

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VALVE CORPORATION,
Petitioner,

v.

IMMERSION CORPORATION,
Patent Owner.

Case No. IPR2024-00582
Patent No. 11,175,738

REPLY DECLARATION OF GREGORY F. WELCH, PH.D.

Valve Exhibit 1042 Valve v. Immersion IPR2024-00582

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	MATERIALS REVIEWED AND CONSIDERED	2
III.	IMMERSION’S PROPOSED CONSTRUCTION OF “HAPTIC EFFECT”	3

I, Gregory F. Welch, declare:

I. INTRODUCTION

1. I previously provided opinions (reflected in EX1004) on behalf of Valve Corporation (“Valve” or “Petitioner”), concerning the patentability of certain claims in U.S. Patent No. 11,175,738 (EX1001, “the ’738 patent”), and specifically claims 1-6, 14-16, and 19 (the “Challenged Claims”). I do so in this Declaration in support of Valve’s Reply to Patent Owner’s Response. In particular, I was asked by Valve to consider arguments made by Patent Owner Immersion Corporation (“Immersion”) and by Patent Owner’s expert, Dr. Robert Akl concerning the appropriate construction of the term “haptic effect.”

2. As I explained in my previous declaration (EX1004, ¶2), I am being compensated for my services at a rate of \$600/hour, plus actual expenses. As before, my compensation is in no way contingent on my findings, my testimony, or the outcome of any proceeding, and I have no other personal or financial stake or interest in this proceeding’s outcome, or expectation or promise of additional business in exchange for my positions.

3. I make this Declaration based on my personal knowledge, including my education, training, research, and professional experience.

II. MATERIALS REVIEWED AND CONSIDERED

4. As in my previous declaration, my findings are based on my years of education, research, experience, and background in hardware and software designs for electronic devices that provide haptic feedback to a user, as well as my investigation and study of relevant materials for this declaration. When developing the opinions set forth in this declaration, I assumed the perspective of a person having ordinary skill in the art (“POSA”), as set forth in Section III of EX1004.

5. In forming my opinions, I studied and considered the Petition (Paper No. 2); my previous declaration (EX1004); and the materials cited in my previous declaration, including those cited in Appendix A to EX1004. I also reviewed the Board’s Decision Granting Institution of *Inter Partes* Review (Paper No. 10, “DI”); the Patent Owner Response (Paper No. 15, “POR”); the declaration of Patent Owner’s expert, Dr. Robert Akl (EX2008, “Akl-Decl.”); and the material Dr. Akl cited in his declaration.

6. The below table supplements the list of documents I included with my previous declaration (EX1004, Appendix A) with additional exhibits that I studied and considered for this declaration.

Exhibit	Description
1036	December 19, 2024 Deposition Transcript of Gregory Welch, Ph.D.
1037	<i>Immersion Corp. v. Fitbit, Inc.</i> , W.D. Wash. 3:17-cv-3886, Dkt. No. 1 (Complaint for Patent Infringement) (July 10, 2017)

Exhibit	Description
1038	<i>Immersion Corp. v. Valve Corp.</i> , N.D. Cal. 2:23-cv-00712, Dkt. No. 1 (Complaint for Patent Infringement) (May 15, 2023)
1039	U.S. Patent Application Publication 2014/0347177A1 (“Phan”)
1040	U.S. Patent Application Publication 2014/0139448A1 (“Levesque-1”)
1041	U.S. Patent Application Publication 2014/0118127A1 (“Levesque-2”)

III. IMMERSION’S PROPOSED CONSTRUCTION OF “HAPTIC EFFECT”

7. In my previous declaration, I discussed the “bubble effect” embodiment disclosed in Pratt (EX1006), which simulates “clicking” a button. EX1004, ¶¶ 82-83. As I explained, Pratt’s “bubble effect” embodiment was one of two separate, independent embodiments in Pratt in which a haptic effect is output in response to a “haptic output signal” that is generated based on *both* proximity and touch-related inputs. *E.g.*, EX1004, ¶¶ 133-134 (describing how Pratt discloses two separate embodiments in which a haptic output signal is generated based on a signal from a proximity sensor *and* a signal from a touch sensor), ¶¶ 135-147 (describing Pratt’s “bubble effect” embodiment in further detail).

8. As I previously noted, the ’738 Patent itself discloses a comparable “haptic effect meant to confirm ‘pushing’ on a virtual button” (EX1001, 11:38-40) which may be used in, for example, active driving applications where a user cannot easily look at a screen (*see id.*, 3:19-24). EX1004, ¶¶ 134, 136.

9. Based on my review of the POR (Paper No. 15) and Dr. Akl's declaration (EX2008), I understand that Immersion does not disagree that Pratt's "bubble effect" is comparable to the '738 Patent's "'pushing' on a virtual button" effect. Immersion never disputes the Board's Decision Granting Institution of *Inter Partes* Review (Paper No. 10), in which the Board observed that "Pratt's 'bubble effect' is analogous to the 'pushing effect' disclosed in the '738 Patent, in which there is an additional confirmatory 'pushing' part of the effect after the user touches the surface." DI, 15. Immersion likewise never raises any dispute with my testimony during deposition explaining that "push[ing] a virtual button in the context of the '738 patent" encompassed an effect—e.g., "some sort of tactile or haptic feedback" such as a "click or something like that"—that indicated to a user that a "press has been registered." EX1036, 12:17-14:10.

10. Instead, Immersion argues that the '738 Patent's "'pushing' on a virtual button" embodiment is not covered by any of the '738 Patent's claims, because the claimed "haptic effect" must be a "a single, unmodified haptic effect that is based on the proximity sensor signal and the touch sensor signal." POR, 19; EX2008, ¶¶ 34-35. Specifically, Immersion says that the "haptic effect as claimed is a single haptic effect that has not yet been modified or combined with another haptic effect" (POR, 20; EX2008, ¶ 34) and that, by contrast, a "haptic effect that is derived from further modification"—such as the "pushing" effect "described in

11:35-38”—“is not the original haptic effect” claimed in Claim 1 (POR, 21; EX2008, ¶ 35).

11. I disagree with Immersion. There is no basis to interpret the Challenged Claims so narrowly that they *exclude* the '738 Patent's embodiment that discloses the “‘pushing’ on a virtual button” effect. Instead, the '738 Patent explains that:

[P]rocessor 102 may be configured to output a particular haptic effect associated with a particular control on a user interface element displayed on the touch sensitive surface 116. Such a haptic effect may further be modified or combined with another haptic effect based on the proximity sensor signal. In some embodiments, *the haptic effect can include one or more haptic effects. For example, the haptic effect can include a haptic effect meant to confirm “pushing” on a virtual button.*”

EX1001, 11-32:40.

12. According to Immersion, neither “the haptic effect [that] can include one or more haptic effects” (EX1001, 11:37-38) nor “the haptic effect [that] can include a haptic effect meant to confirm ‘pushing’ on a virtual button” (EX1001, 11:38-40) are “the *original* haptic effect that is claimed in Claim 1.” POR, 21. They are instead examples of a “*secondary* haptic effect... outside the scope of” the Challenged Claims. *Id.* (“The haptic effect that is derived from further modification as described in 11:35-38... is a secondary haptic effect... An example

of this secondary haptic effect is ‘pushing’ on a virtual button.”). Dr. Akl appears to agree with Immersion that at least “the haptic effect [that] can include one or more haptic effects” is excluded from the Challenged Claims. *See* EX2008, ¶ 35 (discussing the “haptic effect... described in 11:35-38” without addressing the “‘pushing’ on a virtual button” example at 11:39-40).

13. I strongly disagree with Immersion and Dr. Akl. The ’738 Patent does not ever describe the concept of “original” and “secondary” haptic effects, let alone distinguish between them, or suggest that the claims cover only one and not the other. Instead, the ’738 Patent consistently discloses that a “haptic effect” may simply be a sensation that a user experiences or perceives. For example, the specification discloses that “haptic output device 118 is configured to output *a haptic effect comprising*, for example, a vibration, a squeeze, a poke, a change in a perceived coefficient of friction, a simulated texture, *a stroking sensation*...” EX1001, 5:19-23. The specification also discloses that “[v]arying the levels of attraction between the object and the conducting layer can *vary the haptic effect perceived by a user*.” *Id.*, 6:15-17. The specification also discloses that “[t]he dual proximity sensor and haptic actuator shown in FIGS. 2A and 2B can be used *to provide a variety of haptic effects*. For example, the actuator 202 may be used *to provide a static electrostatic friction sensation*.” *Id.*, 9:59-62. Given these

descriptions of “haptic effect,” a POSA would understand that the “haptic effect” may be a physical effect that a **human** may sense, perceive, or experience.

14. For example, the ’738 Patent repeatedly discloses that the “haptic effect” may be a “vibration.” *E.g., id.*, 5:19-21 (“a haptic effect comprising, for example, a **vibration**...”), 5:43-44 (“a haptic effect comprising a vibration”), 5:65-66 (“The haptic effect may comprise... a simulated vibration...”), 10:64-65 (“a haptic effect comprising a vibration”), 11:2-3 (“In yet another embodiment, the haptic effect may comprise a vibration.”), 11:51-54 (“the haptic effect comprises a vibration...”), 11:56-57 (“the haptic effect may comprise a vibration.”). In the context of the ’738 Patent, a “vibration” is a type of human-experienced sensation.

15. That a haptic effect, as that term is used in the ’738 Patent, may be a user sensation—e.g., a physical effect experienced or perceived by a human, such as a “vibration”—is confirmed by Immersion’s own characterizations in court. For example, in the co-pending litigation against Valve before the United States District Court in the Western District of Washington, Immersion characterized the ’738 Patent as “providing haptic feedback” in the context of “video game controllers.” EX1038, ¶ 40. Immersion further explained that “[h]aptic feedback” in this context “provides touch or tactile **sensations** to users of electronic devices and may include tactile **sensations** produced by an actuator, such as a motor, a linear resonant actuator, or a piezoelectric actuator. Because of the importance of

the sense of touch to the way people perceive their surroundings and the things with which they interact, haptics can greatly enhance the usability and functionality of consumer electronic devices. For example, when haptic technology is implemented in video game systems and controllers, *users can experience vibrating forces* that mimic real-life forces as they navigate through virtual controls or interact with virtual objects...” EX1038, ¶ 41. Similarly, before the United States District Court in the Northern District of California, Immersion said that “*Haptic effects* (such as tactile or touch feedback) can be produced by actuators, or motors, which create a *vibration*, jolt, pulse, spatial texture, or other *physical sensation*.” EX1037, ¶3.

16. Thus, in the context of the ’738 Patent, and consistent with Immersion’s own statements made outside of this proceeding, a haptic effect encompasses a sensation—for example, a vibration—experienced by the device user. This is consistent with the testimony I provided to Immersion when deposed for this proceeding. *See* EX1036, 8:12-17 (explaining that a “haptic effect,” may “refer to the sensations you might feel”).

17. This is even consistent with Immersion’s *own* emphasis in its POR (Paper No. 15) that the claimed invention of the ’738 Patent allegedly “provides a more intuitive *experience* for users interacting with touchscreen devices.” POR, 1 (citing EX1001, 2:54-67). A user’s experience when interacting with a

touchscreen device depends on the sensations the user experiences—regardless of exactly how those sensations are produced.

18. I say that a haptic effect in the context of the '738 Patent “encompasses” a sensation experienced by a user to be clear that “haptic effect” in the context of the patent is not *limited* to a sensation experienced by a user. Instead, as I explained during my deposition in this matter, the '738 Patent uses “haptic effect” in “different ways” (EX1036, 21:12-14). The point simply is that a POSA reading the '738 Patent specification would understand that the sensation that the user experiences may on its own be “haptic effect.”

19. In paragraph 92 of his declaration, Dr. Akl asserts that:

I understand that the Institution Decision in this IPR proceeding states that because “Pratt's ‘bubble’ effect would appear to be a different sensation to the user if pre-charging did not happen” that the ‘haptic effect’ of Pratt is based on both proximity and touch.” DI at 15. But, as I explained above, *what the user experiences does not define the haptic effect*. A POSITA would understand that the bubble effect remains two haptic effects that are combined into a single user sensation.

This paragraph is virtually identical to a paragraph on page 33 of the POR:

The Institution Decision concludes that because “Pratt’s ‘bubble’ effect would appear to be a different sensation to the user if pre-charging did not happen” that the ‘haptic effect’ of Pratt is based on both proximity and touch.” DI at 15. However, as discussed above, *the experience of the user does not define the haptic effect*. EX2008, ¶92. A POSA would understand that the bubble effect remains two haptic effects that may later be combined into a single user sensation. *Id.*

20. However, the highlighted assertion—that is, that “the experience of the user does not define the haptic effect”—clearly contradicts the ’738 Patent as it would be understood by a POSA. As I explained above, the ’738 Patent repeatedly explains that the physical “sensation” experienced by a user *can* constitute the “haptic effect.” *E.g.*, EX1001, 5:19-23, 6:15-17, 9:59-62. And that is consistent with Immersion’s *own* emphasis in its POR (Paper No. 15) that the claimed invention of the ’738 Patent allegedly “provides a more intuitive *experience* for users interacting with touchscreen devices.” POR, 1.

21. The disclosures in the ’738 Patent that a “haptic effect” may be a physical sensation also contradicts Immersion’s suggestion that the claimed “haptic effect” must be a “single, unmodified haptic effect” (POR, 28) that “has *not yet* been modified or combined with another haptic effect” (POR, 20) (emphasis original). As an initial matter, “the experience for users interacting with touchscreen devices”—which the “claimed invention of the ’738 Patent” purportedly improves (POR, 1)—is the *same* regardless of how the haptic effect can be subdivided. Moreover, a POSA would understand that *any* given “haptic effect” can be decomposed into smaller components, and that—as I explained during my deposition—essentially *anything* that a user senses “is going to be, at some level, a *series* of haptic events.” EX1036, 15:11-16:8.

22. At the time of the alleged invention, a POSA would understand that data for providing a “haptic effect” to a user could be transmitted—e.g., within a device—using a data stream that was represented in the well-known pulse code modulation (PCM) data format. This knowledge of a POSA is corroborated by, for example, the Phan reference. *E.g.*, EX1039, [0003] (“With the increasing use of haptic effects to enhance a user's experience in a plethora of digital content applications, it is desirable to efficiently store and/or transmit haptic data together with other digital content (e.g., multimedia data) over a network. A haptic data stream is typically represented in raw pulse code modulation (“PCM”) data format.”).

23. For illustration purposes, a representation of a stream of haptic data “A”—which could be represented in the PCM data format—is shown below:

A	01101000011010011110010101000011100011100011100
----------	--

24. The *exact same* haptic data can be represented as a combination of “B” and “C,” shown below.

B+C	01101000011010011110010101000011100011100011100
------------	--

25. The *exact same* haptic data can also be represented as a combination of “D,” “E,” and “F,” shown below.

D+E+F	01101000011010011110010101000011100011100011100
--------------	--

26. Under Immersion’s theory, only “A” as shown below—and not the combination of “B” and “C,” or the combination of “D,” “E,” and “F”—would constitute a “haptic effect” as claimed.

A	01101000011010011110010101000011100011100011100
B+C	01101000011010011110010101000011100011100011100
D+E+F	01101000011010011110010101000011100011100011100

27. Immersion’s theory is illogical from a POSA’s perspective. B together with C constitutes *the exact same data stream* as A and yields the exact same sensation for users that data stream A yields. Likewise, D together with E and F constitutes *the exact same data stream* as A and yields the exact same sensation for users that data stream A yields. There is no logical reason to distinguish among the haptic effect corresponding to haptic data stream A, the haptic effect corresponding to the combination of haptic data streams B and C, and the haptic effect corresponding to the combination of haptic data streams D, E, and F. It would be wholly arbitrary to distinguish the haptic effect produced by A from the haptic effect produced by B+C or the haptic effect D+E+F merely because A reflects “a single haptic effect that has not yet been modified or combined with another haptic effect,” while B+C or D+E+F do not. Moreover, Immersion does not identify any objective way to determine that a given haptic effect is unmodified or modified. Immersion does not even explain *when* in the process of outputting a

haptic effect a POSA would have to make that determination—e.g., at some point before the claimed haptic effect is generated by the claimed haptic output device, or at some point while it is being generated, or at some point after it has been generated.

28. This same principle can be illustrated using visualizations of haptic drive signals in Levesque-448, which is a patent application assigned to Immersion and published on May 22, 2014. Levesque-448 includes FIGs. 5C-5D, which “schematically illustrate embodiments of haptic drive signals that may be used to generate haptic effects that simulate a texture.” EX1040, [0016]. FIGs. 5C-5D are reproduced below:

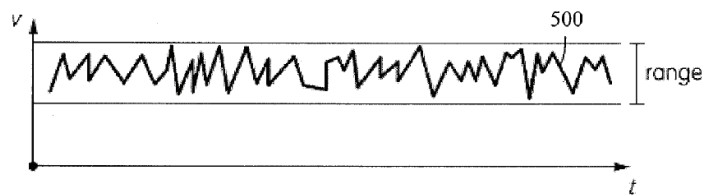


FIG. 5C

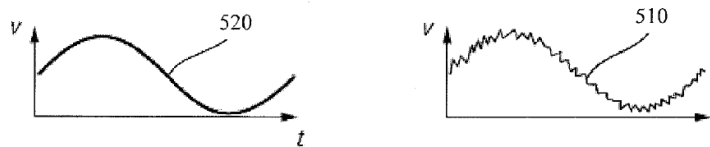


FIG. 5D

29. Levesque-448 expressly discloses that “a haptic effect [singular] may be based on a combination of a random or pseudo-random signal and another

signal. For example, as illustrated in FIG. 5D, a haptic effect may be based on **signal 510**, which is a combination of the random or pseudo-random signal 500 and signal 520 which may be a periodic signal.” EX1040, [0049]. Above, “signal 510” generates a particular sensation of texture for the user. This is true **regardless of whether** the signal is a so-called **primary** haptic effect that is produced without combining any signals or a so-called **secondary** haptic effect combining “signal 500 and signal 520.” EX1040, [0049]. It would again be wholly arbitrary to distinguish signal 510 on its own from signal 510 if it were created by combining signals 500 and 520, merely because the former reflects “a single haptic effect that has not yet been modified or combined with another haptic effect,” and the latter does not. This exemplifies how there is no objective way to determine whether a given haptic effect is unmodified, modified, primary, or secondary.

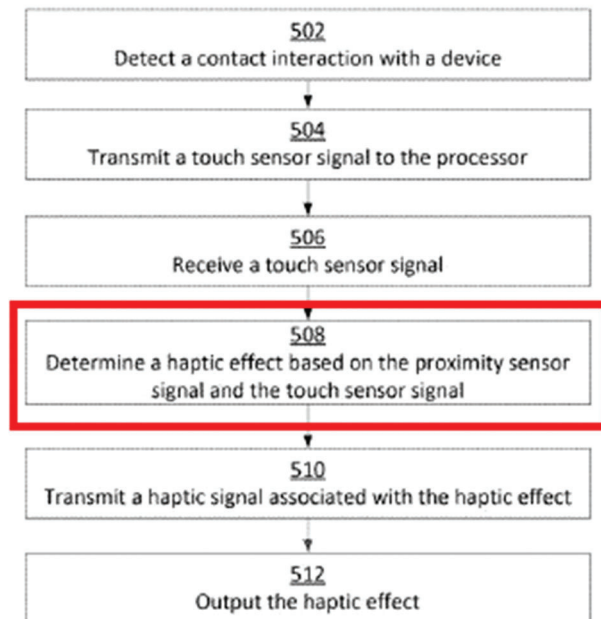
30. Again, Immersion **has acknowledged** that the ’738 Patent’s supposed invention serves to offer “a more intuitive **experience** for users interacting with touchscreen devices” POR, 1. In the examples described above (¶¶ 23-27 and ¶¶ 28-29), users would **experience the exact same sensation** regardless of whether it is described as “B+C” or “D+E+F” rather than “A”—or “500+520” rather than “510.” Both above example sets of signals would be identical if the electrical signals or mechanical forces were measured with an oscilloscope.

31. Immersion’s theory is the logical equivalent of asserting that an orange liquid is not actually an orange liquid if it resulted from combining red and yellow liquids.

32. The ’738 Patent itself stresses the logical reality and understanding of a POSA that “*the haptic effect can include one or more haptic effects*” (EX1001, 11:37-38)—just like a color may include one or more colors. *See also id.*, 5:26-28 (“[S]ome haptic effects may use multiple haptic output devices 118 of the same or different types in sequence and/or in concert.”); *id.*, 10:47-48 (“[T]he haptic effect can include one or more haptic effects.”). The ’738 Patent also offers an express example, in the very next sentence following 11:37-38, of a “haptic effect” that “can include a haptic effect meant to confirm ‘pushing’ on a virtual button.” EX1001, 11:38-40. This understanding of a POSA (that a haptic effect may include more than one haptic effect) is corroborated by Immersion’s own Levesque-127 reference. *See* EX1041, [0049] (“[T]he haptic effect [singular] may be generated by generating two haptic effects... A user may perceive a combination of the two haptic effects *as a single haptic effect.*”).

33. Separately, Immersion’s repeated citations to the ’738 Patent’s Figure 5 to support its theory that the term “haptic effect” only refers to “a single haptic effect that has not yet been modified or combined with another haptic effect,” wrongly assumes that Figure 5 itself reflects “a single, unmodified haptic effect”

being “determined from a touch signal and a sensor signal at step 508.” For reference, Figure 5 is reproduced below with Immersion’s annotations.



POR, 19-20. Immersion’s assumption that step 508 applies only to a single, unmodified haptic effect is unsupported. As I discuss above, the ’738 Patent makes clear that the determined “haptic effect” can be a *sensation* experienced by the user. A device could therefore practice the steps in ’738 Patent Figure 5 by (1) “determin[ing]” a sensation for the user to experience “based on the proximity and touch sensor signals,” and (2) transmitting a “haptic signal” associated *with that sensation*. Such a haptic signal may include multiple components—for example, B+C or D+E+F, or signals 500+520, to use the examples described above.

34. For at least these reasons, Immersion’s attempt to drastically narrow its claims to exclude the ’738 Patent’s described ‘pushing’ on a virtual button”

embodiment are unsupported and flawed. Pratt's "bubble effect" embodiment anticipates claims 1-3, 5-6, 14-15, and 19.

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

I declare under penalty of perjury that the foregoing is true and correct.

Dated: 27 MAR 2025



Gregory F. Welch, Ph.D.