

weapon. According to the Petitioner, the weapon reload use case only discloses haptic effects based on direction—not position and as explained above, direction is determined by an inertial sensor—not a camera sensor. The Petition does not show any evidence that camera 108 (for tracking position) is utilized for the weapon reload use case, specifically for the purpose of determining haptics. Therefore, Petitioner fails to demonstrate that Rogers discloses the determination of haptic effects based on data received from the sensor, i.e., a sensor for tracking position of the proxy object for which haptic output is based on as required by the claim.

D. Petitioner Has Not Shown That Rogers Discloses “determine a modified visual effect based in part on data received from the sensor”

101. I understand that the claim requires that both determinations for haptic effect and modified visual effect are based on the same sensor data. *See* Ex. 1001 at Claim 1, elements [1D1] and [1D2]. Claim elements [1D1] and [1D2] for determining a modified visual effect and haptic effects are based on *the* position sensor, which finds its antecedent basis in claim element [1C]- a sensor for tracking the position sensor of the proxy object. Thus, both limitations for determining a modified visual effect and haptic effects must be based on the same sensor for tracking the position of the proxy object. But Petitioner has only shown that modified visual effects are based on position sensor data (Pet. at 74-76), and on the other hand, Petitioner has only shown that haptic effects are based on inertial sensor data (Pet.

at 77). Although, Petitioner argues that *both* “camera 108’s images and inertial sensor data” are used, it supports this argument by simply referring to the embodiment described in paragraph 44 of Rogers. But, as I’ve explained above, that embodiment is different from the one Petitioner relies on for the haptics limitation (claim element [1D1]). Also, the claim requires a singular sensor to be commonly used for claim element [1D1] and claim element [1D2], and for that additional reason, I disagree with Petitioner’s argument involving the use of both camera 108 and inertial sensor for the weapon reload embodiment.

102. As discussed previously, Petitioner points to the weapon reload use case in Rogers to show that haptics effects are provided when the user tilting the weapon in the upward direction, which is based on “Inertial Tracking” sensor data. Pet. at 77. For the limitation determining a modified visual effect, Petitioner argues that such determination is in response to the user moving interface object 104. Pet. at 74. I understand Petitioner argues that a modified visual effect “changes in correspondence with the detected location and orientation of interface object 104—i.e., computer 106’s processor determines the ‘*modified visual effect*’ that the user sees as virtual hands gripping a virtual weapon that points in the same direction detected for interface object 104, thus meeting [1D1].” In support, Petitioner cites to Rogers’ disclosures at ¶¶[0018], [0043]-[0045], [0052]-[0055], [0068]-[0070], [0106]-[0109].

103. I disagree with the argument above suggesting that the determination of a modified visual effect is based on inertial sensor data. None of the passages that Petitioner cites indicates that the modified visual effect is determined based on the inertial sensor data that haptic effects also depend on. For example, Petitioner refers to “virtual hands gripping a virtual weapon” in Rogers for the claim limitation of determining a modified visual effect. Pet. at 74. However, Rogers at ¶[0045] states: using these various types of controllers, or even simply hand gestures that are made and captured by one or more cameras, it is possible to interface, control, maneuver, interact with, and participate in the virtual reality environment presented on the HMD 102. Ex. 1010 at ¶[0045] (emphasis added). Therefore, this passage that Petitioner cites to in Rogers shows that the camera sensor is used for the modified visual effect limitation, not the inertial sensor, which is used for the haptics limitation. In other words, Petitioner has not shown that a single sensor is consistently used across both claim elements [1D1] and [1D2].

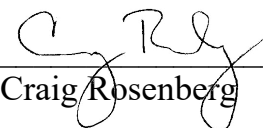
104. As another example, Rogers at ¶[0055] states: depending on the way the directional interface object 104 is being held, the corresponding virtual reality view of the weapon will also be held in a similar fashion, which provides a more realistic and corresponding view to the user.” A POSITA would understand that this does not depend on any inertial sensor data. Rogers explains that the way a user holds the object is determined by a sensor that detects the amount of contact made

on the trigger area by the user's hand. *See, e.g.*, Ex. 1010 at ¶[0055] (“If more surface area is being covered by the user's hand when the user's hand is in a gripping position, on a particular side, that may be indicative of the way the user is holding the directional interface object 104”).

105. A POSITA would understand that Rogers does not disclose superimposing a visual effect on the directional interface object using the inertial sensors. As I have explained above, in the context of the weapon reload use case, inertial sensors are used to generate inertial data reflective of the movement of the directional interface object, which can be used together with captured images to determine the position of a virtual object in the virtual environment. But, Rogers does not disclose superimposing the visual effect on the directional interface object using inertial sensor data.

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 May 15, 2024, in Shoreline, Washington.

By: 
Craig Rosenberg