

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.,
Petitioner,

v.

MULLEN INDUSTRIES LLC,
Patent Owner.

IPR2025-00743
Patent 11,947,716 B2

Before KEN B. BARRETT, JEFFREY S. SMITH, AND
MIRIAM L. QUINN, *Administrative Patent Judges*.

SMITH, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Petitioner filed a Petition (Paper 2, “Pet.”) requesting *inter partes* review of claims 1, 8, 16, and 18 of U.S. Patent No. 11,947,716 B2 (Ex. 1001, “the ’716 patent”) pursuant to 35 U.S.C. § 311(a). Patent Owner filed a Preliminary Response (Paper 9, “Prelim. Resp.”) pursuant to 35 U.S.C. § 313.

Institution of an *inter partes* review may not be authorized by statute “unless . . . the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a). Upon consideration of the Petition and the Preliminary Response, we determine Petitioner has demonstrated a reasonable likelihood that it would prevail in establishing the unpatentability of at least one of claims 1, 8, 16, and 18 of the ’716 patent. Accordingly, we institute the requested *inter partes* review.

A. *Real-Parties-in-Interest*

Petitioner identifies itself as the real-party-in-interest. Pet. 1. Patent Owner identifies itself as the real-party-in-interest. Paper 3, 1.

B. *Related Matters*

The parties state that the ’716 patent is currently asserted in *Mullen Industries LLC v. Meta Platforms, Inc.*, No. 1:24-cv-00354 DAE (W.D. Tex.). Pet. 1; Paper 3, 1. The Petition identifies twelve IPRs challenging related patents. Pet. 1.

C. The '716 Patent

The '716 patent “relates to improved portable devices.” Ex. 1001, 1:30. The portable device can be a head-mounted system that includes virtual bifocals to display information to a user so that the user can work in a virtual world while working in the actual world. *Id.* at 2:31–38; *see id.* at 13:52–14:28. The virtual bifocal feature can use a night vision camera or an infrared camera to provide a transparent feature to a non-transparent display screen by feeding in video information in real time of the environment in the user’s field of vision. *Id.* at 14:59–64; *see id.* at 2:38–41, 14:53–59.

D. Illustrative Claims

Challenged claims 1 and 16 of the '716 patent are reproduced below along with Petitioner’s labels for the limitations.

1. [1pre] An apparatus comprising:
 - [1a] a head-wearable device comprising at least one housing, said at least one housing comprising:
 - [1b] a speaker;
 - [1c] a microphone; and
 - [1d] a movement sensor, wherein said movement sensor comprises an accelerometer;
 - [1e] a manual input operably coupled to said head-wearable device;
 - [1f] wherein said head-wearable device further comprises:
 - [1f1] a display operable to cover at least a portion of at least one eye of a wearer of said head-wearable device, wherein said display is operable to display a virtual object and to allow said wearer of said head-wearable device to view, simultaneously with said virtual object, a portion of said wearer’s actual world environment, and
 - [1f2] a camera pointed in a field-of-vision of said wearer and operable to capture an image of said portion of said wearer’s actual world environment;

[1g] wherein said display is operable to display said image of said wearer's actual world environment taken by said camera simultaneously with said virtual object.

16. [16pre] A head-mounted device comprising:

[16a] a head-mounted power source;

[16b] a head-mounted manual input;

[16c] a head-mounted processor;

[16d] a head-mounted movement sensor;

[16e] a top-of-the-head mounting structure;

[16f] a behind-the-head mounting structure;

[16g] a head-mounted display operable to cover at least a portion of at least one eye of a wearer of said head-mounted device, wherein a first virtual object is operable to be displayed on said head-mounted display and controlled with manual input and a second virtual object is operable to be displayed on said head mounted display and controlled autonomously by said processor; and

[16h] a head-mounted camera, wherein information from said head-mounted camera is operable to be displayed on said head-mounted display simultaneously with said first virtual object and said second virtual object.

E. Asserted Grounds

Petitioner asserts that claims 1, 8, 16, and 18 of the '716 patent are unpatentable on the following grounds (Pet. 3):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
16, 18	103	Ronzani, ¹ Horton, ² Ohshima ³
1, 8	103	Ronzani, Horton, Natoli, ⁴ Peli ⁵

¹ US Appl. Pub. No. 2002/0163486 published Nov. 7, 2002 (Ex. 1003).

² US Patent No. 5,615,132 issued Mar. 25, 1997 (Ex. 1004).

³ US Patent No. 6,951,515 issued Oct. 4, 2005 (Ex. 1005).

⁴ US Patent No. 6,388,657 issued May 14, 2002 (Ex. 1007).

⁵ US Patent No. 6,611,618 issued Aug. 26, 2003 (Ex. 1006).

II. ANALYSIS

A. Level of Ordinary Skill in the Art

Petitioner contends that

A person of ordinary skill would have possessed a bachelor's degree in electrical engineering, computer science, or similar field, with two years combined experience in designing and/or developing interactive location-based computer systems/software, such as video games or other simulations incorporating location information (such as GPS information associated with a user's physical location), and in designing and/or developing computer systems/software involving graphical virtual and/or augmented reality. A person could also have qualified as a person of ordinary skill in the art with some combination of (1) more formal education (such as a master's of science degree) and less technical experience, or (2) less formal education and more technical or professional experience. (EX1002, ¶¶21–25.)

Pet. 4. Patent Owner at this stage does not challenge Petitioner's definition of the level of ordinary skill. *See generally*, Prelim. Resp. As Petitioner's definition of a person of ordinary skill appears commensurate with the subject matter before us, we apply Petitioner's definition for purposes of this Decision.

B. Claim Construction

We interpret the challenged claims,

using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.

37 C.F.R. § 42.100(b) (2022). We construe expressly only those claim terms that require analysis to determine whether to institute *inter partes* review.

See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc., 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that “only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy”).

Petitioner submits that express construction is not required. Pet. 5. However, Patent Owner proposes construing the claim term “wherein a first virtual object is operable to be displayed on said head-mounted display and controlled with manual input” recited in claim 16 as meaning that the first virtual object is operable to be controlled with manual input while it is being displayed on the head-mounted display. Prelim. Resp. 10. Patent Owner contends that the Specification’s disclosure that a user can interact with a virtual world and an actual world at the same time supports its proposed construction of this term. *Id.* at 11–12 (citing Ex. 1001, 13:65–14:1, 14:12–18, 15:36–37, 16:4–8).

Petitioner contends that the plain meaning of “wherein a first virtual object is operable to be displayed on said head-mounted display and controlled with manual input” is that a virtual object can be displayed on the head-mounted display, and it can also be controlled with manual input. Paper 10, 1. Petitioner contends that claim 16 does not recite the narrowing limitation “while it is being displayed” proposed by Patent Owner. *Id.* Petitioner highlights that claims 1, 14, 16 and 18 expressly recite when certain functions must occur “simultaneously.” *Id.* at 2. In contrast, Petitioner asserts that the claim term “a first virtual object is operable to be displayed . . . and controlled” does not recite that the first virtual object is displayed and controlled simultaneously. *Id.*

Petitioner also contends that the Specification does not limit the meaning of this claim term, but rather, teaches an open-ended variety of

virtual objects, including virtual objects that exist independently of being displayed. Paper 10, 2 (citing Ex. 1001, 13:65–14:7, 14:22–52, Fig. 15, claim 9). In particular, Petitioner contends that the Specification describes virtual objects that exist in locked locations relative to the user, so that they can only be seen when a user is looking in a particular direction. *Id.* In addition, Petitioner contends that the Specification describes a user manually moving a virtual email to a virtual trash can, where the virtual email is no longer displayed, and manually purging the unseen virtual email from the virtual trash can. *Id.* at 3 (citing Ex. 1001, 12:46–54, 14:51–52). Finally, Petitioner contends that the ’716 patent never disavows embodiments where a virtual object is displayed after the controlling manual input is provided. *Id.*

Patent Owner contends that the conjunctive word “and” in the phrase “a first virtual object displayed on said head-mounted display and controlled with manual input” means that the display and the control occur together. Paper 11, 1. Patent Owner contends that although the Specification discloses virtual objects that are locked in a certain location and can only be looked at when the user is looking in a particular direction, the Specification does not disclose manually controlling a virtual object when the virtual object is not displayed. *Id.* at 2. Patent Owner contends that, in the example of a user manually purging a virtual email from a virtual trash can, the user is telling the virtual trash can to act, not the virtual email. *Id.* Patent Owner also contends that although other claim terms use the word “simultaneously” and this claim term does not, the reason is that the other claim terms recite multiple pieces of information that could or could not be displayed simultaneously. *Id.* at 2–3.

On this record, we agree with Petitioner that Claim 16 does not require the virtual object to be displayed and controlled simultaneously. We highlight that claims 1, 14, 16, and 18 use the word “simultaneously” when requiring certain actions to occur at the same time. The fact that patentee used the word “simultaneously” to require certain claimed actions to occur at the same time, but did not use the word “simultaneously” in the claim term “a virtual object is operable to be displayed . . . and controlled” indicates that the patentee did not intend that the actions of displaying the virtual object and controlling of the virtual object are required to occur simultaneously. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005) (“Differences among claims can also be a useful guide in understanding the meaning of particular claim terms.”).

Further, the Specification discloses that a user can manually purge an unseen virtual email located in a virtual trash can, which shows that in at least this embodiment, the user can manually control a virtual object while the virtual object is not being displayed. Patent Owner’s contention that the user is telling the virtual trash can to act does not address the fact that the user’s manual input controls the unseen virtual email by purging the unseen virtual email from the virtual trash can. This embodiment of purging an unseen virtual object further indicates that the scope of this claim term does not require displaying the virtual object and controlling the virtual object simultaneously. *See Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1583 (Fed. Cir. 1996) (holding that interpreting a claim to exclude an embodiment disclosed in the written description “is rarely, if ever, correct and would require highly persuasive evidentiary support, which is wholly absent in this case.”).

We do not construe “wherein a first virtual object is operable to be displayed on said head-mounted display and controlled with manual input,” as recited in claim 16, to require controlling the virtual object “while it is being displayed,” as proposed by Patent Owner.

C. Analysis of Ground 1

For ground 1, Petitioner contends that claims 16 and 18 would have been obvious over the combination of Ronzani, Horton, and Ohshima. Pet. 12–50. In doing so, Petitioner explains how the combination satisfies each claim limitation and provides supporting testimony from its expert. *See id.* Patent Owner challenges ground 1 by contending that Ohshima does not teach a virtual object that is displayed and controlled, and that a person of ordinary skill in the art would not have combined the teachings of Ronzani, Horton, and Ohshima. Prelim. Resp. 18–28.

Patent Owner’s contention that Ohshima does not teach “a first virtual object is . . . displayed . . . and controlled”

Claim 16 recites “a first virtual object is operable to be displayed on said head-mounted display and controlled with manual input.” Petitioner contends that “Ohshima’s ‘virtual bullet’ is ‘controlled with manual input’ including (1) being fired by the player’s trigger action using controller 1004, and (2) the user’s positioning of controller 1004 manually controls the bullet’s line-of-fire direction.” Pet. 37 (citing Ex. 1005, 6:57–63, 9:2–8; Ex. 1003 ¶¶ 127–129).

Patent Owner contends that Ohshima does not disclose this limitation, under Patent Owner’s proposed construction, because Ohshima’s virtual bullet is not controlled after it is fired and displayed. Prelim. Resp. 19–20. However, we do not agree with Patent Owner’s proposed construction as discussed in our analysis of this term. *See supra* Section II.B.

Patent Owner contends that, even if the Board declines to adopt Patent Owner's proposed construction, Ohshima still does not disclose this limitation. Prelim. Resp. 20. Patent Owner contends that the virtual object of Ohshima does not exist before the user pulls the trigger. *Id.* at 21 (citing Ex. 1005, 7:17–38). According to Patent Owner, if the manual input comes entirely before the existence of the virtual object, then the manual input at most creates the virtual object but cannot control the virtual object. *Id.*

Patent Owner's contention that a virtual bullet does not exist before the user pulls the trigger does not address Petitioner's showing that the direction and timing of the virtual bullet are controlled by the user positioning a controller and pulling a trigger. On this record, we are sufficiently persuaded that Ohshima's virtual bullet is controlled with manual input from a user by the user positioning a controller to manually control the bullet's line-of-fire direction and the user pulling a trigger to manually control the timing of the bullet.

Patent Owner's contentions against combining Ronzani and Ohshima

Patent Owner presents several arguments to assert that a person of ordinary skill in the art would not have combined the teachings of Ronzani and Ohshima. Patent Owner contends that (1) Ronzani would not benefit from Ohshima's virtual reality application because Ronzani does not use virtual reality applications, (2) because Ronzani and Ohshima are from entirely different fields, a person of ordinary skill would not have looked to Ohshima, (3) Petitioner relies on impermissible hindsight, and (4) Ronzani and Ohshima are technically incompatible. Prelim. Resp. 22–26.

Patent Owner's contention that Ronzani would not benefit from Ohshima's virtual reality application

Patent Owner contends that the Petition incorrectly argues that Ronzani describes its invention as being able to run virtual reality applications. Prelim. Resp. 22. Patent Owner contends that Ronzani's disclosure of "virtual imaging," "commercial, industrial, and entertainment purposes," "a virtual reality data glove," and "a virtual keyboard" does not imply a virtual reality simulation. *Id.* at 22–23 (citing Ex. 1003 ¶¶ 2, 5, 7, 170). According to Patent Owner, because Ronzani is not designed to run virtual reality applications, Ronzani would not benefit from Ohshima's virtual reality application. *Id.* at 23–24.

On the present record, we disagree. Dr. Cooperstock testifies that Ronzani describes using a head-mounted display device for a variety of applications, including simulations, applications that track the movement of the user, virtual reality applications that use a virtual reality data glove, augmented reality where the display overlays an image over the user's existing field of view, and entertainment purposes. Ex. 1002 ¶ 96 (citing Ex. 1003 ¶¶ 2, 5, 11, 170); *see* Pet. 24 (citing Ex. 1002 ¶ 96). Ronzani discloses that: "[h]ead mounted display systems have been developed for . . . use by aircraft pilots and for simulation such as virtual imaging" (Ex. 1003 ¶ 2); its head-mounted display system is used "for numerous applications including . . . entertainment purposes" (*id.* at ¶ 5); its "user interface can be . . . a virtual keyboard" (*id.* at ¶ 7); its head-mounted display "overlays an image over the user[']s existing field of view" (*id.* at ¶ 11); and the wearer of its head-mounted display "can control the operation of the CPU 712 through [an] input device" such as "a virtual reality data glove" (*id.* at ¶ 170). At this stage, Dr. Cooperstock's testimony and Ronzani's disclosure sufficiently

persuade us that a person of ordinary skill would have recognized that Ronzani describes using its head-mounted display for a variety of applications including simulations, entertainment, augmented reality, and virtual reality applications including the virtual reality video game of Ohshima.

Patent Owner's contention that Ronzani and Ohshima are not analogous art

Patent Owner contends that Ronzani and Ohshima are not analogous art because they are drawn from different fields and problems. *See* Prelim. Resp. 23 (“Ronzani and Ohshima are further from entirely different fields and a POSITA would not look to Ohshima to modify Ronzani.”). According to Patent Owner, Ronzani focuses on mission-critical applications such as firefighting which require a head-mounted display that augments situational awareness without impairing vision, and Ohshima focuses on virtual gaming. *Id.* Patent Owner contends that “there is insufficient basis” for a person of ordinary skill “to look to Ohshima” in order to modify Ronzani. *Id.*

We disagree with Patent Owner's contention that Ronzani's head-mounted display is limited to mission-critical applications for the reasons discussed above. We also disagree with Patent Owner's contention that there is insufficient basis for a person of ordinary skill to look to Ohshima. Our reviewing court addressed the issue of determining whether a reference is analogous art:

A reference qualifies as prior art for an obviousness determination under § 103 only when it is analogous to the claimed invention. Two separate tests define the scope of analogous prior art: (1) whether the art is from the same field of endeavor, regardless of the problem addressed and, (2) if the

reference is not within the field of the inventor's endeavor, whether the reference still is reasonably pertinent to the particular problem with which the inventor is involved. . . . A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem. If a reference disclosure has the same purpose as the claimed invention, the reference relates to the same problem, and that fact supports use of that reference in an obviousness rejection.

In re Klein, 647 F.3d 1343, 1348 (Fed. Cir. 2011). The '716 patent "relates to improved portable devices" such as head-mounted displays. Ex. 1001, 1:30, Fig. 9. Ronzani "relates generally to systems and methods for mounting display . . . systems to the human body" such as head-mounted displays. Ex. 1003 ¶ 5. Ohshima "relates to a game apparatus" such as a head-mounted display. Ex. 1005, 1:9, 5:34–36, Fig. 4. We are sufficiently persuaded that Ronzani, Ohshima, and the '716 patent are from the same field of endeavor of head-mounted displays. Also, the '716 patent discloses a camera that addresses the problem of providing video information "of the environment in the user's field of vision" (Ex. 1001, 14:53–64), which is the same problem addressed by Ohshima's camera (Ex. 1005, 6:48–49; 7:24–25, 7:64–65, Figs. 4, 5, 8, 9, 11). We are sufficiently persuaded that Ronzani and Ohshima are analogous to the '716 patent, and that a person of ordinary skill would have had sufficient basis to turn to both Ronzani and Ohshima.

Patent Owner's contention that the Petition relies on hindsight to combine the teachings of Ronzani and Ohshima

Patent Owner contends that Ohshima does more than describe technical details that Ronzani omits. Prelim. Resp. 24. According to Patent Owner, Ohshima features virtual objects that move independently to play a

game, and Ronzani does not. *Id.* Patent Owner contends that a person of ordinary skill would not have transformed Ronzani's lightweight utility headset used to receive a video feed for firefighting into a mixed reality gaming apparatus without using impermissible hindsight. *Id.*

We disagree with Patent Owner's contention that Ronzani's device is limited to a firefighting application. Although Ronzani discloses an embodiment of its head-mounted display system used by a firefighter (Ex. 1003 ¶ 174), Ronzani's disclosure does not limit the head-mounted display device to firefighting applications, but rather, describes a display device used in a variety of applications including simulations, entertainment, augmented reality, and virtual reality as discussed above. We also disagree with Patent Owner's contention that Ronzani does not display virtual images for the reasons discussed above. We highlight that Ronzani discloses sending a video signal from a computer to the head-mounted device and displaying images from the video signal, and that the displayed images include virtual images. *Id.* at ¶¶ 2 (virtual imaging), 92, 93, 98, 145–146 (head-mounted computer 510 provides video signals to the display). Ronzani also discloses “that the display overlays an image over the user[']s existing field of view.” *Id.* at 11. On this record, we are sufficiently persuaded that a person of ordinary skill in the art would have recognized that Ronzani describes a head-mounted display device that receives a video signal from a computer and displays virtual images from the video signal, such as virtual images from Ohshima's virtual reality game.

Because we are sufficiently persuaded that Ronzani describes displaying virtual images, we disagree with Patent Owner's contention that Petitioner relies on impermissible hindsight to combine the teachings of

Ronzani and Ohshima. Petitioner relies on Ronzani to teach a head-mounted display device for entertainment applications that display virtual images. Pet. 40 (citing Ex. 1003 ¶¶ 2, 5, 170). Petitioner relies on Ohshima to teach implementation details of a specific entertainment application that displays virtual images. *Id.* at 40–41. Petitioner contends that a person of ordinary skill in the art would have modified Ronzani’s head-mounted display device to include Ohshima’s virtual reality game for the benefit of achieving Ronzani’s goal of entertainment. *Id.* (citing Ex. 2:33–38, 6:57–59, 11:22–26, 11:66–12:2; Ex. 1002 ¶ 135). Petitioner also contends that applying Ohshima’s technique of playing a game using a head-mounted display device to Ronzani’s head-mounted display device would improve Ronzani’s head-mounted display device in the same way. Pet. 41–42.

We are sufficiently persuaded that a person of ordinary skill in the art would have used Ronzani’s head-mounted device to run Ohshima’s virtual reality game for the benefit of providing the user of the device with entertainment. We are also sufficiently persuaded that the combination of Ronzani and Ohshima “simply arranges old elements [of a head-mounted display device and a virtual reality game] with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007)).

Patent Owner’s contention that Ronzani and Ohshima are technically incompatible

Patent Owner contends that using the immersive gaming system of Ohshima, which has a video see-through display, in the system of Ronzani, which has an optical see-through display, would require more than trivial adaptation. Prelim. Resp. 25. In particular, Patent Owner contends that

replacing Ronzani's optical display with Ohshima's video headset, which superimposes virtual objects on real space within the headset, requires overhauling the user interface and visual rendering systems of both Ronzani and Ohshima. *Id.*

We disagree. Patent Owner's contention is attorney argument unsupported by evidence. Further, Patent Owner's contention is inconsistent with Ohshima's disclosure that a head-mounted display device can use either a video see-through display or an optical see-through display (Ex. 1005, 6:52–56) and with Ronzani's disclosure that its display can be a transmission type display that receives light directly from a user's field of view, or an emission type display such as an active matrix electroluminescent display (Ex. 1003 ¶¶ 11–12). We are sufficiently persuaded on this record that both Ronzani and Ohshima teach using either a video see-through display or an optical see-through display; therefore, the teachings of Ronzani and Ohshima are not technically incompatible.

Patent Owner's contentions against combining Ronzani and Horton

Claim 16 recites “a head-mounted movement sensor.” Patent Owner contends that there is no motivation to add Horton's head-mounted movement sensor to Ronzani's head-mounted display, because (1) Horton immerses a user in a virtual world whereas Ronzani's user is a first responder who wants to avoid immersion into a virtual world, (2) Ronzani does not use virtual reality applications and therefore would not benefit from Horton's sensor that improves virtual reality applications, and (3) adding Horton's sensor to Ronzani's head-mounted device would “overload[] a user's head with equipment.” Prelim. Resp. 26–28.

We disagree with Patent Owner's contentions that Ronzani's device is only used by first responders and that Ronzani does not disclose that its device performs entertainment applications such as virtual reality games for the reasons discussed above. We also disagree with Patent Owner's contention that Horton's sensor, when added to Ronzani's device, would overload a user's head. Patent Owner's contention is attorney argument unsupported by evidence. Patent Owner's contention is also inconsistent with Horton's disclosure that its tracking system is small, lightweight, and easily attached to a user's head-mounted device without significant interference to natural body movements. Ex. 1005, 1:25–26, 2:32–35, 3:53–54, 4:29–31.

Ronzani describes using its head-mounted display device for a variety of applications including simulations, virtual reality, and augmented reality as discussed above. Horton discloses that its head-mounted sensor addresses the need for a virtual reality application to determine the position and orientation of a user in order to provide a realistic virtual reality simulation. Ex. 1004, 1:13–28, 2:4–10, 2:16–35, 2:52–62. On the present record, we are sufficiently persuaded that a person of ordinary skill in the art would have added Horton's head-mounted sensor to Ronzani's head-mounted display device for the benefit of providing a realistic virtual reality simulation as taught by Horton. We are also sufficiently persuaded that the combination of Ronzani's head-mounted display and Horton's head-mounted sensor simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement.

Conclusion for ground 1

We determine that Petitioner demonstrates a reasonable likelihood of showing that independent claim 16 is unpatentable over the combination of Ronzani, Horton, and Ohshima. Patent Owner does not dispute Petitioner's showing that the combination teaches the limitation of dependent claim 18.

D. Analysis of Ground 2

Petitioner contends that claims 1 and 8 would have been obvious over the combination of Ronzani, Horton, Natoli, and Peli. Pet. 51–78. In doing so, Petitioner explains how the combination satisfies each claim limitation and provides supporting testimony from its expert. *See id.* Patent Owner challenges ground 2 by contending that the combination does not teach several limitations of claim 1, and that a person of ordinary skill would not have had a reason to combine the asserted references in the manner claimed. Prelim. Resp. 28–42.

Patent Owner's contention that the combination of Ronzani and Natoli does not teach a display that allows a simultaneous view of a virtual object and an actual world

Claim 1 recites a head-wearable device comprising a display “to allow a wearer of said head-wearable device to view, simultaneously with said virtual object, a portion of said wearer's actual world environment.” Petitioner contends that Ronzani discloses an optical see-through display of a head-mounted device that overlays an image on the display, so that the wearer sees the image and the actual world environment through the display. Pet. 60–61 (citing Ex. 1003 ¶¶ 11, 211, 275, 276, 279, 280, Figs. 47A–D, 65–70). Petitioner contends that Ronzani further discloses using a virtual reality keyboard controlled by a virtual reality data glove as an input device. *Id.* at 61–62 (citing Ex. 1003, ¶¶ 7, 170). Petitioner contends that Natoli

discloses a system for displaying a virtual reality keyboard on a head-mounted semi-transparent display device. *Id.* at 62–64 (citing Ex. 1007, 2:34–48, 5:28–41, 6:64–7:15, 12:64–67, Figs. 2, 26). Petitioner contends that a person of ordinary skill would have used Ronzani’s device to display Natoli’s virtual keyboard for the benefit of providing the versatility of a physical keyboard without the physical keyboard’s disadvantages of wear, damage, and theft as taught by Natoli. Pet. 66–67 (citing Ex. 1007, 1:47–63).

Patent Owner contends that Ronzani does not display a virtual object, but rather turns a video feed into a video image. Prelim. Resp. 29–31. We disagree with Patent Owner’s contention that Ronzani does not display a virtual object for the reasons discussed above in our analysis of ground 1. We are sufficiently persuaded that Ronzani discloses a head-mounted optical see-through display that allows a wearer to simultaneously view a virtual object and the real-world environment. Ex. 1003 ¶¶ 2, 5, 7, 11. Further, Patent Owner’s contention against Ronzani alone does not address the combined teachings of Ronzani and Natoli. Ronzani discloses a head-mounted display device that receives a video signal from a computer and displays images from the signal, and Natoli discloses that the displayed image can be a virtual reality keyboard. Ex. 1003 ¶¶ 92, 93; Ex. 1007, 5:28–52.

Patent Owner contends that the wearer of Natoli’s device never sees any virtual object simultaneously with any portion of the world environment as required by the claim, because, according to Patent Owner, Natoli does not have a semi-transparent display. Prelim. Resp. 32–34. However, Petitioner relies on Ronzani’s disclosure of an optical see-through display to

teach a display that allows a user to simultaneously view a virtual keyboard and the actual world environment, and relies on Natoli to teach only the implementation details of displaying Ronzani's virtual keyboard. Pet. 61–62. Patent Owner's contention against Natoli alone does not address Petitioner's combination as discussed above.

Further, even though Petitioner relies on the combination of Ronzani and Natoli to teach this limitation, we address Patent Owner's argument against Natoli alone at this stage to guide the parties. To the extent it is necessary, we disagree with Patent Owner's contention that Natoli does not disclose a display that allows a user to simultaneously view a virtual object and the world environment. To support its contention against Natoli, Patent Owner contends that Natoli has a bifocal display that allows a user to view a virtual object by tilting an eye toward an LCD display and to view the physical environment by tilting an eye through the LCD in another direction. Prelim. Resp. 33–34. Patent Owner's contention implicitly construes the scope of the claim to exclude Natoli's bifocal display. However, the Specification of the '716 patent discloses that “a virtual bifocal feature may be provided such that when a user looks up . . . an augmented environment is provided and when the user looks forward, an actual environment is provided.” Ex. 1001, 14:15–18. Patent Owner's contention is not commensurate with the scope of the claim as read in light of the Specification. Natoli discloses an LCD that “may be bifocal; that is, the user may view the VR world . . . by tilting an eye in one direction toward the LCD, and may view the actual physical environment through the LCD by tilting an eye in another direction” (Ex. 1007, 5:36–41), which teaches

allowing a user to simultaneously view a virtual object and an actual environment within the scope of claim 1 read in light of the Specification.

We are sufficiently persuaded that the combination of Ronzani and Natoli teaches a display “to allow a wearer . . . to view, simultaneously with said virtual object, a portion of said wearer’s actual world environment” as recited in claim 1.

Patent Owner’s contention against combining Ronzani and Natoli

Patent Owner contends that there is no motivation to combine the virtual keyboard displayed by Natoli with Ronzani’s head-mounted display device. Prelim. Resp. 34–35. Patent Owner contends that Ronzani’s disclosure focuses on mission-critical applications such as firefighting that require situational awareness, whereas Natoli’s display completely isolates the user visually from the physical world. *Id.* at 35–36. Patent Owner contends that using Natoli’s virtual keyboard in Ronzani’s display would partially obstruct the user’s view, impairing a firefighter’s ability to respond to a fire. *Id.* at 37. Patent Owner also contends that Ronzani does not need a virtual keyboard, because Ronzani has sufficient input methods. *Id.*

We disagree with Patent Owner’s contention that Ronzani only discloses using its head-mounted display device for mission-critical applications such as firefighting. Rather, we are sufficiently persuaded that Ronzani discloses using its device for applications such as entertainment, simulations, virtual reality, and augmented reality as discussed above. Further, Patent Owner’s contention that Ronzani’s display would not display a virtual keyboard is inconsistent with Ronzani’s disclosure that its “user interface can be . . . a virtual keyboard.” Ex. 1003 ¶ 7. We are sufficiently persuaded that a person of ordinary skill in the art would have displayed a

virtual keyboard on Ronzani's head-mounted display device for the benefit of providing an input device that has the advantages of a physical keyboard's range and versatility without the disadvantages of the physical keyboard's size and susceptibility to wear, damage, and theft as taught by Natoli. Ex. 1007, 1:47–63, 2:15–48.

Patent Owner's contentions against combining Ronzani and Peli

Claim 1 recites “a camera pointed in a field-of-vision of said wearer and operable to capture an image of said portion of said wearer's actual world environment.” Patent Owner contends that Ronzani's display is for mission-critical applications such as firefighting, whereas Peli's display enhances vision for the visually impaired. Prelim. Resp. 38–39. We disagree with Patent Owner's contention that Ronzani's display is only for mission-critical applications for the reasons given above.

Patent Owner contends that Peli discloses a system to enhance vision for patients with visual impairments, and that the Petition does not show that Ronzani's display would be used by people with vision impairment. Prelim. Resp. 39. Patent Owner also contends that Peli's method of image processing would compromise the immediacy that Ronzani's high-stakes environment demands. *Id.* at 40.

Patent Owner's contentions do not address Petitioner's combination. Petitioner contends that Ronzani discloses an embodiment of a head-mounted display device that includes a camera. Pet. 68 (citing Ex. 1003, Fig. 33). Petitioner also contends that Ronzani discloses embodiments of the device that include an infrared detector and provide night vision capability. *Id.* at 73 (citing Ex. 1003 ¶¶ 154, 181, 192, 197, 202). Petitioner contends that Peli discloses a head-mounted display device with an infrared night

vision camera that projects images onto a see-through display. *Id.* at 69 (citing Ex. 1006, 14:24–49). Petitioner contends that a person of ordinary skill in the art would have used Peli’s head-mounted night vision camera as the camera in Ronzani’s head-mounted display device for the benefits of implementing Ronzani’s night vision embodiment as well as enhancing visibility of the real-world environment, enhancing mobility of people having night blindness, and displaying a bright image during periods of low ambient light intensity as taught by Peli. Pet. 73–75 (citing Ex. 1006, 14:25–26, 14:50–55, 14:62–63). We are persuaded, at this juncture, that Petitioner has provided sufficient reasons to combine the teachings of Ronzani and Peli.

Patent Owner’s contentions against combining Ronzani, Horton, Natoli, and Peli

Patent Owner contends that the Petition’s attempt to combine Ronzani, Horton, Natoli, and Peli cobbles together disparate technologies with incompatible goals and technology. Prelim. Resp. 41. Patent Owner contends that Ronzani is designed for hazardous applications such as firefighting, Natoli and Horton are designed for immersive virtual reality worlds, and Peli is designed for people who have vision problems. *Id.* Patent Owner contends that the Petition, in assembling discrete features from dissimilar systems in a manner not suggested by the references, relies on impermissible hindsight reconstruction. *Id.* at 42.

To the extent that Patent Owner’s arguments contend that the references are technically incompatible, the arguments are underdeveloped and without factual support. And to the extent that Patent Owner’s arguments assert that the references are non-analogous art, the arguments are

underdeveloped and unpersuasive, because Petitioner reasonably shows that these references are analogous to the '716 patent. Pet. 27, 65, 72.

On this record, we are sufficiently persuaded that Natoli, Peli, and Horton teach details for implementing Ronzani's disclosed features of a virtual keyboard (Ex. 1003 ¶ 7; Ex. 1007, 2:34–35), an infrared night vision camera (Ex. 1003 ¶ 181; Ex. 1006, 4:42–44), and use in a simulation or virtual reality application (Ex. 1003 ¶¶ 2, 5, 7, 11; Ex. 1004, 2:52–54) as discussed above. Even if we accepted Patent Owner's contention that the disclosures of Natoli, Peli, and Horton describe seemingly unrelated applications, Ronzani discloses a device for use in numerous applications including the applications described by Natoli, Peli, and Horton. The Supreme Court has held that a "person of ordinary skill is also a person of ordinary creativity, not an automaton" and that in an obviousness analysis, the Board "can take account of the inferences and creative steps that a person of ordinary skill in the art would employ." *KSR*, 550 US at 418, 421. We are sufficiently persuaded that a person of ordinary skill, in order to implement and improve on the disclosed features of Ronzani, would have had reasons to do so using the teachings of Horton, Natoli and Peli as discussed above.

III. CONCLUSION

Based on the arguments presented in the Petition, we conclude that Petitioner has demonstrated a reasonable likelihood of prevailing with respect to at least one claim of the '716 patent challenged in the Petition. Accordingly, we institute a trial on all claims and all grounds asserted in the

Petition. The Board has not made a final determination under 35 U.S.C. § 318(a) with respect to the patentability of the challenged claims.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1, 8, 16, and 18 of the '716 patent is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4(b), *inter partes* review of the '716 patent shall commence on the entry date of this Decision, and notice is hereby given of the institution of a trial.

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