

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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META PLATFORMS, INC.,  
Petitioner,

v.

EIGHT KHZ, LLC,  
Patent Owner.

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Case IPR2023-01023  
Patent 10,798,509

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**PATENT OWNER'S RESPONSE**

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**EXHIBIT LIST**

| <b>Ex.</b> | <b>Description</b>                                                                                                                                                                |
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| 2001       | Declaration of John C. Hart, Ph.D.                                                                                                                                                |
| 2002       | CV of John C. Hart, Ph.D.                                                                                                                                                         |
| 2003       | Defendants' Preliminary Invalidity Contentions                                                                                                                                    |
| 2004       | U.S. District Court Order in <i>Eight kHz, LLC v. Meta Platforms, Inc.</i> , No. 6:22-cv-00575-ADA-DTG (W.D. Tex. Aug. 30, 2023), Granting Joint Motion to Amend Scheduling Order |
| 2005       | U.S. District Court Order in <i>Eight kHz, LLC v. Meta Platforms, Inc.</i> , No. 6:22-cv-00575-ADA-DTG (W.D. Tex. Sep. 11, 2023), Resetting Markman Hearing Via Zoom              |
| 2006       | Memorandum from Katherine K. Vidal on Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (June 21, 2022)           |
| 2007       | Lex Machina, Patent Cases (All Judges) Time to Trial, U.S. District Court for the Western District of Texas, September 9, 2023                                                    |
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| 2010       | Defendant's Final Invalidity Contentions, October 18, 2023                                                                                                                        |
| 2011       | Defendant's Final Invalidity Contentions, Ex. G-09, October 18, 2023                                                                                                              |
| 2012       | Deposition Transcript of Welch                                                                                                                                                    |

## **I. INTRODUCTION**

Meta Platforms, Inc. (“Petitioner”) filed a Petition for Inter Partes Review (IPR), challenging Claims 1-14 and 17-20 (the “Challenged Claims”) of U.S. Patent No. 10,798,509 (the “‘509 Patent”). Paper 2 (“Petition”; Pet.). The Board instituted IPR. Paper 10 (“Decision”).

Petitioner’s obviousness analysis is fundamentally flawed, as explained below. Further, the record provides clear evidence that these Challenged Claims are patentably distinct from the prior art, rendering Petitioner’s arguments ineffective. Patent Owner requests that the Board issue a Final Written Decision affirming the patentability of these Challenged Claims.

### **A. The ‘509 Patent**

The ‘509 Patent discloses a method and an electronic system that, among other things, use sensors located at a wearable electronic device (“WED”) worn by a user to track a portable electronic device (“PED”) held by the user in their hands in order to determine whether the PED is leaving a 3D zone virtually defined by the user via dividing an area round the user. *See* Claim 2; *see also* Claim 17. Upon determining that the PED is leaving the zone, the claims of the ‘509 Patent disclose a mechanism to warn the user. *See* Claim 2; *see also* Claim 17.

### **B. Asserted Grounds**

Petitioner asserts two grounds of unpatentability. Grounds 1 and 2 challenge the patentability of claims 1-14 and 17-20. Ground 1 asserts that claims 1-14 and 17-20 are unpatentable under 35 U.S.C. §103 over Pedrotti (“Pedrotti”; Ex. 1005) in view of Jang (“Jang”; Ex. 1006), and further in view of Begault (“Begault”; Ex. 1007). Pet. 4. Ground 2 asserts that claims 1-14 and 17-20 are unpatentable under 35 U.S.C. §103 over McCulloch (“McCulloch”; Ex. 1008), in view of Pedrotti, and further in view of Flaks (“Flaks”; Ex. 1009). Pet. 46.

### **C. Claim Construction**

In the Decision, the Board agreed with Patent Owner that “no express constructions of the claims are necessary.” Decision at 10. The claim terms should be given their ordinary and customary meaning as understood by a PHOSITA in view of the patent claims, specification, and prosecution history.

### **D. PHOSITA**

For this proceeding, Patent Owner accepts Petitioner’s definition of PHOSITA. Patent Owner chooses not to rely on an expert for this proceeding; nor does Patent Owner rely on the expert declaration and C.V. submitted with its preliminary response. Accordingly, Patent Owner hereby affirmatively withdraws the expert declaration and C.V. submitted with Patent Owner’s preliminary response.

## II. ARGUMENT

### A. **Grounds 1: Claims 1-14 and 17-20 are not obvious over Pedrotti in view of Jang, and further in view of Begault.**

Petitioner's Ground 1 argument is flawed. Petitioner's limitation-by-limitation analysis does not follow the analysis prescribed by the courts. Determining the correct meaning and scope of claims is a prerequisite for any obviousness inquiry. *Amazon.com, Inc. v. Barnesandnoble.com, Inc.*, 239 F.3d 1343, 1351 (Fed. Cir. 2001) ("Only when a claim is properly understood can a determination be made ... whether the prior art ... renders obvious the claimed invention."). Once scope of the claim is determined, the actual obviousness analysis begins. This requires determining "the scope and content of the prior art; differences between the prior art and the claims at issue ...; the presence or absence of a motivation to combine or modify prior art with a reasonable expectation of success." *B/E Aerospace, Inc. v. C&D Zodiac, Inc.*, 962 F.3d 1373, 1378 (Fed. Cir. 2020).

A petitioner who does not state the differences between a challenged claim and the prior art, and relies instead on the Patent Owner and the Board to determine those differences based on the rest of the submission in the petition risks having the corresponding ground of obviousness not included for trial for failing to adequately state a claim for relief.

*Liberty Mutual Insurance Co. v. Progressive Casualty Insurance Co.*, CBM2012-00003, Paper 7 at 2-3 (PTAB Oct. 25, 2012) (precedential).

As discussed below, Petitioner fails to follow the prescribed approach to obviousness analysis. Petitioner misunderstands the correct scope and meaning of Challenged Claims 1-14 and 17-20. Because of this error, Petitioner also fails to identify the differences between prior art's teaching and the Challenged Claims, nor does Petitioner explain how the knowledge of PHOSITA would or even could help resolve those differences.

Under the correct limitation-by-limitation analysis, the proposed combinations fail to render obvious Challenged Claims 1-14 and 17-20.

**1. Dr. Welch admitted that he did not attempt to understand the scope and meaning of claim limitations.**

Petitioner exclusively relies on Dr. Welch's declaration for its obviousness analysis. But Dr. Welch admitted that he failed to "explain what elements of the claims meant to anybody." Ex. 2012, 190:19-192:3. He acknowledged his failure to undertake any "careful analysis" to form an "understanding" of specific limitations of the Challenged Claims. *Id.* Dr. Welch's sole focus was directed at "describe[ing] how a person of ordinary skill would have seen prior art with respect to the words of the claim." *Id.*

But this is classic hindsight bias in light of the claimed invention. Using the claim "as a frame" to assemble "naked parts of separate prior art references [] as a mosaic to recreate a facsimile of the claimed invention, without showing why

persons skilled in the art would have found that mosaic obvious improperly, employs hindsight bias.” See *W.R. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1552-53 (Fed. Cir. 1983). Dr. Welch, by his own admission, deconstructed the Challenged Claims into their individual limitations and then attempted to construct a narrative from the prior art to explain why each limitation was taught. Rather than engaging in a proper obviousness analysis, Dr. Welch interprets the prior art in light of the Challenged Claims and uses his expert status to “supply” key limitations “missing from the prior art” via conclusory assertions. *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9, 5 (PTAB Aug. 24, 2022) (precedential) The Board must exercise extreme caution to ensure that this type of analysis does not obscure its judgment.

**2. As the Board noted in the Decision Petitioner has failed to “ma[ke] a sufficient showing” for Claims 1-8 on Ground 1.**

Petitioner’s proposed combination does not teach or render obvious limitations 1[c] and 1[d], as the Board correctly noted.

**i The proposed combination does not teach limitation 1[c].**

Limitation 1[c] recites, “highlighting, while the user is located in the zone and with a display of the WED, one of the multiple SLPs in the zone when the PED held in the hand of the user is pointed at the one of the multiple SLPs in the zone.” The highlighting occurs for a specific one of the multiple SLPs in the zone when (1) “the

user is located in the zone,” and (2) “the PED held in the hand of the user is pointed at the” SLP. Petitioner fails to meet its burden to show the cited references disclose even highlighting a SLP much less highlighting a SLP in response to the user pointing at the SLP. Pedrotti is completely silent on highlighting virtual items within the zone and Jang is likewise silent on using a handheld controller to select or emphasize images associated with the sounds from the focus area or the non-focus area.

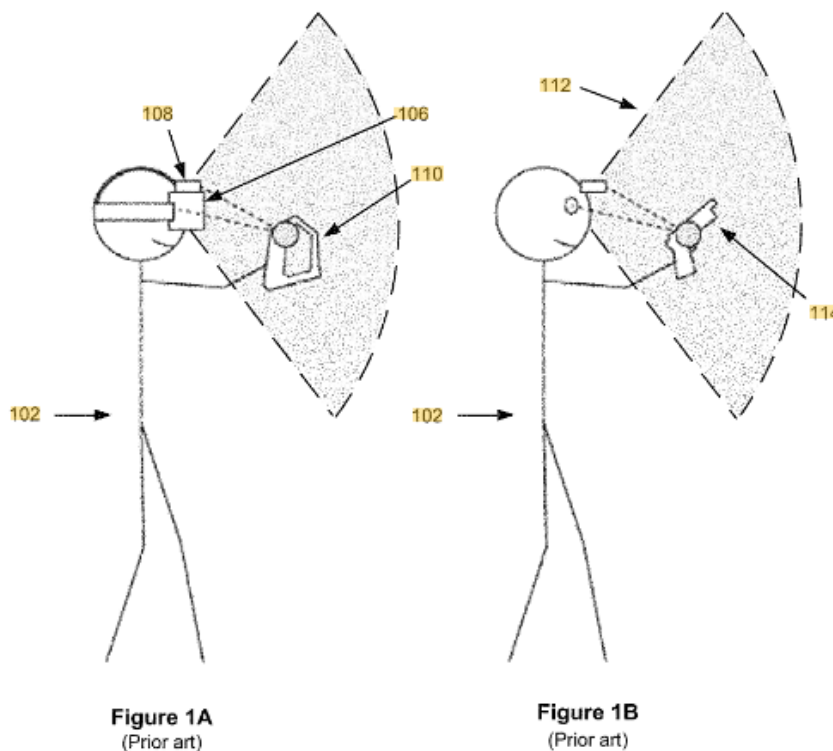
**a. Highlighting a SLP**

Petitioner relies upon Pedrotti’s disclosure that its virtual fence “can be glowing or colored if desired to be more visible,” (Pet. 20), to teach the concept of highlighting. However, Pedrotti’s virtual fence is not a sound localization point and thus does not teach or suggest “highlighting... one of the multiple SLPs.”

Further, even if combining Pedrotti with Jang were a proper combination, which Patent Owner disputes, such combination does not disclose this limitation. As discussed in more detail below, Jang uses a pre-defined scheme to adjust sound processing for different sounds in different areas. Jang 9:49-50. Jang does not disclose anything regarding the selection or emphasis of images associated with the sounds from the focus area or the non-focus area. Accordingly, this combination does not teach or suggest highlighting of an SLP, let alone one of multiple SLPs in a zone while the user is in the zone.

**b. Highlighting the SLP When Pointed To While User is in a Corresponding Zone**

Petitioner asserts that Pedrotti discloses this claim limitation, rendering the claim obvious, specifically citing Pedrotti's controllers (PEDs) manipulate and control virtual objects in VR and suggesting that the pointing pattern is often used for selection. Pedrotti, however, is silent regarding "selection" of SLPs, as explained in §II.A.2.i.a. Further, as illustrated in Figures 1A and 1B of Pedrotti, reproduced below, Pedrotti's "virtual object" is a virtual representation of the controller, not an SLP that the controller can point to. Indeed, as a virtual representation of the controller, it is impossible to point the controller to the virtual object, which is itself.



Thus, Petitioner has mischaracterized the manipulation and control of the “virtual objects” described in Pedrotti, construing these objects as items that can be “selected” and then bridging the selection to a statement not found in the references that the pointing pattern is often-used for selection. Indeed, none of the references teach or suggest pointing to virtual objects with a PED, let alone pointing to one SLP of multiple SLPs in the zone to highlight the particular SLP.

Petitioner alleges that the hypothetical combination of Pedrotti with Jang would have signaled to a PHOSITA to point Pedrotti’s controller to select a sound source in Jang. However, Pedrotti does not disclose pointing to its virtual objects, let alone for selection, and Jang does not disclose selection of one of its sound sources. Thus, even if Pedrotti and Jang were a proper combination, which Patent Owner disputes, this hypothetical combination does not support Petitioner’s position. Instead, as shown above, in contrast to pointing to virtual objects with a controller (PED), Pedrotti provides that virtual objects may represent the controller (PED). *See* Pedrotti’s Figures 1A and 1B.

Jang discloses processing sound in a focus area differently from sound in a non-focus area. Jang, Abstract. Specifically, the focus area is defined based upon the visual perspective of a virtual character, where immediate foreground sound (“focus area”) is prioritized over sound outside of the immediate foreground (“non-focus area”). Jang 4:20-24; *see also id.*, 8:26-28; 9:46-47. Jang teaches that a control unit

114 determines the priority of the sound sources within the focus area based upon a “predetermined scheme.” *Id.*, 9:45-60. Thus, Jang does not suggest dynamic selection of audio sources for prioritized processing, but instead, at best moves a character’s perspective to change a focus area. *Id.*, 10:33-36; *see also id.*, 6:39-59. Thus, Petitioner’s hypothetical of dynamically suggesting a pep band sound, or a conference attendee is a conclusory leap that is not taught or even suggested by the proposed combination.

Additionally, none of the cited references suggest highlighting the SLP “while the user is located in the zone” let alone the combination of being located in the zone and pointing to the SLP with the PED held in the user’s hand. With respect to the zonal criteria for highlighting, Petitioner has not provided a rationale as to how the cited references alone or in combination teach or suggest this limitation other than saying “Pedrotti’s system is used by a user in a zone.” Pet. 19. However, there is no disclosure in Pedrotti of highlighting only while the user is in the zone, let alone while the user is in the zone and the hand-held PED is pointing to the SLP.

**ii      The proposed combination does not teach limitation 1[d].**

Limitation 1[d] recites, “playing, with the WED worn on the head of the user, the binaural sound that emanates from the one of the multiple SLPs in response to the one of the multiple SLPs being pointed at by the PED held in the hand of the

user.” As discussed in §II.A.2.i, the cited references do not disclose pointing to an SLP with a PED held in the hand of the user. Accordingly, the references clearly do not disclose playing the binaural sound that emanates from the pointed to SLP, in response to such pointing.

In support, Petitioner relies upon VR Book, 281 (Ex. 1063), which is not part of the proposed combination allegedly rendering Claim 1 obvious. Specifically, Petitioner alleges that “it was well known ... that playing a sound (e.g., Jang’s binaural sound) ... could, like highlighting, facilitate user selection,” quoting the VR Book as “explaining that ‘objects can make a sound’ ‘when... they have been selected’”. Pet. 23. First, as mentioned in §II.A.2.i with respect to limitation 1[c], Pedrotti and Jang do not teach or suggest user selection of virtual objects let alone via pointing from a hand-held PED. Second, even if playing a sound was well known for facilitating user selection, the current claim limitation triggers playback of sound in response to pointing – not selection – of the SLP. Thus, even if “objects can make a sound” “when... they have been selected,” as posited by Petitioner, this is not analogous to playing the binaural sound emanating from the SLP in response to “being pointed at by the PED,” as recited by limitation 1[d].

Further, even assuming *arguendo* that sound playback based upon selection of an object was known, the current claims provide playback of binaural sound that emanates from the one of the multiple SLPs in response to being pointed at. None

of the cited references disclose such functionality with respect to SLPs. Indeed, Pedrotti is silent regarding SLPs. Further, Jang, at best, teaches changing prioritization of sound processing of sound sources based upon user perspective changes. *See* Jang 6:39-59; 7:3-7; 8:26-28; 9:46-47. Begault simply provides a user interface that enables configuration of sound sources for subsequent received sound. Begault at 172. Thus, the cited combination does not render the current claim limitation obvious.

For the forgoing reasons, Petitioner's obviousness analysis under Ground 1 fails as to Claim 1 as well as Claims 2-8 depending from Claim 1.

**3. Petitioner has failed to establish *prima facie* obviousness of Claims 17-20 because the Petition fails to consider all of the limitations of Claims 17-20.**

“All words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970). Limitation 17[e] states: the WED “includes one or more sensors that sense when the PED leaves the zone.” For limitation 17[e], Petitioner merely refers back to its argument for limitation 2[a], which requires “tracking, with one or more sensors in the WED worn on the head of the user, the PED to determine when the PED moves outside the zone.” In essence, Petitioner uses its analysis of limitation 2[a] as a shorthand for another limitation that uses different language and pertain to a different

claim, without any further explanation. This approach is insufficient to meet Petitioner's burden.

In fact, Petitioner relies on its limitation 2[a] argument for two other differently worded limitations: 9[c] and 17[e]. Each of these three limitations covers a uniquely different scope and meaning, and they cannot be treated equivalently as Petitioner does. This confusion is a direct result of failure on the part of Dr. Welch and Petitioner to understand the meaning of each limitation. Patent Owner proceeds with explaining the meaning and scope of limitations 2[a], 9[c], and 17[e].

Limitation 2[a] consists of three elements: (1) the WED includes one or more sensors; (2) these sensors track the PED; and (3) a determination is made based on this tracking to ascertain when the PED leaves the zone. The limitation never requires that the recited determination is performed specifically by a processor within the WED. Rather, it simply necessitates that a processor, whether located within the WED or external to it, makes the determination based on tracking information relayed by the sensors.

Limitation 9[c] states “determining, with the WED worn on the head of the user, when the user is leaving the zone.” This limitation (and Claim 9 in general) does not disclose sensors or tracking by sensors. All that this claim requires is that the act of determination is performed by the WED. That is to say, the determining

processor is located in the WED. The Claim never requires use of sensory data sensed by sensors in the WED to determine “when the user is leaving the zone.”

Limitation 17[e] is narrower than the other two. It requires that the WED “includes one or more sensors that sense when the PED leaves the zone.” In fact, Claim 17 does not require an independent “determination” step unlike Claims 2 and 9. In Claim 17, the mere “sensing that the PED leaves the zone” is enough to actuate a further action (i.e., “display[ing] a 3D virtual image of the zone *in response to* sensing that the PED leaves the zone”). In limitation 17[e], the sensors sensing the PED must be located in the WED.

Petitioner and Dr. Welch fail to offer any analysis regarding the meaning and scope of these limitations. Furthermore, Petitioner does not clarify why it treats these three differently worded limitations, which cover different scopes and convey distinct meanings, in a similar manner. Thus, Petitioner has failed to establish obviousness of Claim 17 by preponderance of evidence. *See Amazon.com, Inc.* 239 F.3d at 1351 (“Only when a claim is properly understood can a determination be made ... whether the prior art ... renders obvious the claimed invention.”); *see also* §II.A.1.

Even overlooking this, Petitioner has failed to establish that the proposed combination renders obvious Claims 17-20.

- i      The proposed combination of Ground 1 does not render obvious Claims 17-20, because Pedrotti neither discloses nor renders obvious limitations 17[e] and 2[a].**

As explained in §II.A.3, Petitioner interprets limitations 17[e] and 2[a] as equivalent, and as such it advances identical argument *based exclusively on Pedrotti* for them. *Id.* at 42 (“Limitation 17[e] ... would have been obvious for the same reasons as limitation 2[a].”). Considering the disparate meanings and scopes of these limitations, as discussed in §II.A.3, the Board must reject Petitioner’s obviousness analysis concerning Claim 17 (and all dependent claims depending from it).

That said, since Petitioner relies exclusively on its analysis of limitation 2[a] for limitation 17[e], Patent Owner nevertheless addresses deficiencies in Petitioner’s limitation 2[a] argument. Specifically, Patent Owner explains why Pedrotti does not teach or render obvious limitation 2[a].

To teach limitation 2[a], Petitioner must show that Pedrotti discloses three elements—all of which are required by the express language of the limitation: (1) the WED includes one or more sensors; (2) these sensors track the PED; and (3) a determination is made based on this tracking to ascertain when the PED leaves the zone. *See* §II.A.3. To meet its burden, Petitioner presents several superficial arguments, all of which lack merit.

**a. Petitioner’s reference to §§IV.E.2-IV.E.4 of the Petition is inapposite.**

For its first argument, Petitioner refers back to its arguments in §§IV.E.2-IV.E.4 of the Petition to maintain that “Pedrotti disclosed or at a minimum rendered obvious handheld controllers (PEDs) tracked by an HMD (WED).” Pet. 24. Reviewing these sections makes it even clearer that Pedrotti does not teach limitation 2[a].

Section IV.E.2 of the Petition discusses limitation 1[a] that recites “dividing, with a portable electronic device (PED) held in a hand of a user, an area around the user into a zone that includes multiples [sic] sound localization points (SLPs) from where binaural sound originates to the user.” This limitation has nothing to do with limitation 2[a]. Nevertheless, Petitioner admits in Section IV.E.2 that in Pedrotti, although the user “‘holds a handheld controller’ (PED) comprising a ‘tracker,’ which ‘provides information regarding a position of the handheld controller[,]’” ***it is actually “[a] processor [that] tracks the controller’s movement”—not sensors within the WED.*** Pet. 11. Limitation 2[a] expressly requires that the WED’s sensors track the PED.

Section IV.E.3 of the Petition discusses limitation 1[b] that recites “determining, with a wearable electronic device (WED) worn on a head of the user, when the user is located inside the zone.” The fact that Petitioner references its

argument for limitation 1[b], which is not only phrased differently but also encompasses a different scope than limitation 2[a], serves as additional evidence of its failure to conduct a proper obviousness analysis. Unlike limitation 2[a], limitation 1[b] solely requires that the WED determines whether the user is within the designated zone. In contrast to limitation 2[a], limitation 1[b] does not require the inclusion of sensors in the WED or the tracking of the PED by those sensors. That said, Petitioner raises two untenable arguments in Section IV.E.3 that warrant a response by Patent Owner—to the extent that Petitioner intends to rely on these two arguments to establish obviousness of limitation 2[a] over Pedrotti.

One, Petitioner admits once again that in Pedrotti, the processor—not the sensors—tracks the controllers: “Pedrotti’s processor, which may be ‘in the HMD’ ... tracks the HMD and controllers so it ‘knows where the user’s head’—i.e., the user—‘and hands are located.’” Pet. 18. Two, Petitioner cites 13 paragraphs from Dr. Welch’s declaration to assert that “chaperone systems like Pedrotti’s were known,” (Pet. 19 (citing Ex.1003 ¶¶130-142)), yet fails to explain how this succinct conclusory statement is pertinent to establishing the obviousness of limitation 2[a]—which requires, *inter alia*, a demonstration that the sensors within the WED track the PED.

To the extent that Petitioner intends to imply a conclusion that chaperone systems necessarily include sensors within their HMDs that track controllers, there

is no detailed discussion in the Petition supporting this implied conclusion. Petitioner refers the Board and Patent Owner to go in search of the supporting analysis in Dr. Welch's declaration. This amounts to an incorporation by reference in violation of 37 C.F.R. §42.6(a)(3). *Cisco Sys., Inc. v. C-Cation Tech, LLC*, IPR2014-00454, Paper 12 at 9 (PTAB Aug. 29, 2014) (providing that "practice of citing the Declaration to support conclusory statements that are not otherwise supported in the Petition also amounts to incorporation by reference."). This reason alone suffices to not consider Petitioner's passing reference to chaperone systems in determining whether Petitioner has met its burden vis-à-vis limitation 2[a]. *See Parus Holdings, Inc. v. Google LLC*, 70 F.4th 1365, 1370-71 (Fed. Cir. Jun. 12, 2023). Moreover, and of greater significance, neither the Petition nor Dr. Welch's declaration asserts that any of the "chaperone system" examples listed by Dr. Welch teaches tracking of the PED by the WED's sensors track the PED. Ex.1003 ¶¶130-142.

Petitioner further relies on Figure 8.13 in VR Book—which is non-existent—in support of its assertion that "chaperone systems" are well-known. *See* Ex. 1063 at 85-109 (showing that Figure 8.13 does not exist). To the extent, Petitioner intends to rely on Figure 18.3 in VR Book to imply that in "chaperone systems" the HMD necessarily includes sensors that track the PED, Petitioner's argument must be rejected. For one, Petitioner's challenge relies upon a reference, VR Book, which is not part of the cited combination. For another, this Figure merely shows that "[a]

warning grid can be shown to inform the user he is nearing the edge of a tracked space.” Ex.1003 ¶138. Even Dr. Welch understands this figure to warn a user when he is approaching “a real-world physical object not visually represented in the virtual world (e.g., a wall).” *Id.* This figure does not show that the WED’s sensors track the PED held by the user.

Section IV.E.4 of the Petition discusses limitation 1[c] that recites “highlighting, while the user is located in the zone and with a display of the WED, one of the multiple SLPs in the zone when the PED held in the hand of the user is pointed at the one of the multiple SLPs in the zone.” This limitation has nothing to do with limitation 2[a]. Nevertheless, Petitioner admits in Section IV.E.3 that “*the processor in Pedrotti’s HMD* tracks ‘the position and orientation of one or more trackers in the physical controllers,’”<sup>1</sup> (Pet. 21 (citing Pedrotti 4:37-44)), whereas limitation 2[a] expressly requires that the WED’s sensors track the PED.

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<sup>1</sup> Petitioner distorts Pedrotti’s teachings by selectively quoting from its disclosure, omitting crucial information. The excerpt Petitioner relies on fails to specify that the processor is situated within the HMD. It states, “[t]he processor similarly tracks the position and orientation of the HMD tracker, and possibly the position and orientation of one or more trackers in the physical controllers ....” Pedrotti 4:37-44.

**b. Petitioner’s argument that a PHOSITA would be motivated to use Pedrotti’s HMD with sensors to track the controller is incorrect.**

For its second argument, Petitioner maintains that because Pedrotti’s controllers “‘provide position and orientation information’ to sensors, e.g., ‘a camera mounted on a base station or elsewhere[,]’” somehow a PHOSITA would be motivated to modify Pedrotti to include the sensors within its HMD. Petitioner does not explain why that would be the case in the Petition; instead, it refers the Board and Patent Owner to Dr. Welch’s declaration to search for the why. This amounts to an incorporation by reference in violation of 37 C.F.R. §42.6(a)(3). *Cisco Sys. Paper 12 at 9* (PTAB Aug. 29, 2014) (providing that “practice of citing the Declaration to support conclusory statements that are not otherwise supported in the Petition also amounts to incorporation by reference.”). Even overlooking this, Petitioner is incorrect for several reasons.

**(1) Pedrotti never teaches or discloses that the HMD uses sensors within it to track the controllers.**

Pedrotti does not teach or disclose a WED that can track with sensors the location of a PED in the hand of a user, because Pedrotti does not disclose the necessary sensors within the WED that would be required to track the PED.

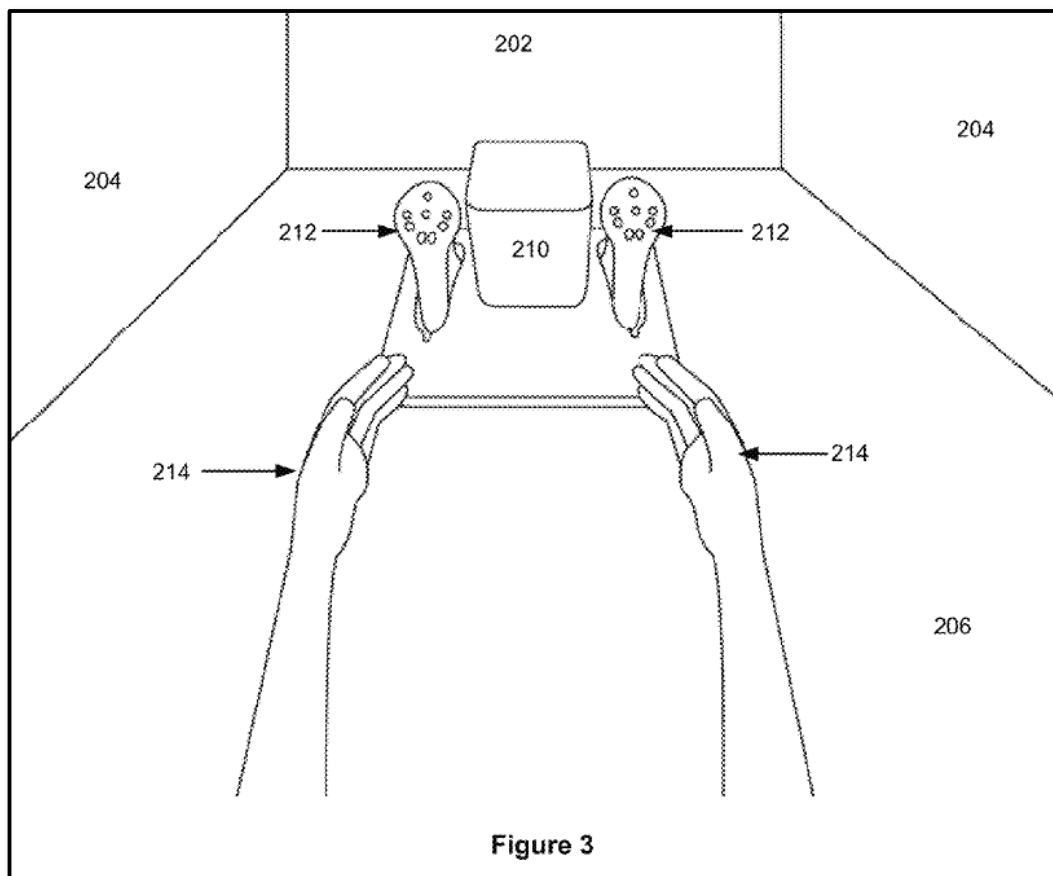
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Consequently, according to this disclosure, the processor is not located within the HMD but rather tracks the HMD tracker.

First, Pedrotti is unequivocally clear that the tracking of the controllers is done by the camera or sensor in the base station “or elsewhere,”<sup>2</sup> but certainly **not the WED**. This is demonstrated in Pedrotti Figures 3-6 and 7:6-8:58.

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<sup>2</sup> The “elsewhere” in Pedrotti always refers to stationary devices other than the base station. In discussing Figure 1A, Pedrotti provides a list of examples that may generate electromagnetic field to be sensed for tracking: “Attached to or incorporated in the HMD 106 is a tracker 108, which can be used to determine the position and orientation of the headset 104, and thus of the head of user 102, by, for example, sensing an electromagnetic field generated from a local base station, video game console or **other apparatus (not shown)**.” Pedrotti, 4:49-54. The HMD is shown in Figure 1A, and thus Pedrotti’s reference to “other apparatus” cannot reasonably include the HMD.

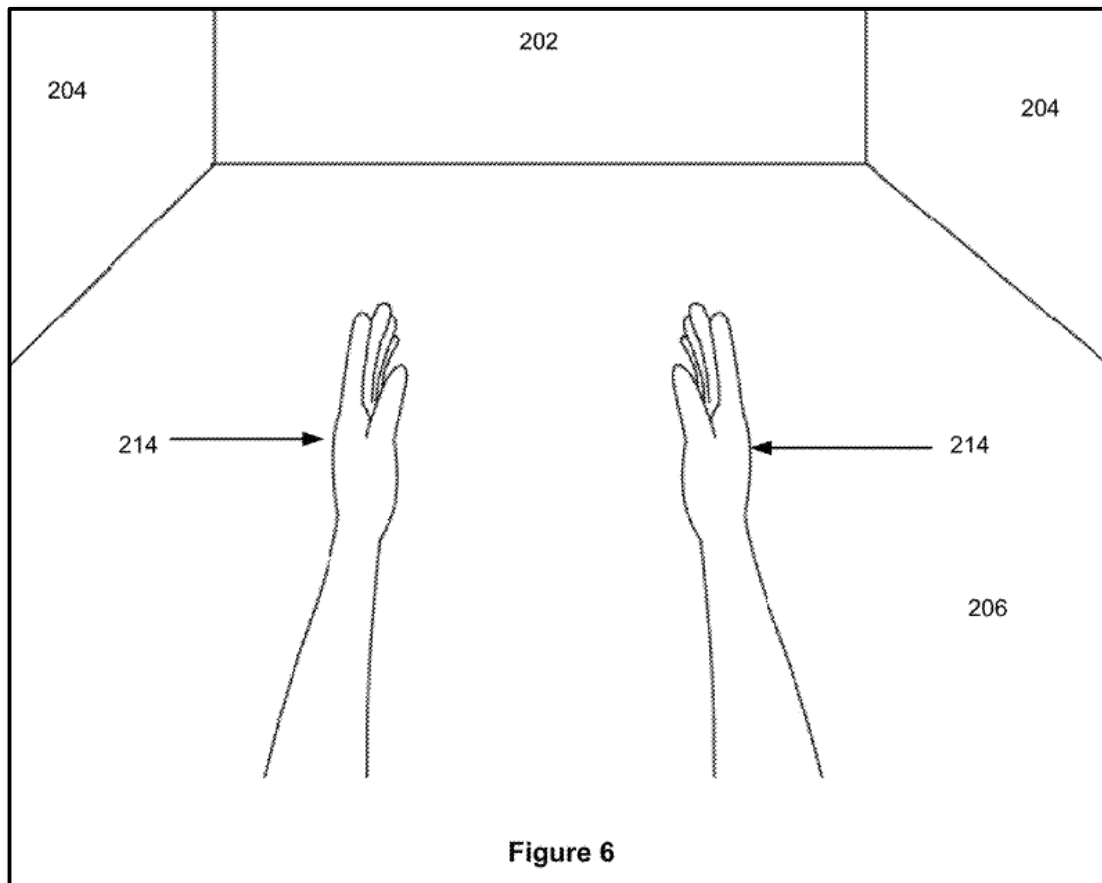


Pedrotti clearly states “the base station or console may contain the processor as well as the other components needed to determine the position and orientation of the trackers in the HMD and controllers.” Pedrotti, 5:56-59. The “other components” include a source for an electromagnetic field. But nowhere is it stated that the “tracking” sensors can be located in the HMD. To this point, Figure 3 shows a user’s virtual view while using the HMD, showing “two virtual hands 214 (with a portion of the forearms) reaching towards the base station.” *Id.*, 7:17-18. This image is what a user sees before they have picked up the controllers 212. However, the arms 214 are computer-generated because “[a]t this point, since the processor has

no information about where the user's hands are in the physical world, the location of these virtual hands 214 is assumed from the position and orientation of the user's head as determined from the tracker." *Id.*, 7:19-23 (emphasis added). In other words, the *HMD*'s location is being tracked by the electromagnetic field source in the base station (or elsewhere), and, more importantly, the *HMD cannot* track anything because *it does not have sensors* mounted on it for tracking other devices. The only sensing that Pedrotti's *HMD* is capable of is via a tracker mounted on it that "provides information about the sensed magnetic field to a processor (also not shown), which derives the position and orientation of the tracker 108, and thus *HMD* 106, relative to a source of the electromagnetic field from such information." *Id.*, 4:54-58. Therefore, neither the electromagnetic field source, nor the sensors for tracking controllers (or even the user's hands) are located on the *HMD*, just the tracker.

Figure 6 shown below is the same virtual view as Figure 3, but with both controllers in the hands of the user. Now, the physical location of both user's hands is known, because the controller location is also tracked via the same electromagnetic field tracking method as the *HMD*, i.e. "it is assumed that the position of the *HMD* and controller trackers relative to the base station may be determined by any of the tracking means described above." *Id.*, 6:11-14. Thus, because the *HMD* is not tracked by itself, and the controllers are tracked by the exact

same method and apparatus (i.e., controllers are equipped with the same trackers that the HMD has), the controllers are not being tracked by the HMD.



Petitioner and its expert fail to point to a single passage or Figure in Pedrotti that shows that the sensors responsible for tracking the controllers are located in the HMD. They cannot do this, because there is no such disclosure in Pedrotti. Faced with this challenge, Petitioner next argues that a PHOSITA would be motivated to add sensors to Pedrotti's HMD for tracking the controllers. Not so.

**(2) No PHOSITA would be motivated to use Pedrotti's HMD with sensors.**

Petitioner's assertion that "POSAs thus would have known and been motivated to use Pedrotti's HMD with sensors, e.g., cameras, to track the trackers in Pedrotti's controllers, e.g., light-emitting controller trackers," (Pet. 24), is undermined by Dr. Welch's declaration. In paragraph 87 of his declaration, Dr. Welch states that there are only two ways for tracking a user's head using sensors and trackers: "one can either put the sources on the user's moving head and then mount sensors at fixed points in the environment, or the reverse—put the sensors on the user's moving head and mount sources at fixed points in the environment." Ex.1003 ¶87. Dr. Welch goes on to state that "the same principles apply to tracking other parts of a user's body (e.g., hands and feet) and other objects." *Id.* Dr. Welch does not state anywhere in its declaration that a third way of tracking is possible whereby both trackers and sensors are moving. It logically follows that to track a moving object, such as a PED held in the hand of a user moving freely, one can choose from any one of the two possible ways described by Dr. Welch. One can either put the trackers (e.g., Pedrotti's light-emitting controller trackers) on the PED and then "mount sensors at fixed points in the environment," or put the sensors on the controllers but affix the trackers in the environment.

In fact, Dr. Welch made it clear during the deposition that “a person of ordinary skill would – it’s probably pretty hopeless” to track when both sensors and trackers are moving. Ex. 2012, 227:5-228:13. Specifically, when Dr. Welch was questioned whether it is possible to track a tracker attached to a part of the user’s body by sensors mounted on the user’s head, he testified that “no sane person of ordinary skill or sane person in general who knows something about sensors and system like this would ever attempt to do that.” *Id.* 233:17-235:10.

Therefore, it remains unclear how Petitioner contends that limitation 2[a], which entails sensors within the mobile WED tracking the PED held by the moving user, is rendered obvious by Pedrotti, especially when its own expert cannot envision a scenario where both the sensors conducting the tracking and the trackers being tracked are in motion.

**(3) Using sensors on HMD to track a moving controller was not well-known.**

Petitioner cites some 13 paragraphs of Dr. Welch’s declaration to drop yet another conclusory sentence—and without providing any analysis—that “[u]sing sensors on HMDs to track controllers ... was well-known.” Pet. 24-25 (citing Ex.1003 ¶¶88-98, 295-296). But none of the examples outlined in the cited paragraphs of Dr. Welch’s declaration stands for a proposition that “[u]sing sensors on HMDs to track controllers ... was well-known.”

For example, Dr. Welch presents a crop-quotation from Ambrus and takes it out of context that “pose and/or movement data may be determined based on sensor information from any combination of sensors mounted on the wearer and/or external to the wearer ....” Ex.1003 ¶88 (citing Ex.1043 at [0075]). But Dr. Welch fails to provide the necessary context that the immediately preceding paragraph in Ambrus states in such unequivocal terms that the sensors in the HMD are used to enable tracking of the HMD itself—but not a separate moving device in the hand of the user: “HMD device 700 may also include a head tracking system that utilizes one or more motion sensors, such as sensors 708 on HMD device 700, to capture pose data and thereby enable position tracking, direction and orientation sensing, and/or motion detection of the user’s head and/or HMD device 700.” Ex.1043 at [0074].

For another example, Dr. Welch presents yet another crop-quotation from McCulloch that merely shows that McCulloch’s HMD may be equipped with many sensors, such as, “an inertial sensing unit [132] ... [or] a location sensing unit [144]” Ex.1003 ¶88 (citing McCulloch 8:17-22). But he fails to mention that the cited sensing units in McCulloch are not used for tracking the location of controllers in the hands of the user. McCulloch is clear that “[t]he inertial sensors [i.e., sensors of the inertial sensing unit 132] are for sensing position, orientation, and sudden

accelerations of head mounted display device 2.” In fact, McCulloch goes on to state that

Data such as from the inertial sensing unit 132 may identify position changes of the head mounted display device 2, and hence, the user’s eyes and perspective. For example, the inertial sensing unit 132 may identify rotation of the user’s eyes and therefore rotation of the user’s perspective of the virtual object.

McCulloch 12:4-9. Similarly, McCulloch’s location sensing unit 144 is merely used to identify the location of the HMD and the user wearing it—it is not used to track the location of the controller. *See id.* 16:18-21. Even Dr. Welch repeatedly confirmed during the deposition that “he never said” that McCulloch’s “HMD tracks controllers.” *See* 270:16-277-6 (“So I’ll repeat again. I don’t think I’ve ever said that. I’m not saying that.”).<sup>3</sup>

For another example, Petitioner and Dr. Welch rely on page 315 of the VR Book that states “[h]and-held tracked devices typically use inertial, electromagnetic, ultrasonic, or optical (camera) technologies.” Pet. 25; Ex.1003 ¶88 (citing Ex.1063

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<sup>3</sup> Patent Owner maintains its position that Petitioner’s and its expert’s reliance on references that are not in the proposed combination is procedurally improper. Accordingly, the Board should not consider evidence based on McCulloch, VR Book, etc. to assess Petitioner’s Ground 1 arguments.

at 315). But at no point does the VR Book state that the hand-held tracked devices are tracked by sensors in the HMD worn by the user as required by limitation 2[a].<sup>4</sup> *See* Ex.1063 at 314-15.

There exists a significant rationale behind why none of the examples cited by Dr. Welch supports the notion that sensors within a moving HMD worn by a user can track moving hand-held controllers—mainly because, as Dr. Welch conceded, a PHOSITA would find it extremely challenging to track moving controllers with sensors that are also in motion. *See* Ex. 2012, 227:5-228:13. “[N]o sane person of ordinary skill or sane person in general who knows something about sensors and system like this would ever attempt to do that.” *Id.* 233:17-235:10. The nonobviousness of Claim 2 (and 17) lies precisely in its disclosure of tracking moving trackers (i.e., the PED) with moving sensors within the WED.

**c. Petitioner’s reliance on Pedrotti’s HMD processor determining the position of its controllers to generate instructions is inapposite.**

For its last argument, Petitioner contends that because “the processor in Pedrotti’s HMD ‘determines from the position of a handheld controller that the handheld controller is within a first preselected distance from a boundary’ ... to

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<sup>4</sup> Even if VR Book states as such, Petitioner cannot rely upon VR Book, which is not part of the cited combination.

provide ‘a warning that the user is about to move out of the selected area[,]’” Pedrotti discloses “tracking a PED (a Pedrotti controller) with one or more sensors in a WED worn on a user’s head.” Pet. 25-26. Not so. As explained in §II.A.3, Petitioner confuses the act of tracking with sensors located in the WED with the act of determining with the processor. The two relay different meanings and cover distinct scopes. Petitioner attempts to use its argument for limitation 9[c] as a shortcut for limitation 2[a]—despite the significant differences in the wordings of the two limitations.

For the forgoing reasons, Petitioner’s obviousness analysis under Ground 1 fails as to 17 as well as Claims 18-20 depending from Claim 17.

**4. The proposed combination does not render obvious Claims 9-16.**

Petitioner’s proposed combination does not teach or render obvious limitations 9[b] and 9[c]. The former recites “determining, with a wearable electronic device (WED) worn on a head of the user, when the user is located inside the zone,” and the latter recites “determining, with the WED worn on the head of the user, when the user is leaving the zone.” Both limitations expressly require that the WED performs the act of determination. To be clear, Patent Owner does not argue that limitations 9[b] and 9[c] preclude the use of a base station. Patent Owner merely argues that express language of the limitations requires that the determination of

whether the user is inside the zone or not be made exclusively with the WED. As explained in §II.A.3, this requires that the processor responsible for making the determination is located in the WED.

Petitioner asserts that “Pedrotti’s processor, which may be ‘in the HMD’ ... tracks the HMD and controllers so it ‘knows where the user’s head’— i.e., the user— ‘and hands are located.’” Pet. 18. Petitioner concludes that Pedrotti’s “HMD then makes determinations of when a user is located inside Pedrotti’s zone to help the user remain in the zone during gameplay.” *Id.*, 18-19. Thus, even Petitioner’s argument indicates that Petitioner interpreters these limitation as requiring that the determining processor be located in the WED. The conundrum for Petitioner lies in the facts that in Pedrotti the processor responsible for performing the determination is not (nor can it be) located in the WED.

First, and as a threshold matter, the express language of these limitations requires that the determination must be made as to whether the user (not the controllers in their hands) is inside the zone. Petitioner’s argument merely aims to show that Pedrotti determines whether the controllers are inside the zone. Certainly, a user can wear the WED without holding the PED in their hands; Claim 9 is directed at determining the user’s whereabouts—not the PED—with respect to boundaries of the virtual zone. Accordingly, even if Petitioner is correct (which it is not), its argument at best shows that Pedrotti’s HMD contains a processor to determine

whether the controller is inside the zone or leaving the zone. Pedrotti cannot determine the location of the user—but only the controllers in the user’s hands.

Second, Petitioner assumes—without explaining—that the processor in Pedrotti’s HMD must necessarily perform the act of determining whether the user or PED is inside the zone. Petitioner’s sole basis for this assumption is the following isolated sentence in Pedrotti: “As above, a processor may be located in the base station, or in a separate location, or even in the HMD or one of the controllers if desired.” Pedrotti 16:20-24. But nowhere does Pedrotti state that this processor performs the act of determining whether the PED is inside the zone or not. In order to display a virtual environment, an HMD needs to have at least one processor, such as a CPU or GPU to process graphics. Pedrotti never teaches, however, the HMD or a processor in the HMD performs the function of tracking movements of the HPED or user as they move outside the zone.

Third, when read in context, it becomes clear that Pedrotti’s HMD processor cannot be used to determine whether the user leaves the zone. The primary purpose of Pedrotti is to track both the HMD and the controller, and this function is performed by a base station or other apparatus that emits an electromagnetic field sensed by the HMD to derive its position relative to the base station. *See* Pedrotti 4:49-58. Pedrotti provides no teaching whatsoever or even a suggestion as to how the HMD could track itself or the user without the use of a separate base station,

video game console, or other apparatus. In Pedrotti the determination is exclusively performed by the base station, because the sensor making the determination is located in the base station. Petitioner does not and cannot point to a single embodiment in Pedrotti to show that a processor in HMD determines the PED or the user is leaving the zone.

For the forgoing reasons, Petitioner's obviousness analysis under Ground 1 fails as to 9 as well as Claims 10-14 depending from Claim 9.

**i      Additionally, the proposed combination does not  
render obvious Claims 10 and 11.**

Limitation 10[b] recites "playing the binaural sound that originates from the one of the SLPs in the zone in response to the WED determining that the PED is pointed at the one of the SLPs." As explained thoroughly in §II.A.2.ii, the proposed combination does not disclose playing the binaural sound that emanates from the pointed to SLP, in response to such pointing. For the same reasons discussed therein, Claim 10 is not rendered obvious by the proposed combination.

Limitation 11[a] recites "highlighting, while the user is located in the zone and with a display of the WED, a virtual image at one of the SLPs in the zone when the PED held in the hand of the user is pointed at the one of the multiple SLPs in the zone." As explained thoroughly in §II.A.2.i, the proposed combination does not

disclose this limitation. For the same reasons discussed therein, Claim 11 is not rendered obvious by the proposed combination.

**B. Ground 2: Claims 1-14 and 17-20 are not obvious over McCulloch in view of Pedrotti, and further in view of Flaks.**

Petitioner's Ground 2 argument is flawed for the same reasons discussed in §II.A. As discussed therein, Petitioner fails to follow the prescribed approach to obviousness analysis. Petitioner misunderstands the correct scope and meaning of Challenged Claims. Further, as discussed in §II.A.1, Petitioner's expert, Dr. Welch, also admitted that he did not attempt to understand the scope of meaning of claim limitations. Because of this error, Petitioner also fails to identify the differences between prior art's teaching and these Challenged Claims, nor does Petitioner explain how the knowledge of PHOSITA would or even could help resolve those differences. Under the correct limitation-by-limitation analysis, the proposed combinations fail to render obvious the Challenged Claims.

**1. As the Board noted in the Decision, Petitioner has failed to “ma[ke] a sufficient showing” for Claims 1-8 on Ground 2.**

Petitioner's proposed combination does not teach or render obvious limitations 1[c] and 1[d], as the Board correctly noted. *See* Decision 38-39. Specifically, as the Board correctly determined Petitioner's arguments for limitation 1[c] relies on many “cited portions of McCulloch,” but none “discuss[es] pointing a PED at an SLP or highlighting a SLP as claimed.” *Id.*

Further, the proposed combination does not teach limitation 1[d]. As established in §II.A.2.ii., Pedrotti does not teach or suggest “playing, with the WED worn on the head of the user, the binaural sound that emanates from the one of the multiple SLPs in response to the one of the multiple SLPs being pointed at by the PED held in the hand of the user,” as described in limitation 1[d]. Similarly, McCulloch does not teach or suggest this feature.

Indeed, Petitioner uses the same faulty rationale that such playback for selection was well known. Pet. 57. As explained in §II.A.2.ii, in contrast to playing based upon selection, the current claim recites playing the binaural sound that emanates from the SLP, “in response to [the SLP] being pointed at.” There is no teaching or suggestion in Pedrotti or McCulloch of such trigger in playing an SLP’s binaural sound. Accordingly, McCulloch does not obviate the deficiencies identified in Ground 1 with respect to limitation 1[d].

Finally, To the extent that Petitioner relies on VR Book to cure any of these deficiencies, the Board should reject Petitioner’s argument, for VR book is not part of the proposed combination. For the forgoing reasons, Petitioner’s obviousness analysis under Ground 1 fails as to Claim 1 as well as Claims 2-8 depending from Claim 1.

**2. Petitioner has failed to establish *prima facie* obviousness of Claims 17-20 because the Petition fails to consider all of the limitations of Claims 17-20.**

Much like its analysis of Claim 17 under Ground 1, as discussed in §II.A.3, in its Ground 2 analysis Petitioner again refers back to its argument for limitation 2[a] for limitation 17[e]. In essence, Petitioner uses its analysis of limitation 2[a] as a shorthand for another limitation that uses different language and pertain to a different claim, without any further explanation. This approach is insufficient to meet Petitioner’s burden for the reasons discussed in §II.A.3. Thus, Petitioner has failed to establish obviousness of Claims 17-20 by preponderance of evidence. Even overlooking this, Petitioner has failed to establish that the proposed combination renders obvious Claims 17-20.

**i The proposed combination of Ground 2 does not render obvious Claims 17-20, because McCulloch neither discloses nor renders obvious limitations 17[e] and 2[a].**

As explained in §II.A.3, Petitioner interprets limitations 17[e] and 2[a] as equivalent, and as such it advances identical argument *based exclusively on Pedrotti* for them. *Id.* at 68 (“Limitation 17[e] ... would have been obvious for the same reasons as limitation 2[a].”). Considering the disparate meanings and scopes of these limitations, as discussed in §II.A.3, the Board must reject Petitioner’s obviousness analysis concerning Claim 17 (and all dependent claims depending from it).

That said, since Petitioner relies exclusively on its analysis of limitation 2[a] for limitation 17[e], Patent Owner nevertheless addresses deficiencies in Petitioner’s limitation 2[a] argument. Specifically, Patent Owner explains why McCulloch does not teach or render obvious limitation 2[a].

To teach limitation 2[a], Petitioner must show that McCulloch disclosing three elements—all of which are required by the express language of the limitation: (1) the WED includes one or more sensors; (2) these sensors track the PED; and (3) a determination is made based on this tracking to ascertain when the PED leaves the zone. *See* §II.A.3. To meet its burden, Petitioner presents several superficial arguments, all of which lack merit.

**a. Petitioner’s reference to §§V.D.2-V.D.4 of the Petition is inapposite.**

For its first argument, Petitioner refers back to its arguments in §§V.D.2-V.D.4 of the Petition to maintain that “McCulloch’s HMD (WED) tracks handheld controllers (PEDs).” Pet. 57. Reviewing these sections makes it even clearer that McCulloch does not teach limitation 2[a].

Section V.D.2 of the Petition discusses limitation 1[a] that recites “dividing, with a portable electronic device (PED) held in a hand of a user, an area around the user into a zone that includes multiples [sic] sound localization points (SLPs) from where binaural sound originates to the user.” This limitation has nothing to do with

limitation 2[a]. Regardless, portions of McCulloch that Petitioner relies on fail to support Petitioner’s conclusory assertion that “McCulloch’s HMD tracks the controllers.”<sup>5</sup> Pet. 50. Petitioner first cites McCulloch 4:25-31 in support of its assertion—but in the cited passage McCulloch merely lists “examples of the real controller device.” McCulloch 4:25-31. Nowhere does McCulloch disclose that these devices are tracked with sensors in the HMD.

Next, Petitioner cites some 3 pages of disclosure from McCulloch “describing ‘computing environment 54’” in support of its conclusory assertion that McCulloch’s HMD tracks the controllers. Pet. 50 (citing McCulloch 13:52-18:7). But at no point in these 3 pages of disclosure, McCulloch discloses that tracking sensors are located in the HMD for tracking the controllers. *See* McCulloch 13:52-18:7. There, McCulloch generally describes the computing environment 54 from a “software perspective.” *Id.* Specifically, McCulloch lists “the software components of a computing environment 54”—which by definition cannot include hardware like sensors. *Id.*, 13:65-66. The components are an operating system and an image and audio processing engine 191—which “processes image data (e.g. moving data like

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<sup>5</sup> More importantly, these portions never show that the HMD tracks controllers *with sensors located in the HMD itself*, which is what needs to be established for limitation 2[a].

video or still), and audio data in order to support applications executing for a head mounted display (HMD) device system like a see-through, augmented reality display device system 8.” *Id.*, 13:65-14:5. There is no discussion of sensors for the purpose of tracking a PED held in hands of the user. The only tracking described in this portion of McCulloch is limited to “an eye tracking software 134” that uses an “eye tracking software 196” to capture and process eye data via an eye tracking camera. *Id.*, 14:15-17; *Id.*, 14:57:60.

Next, Petitioner offers a truncated quotation to bolster its claim that “McCulloch’s HMD (WED) tracks handheld controllers (PEDs),” (Pet. 50), deliberately omitting a vital segment in an effort to mislead the Board that McCulloch’s “[i]nertial motion sensors” somehow tracks the controllers. Pet. 50 (citing McCulloch 29:4-63). The full sentence reads “[i]nertial motion sensors (not shown) in the handheld real controller device 19 identify parameters like speed, acceleration and direction of motion of the device 19 which is sent as data to the display device system 8.” McCulloch 29:4-63. Tellingly, Petitioner omits the underlined segment that makes it clear that in McCulloch the sensors are in the controller not in the HMD as expressly required by limitations 2[a] and 17[e].

Finally, Petitioner provides a string of citations to McCulloch in support of its assertion that “[t]he HMD tracks the controllers relative to the HMD and the surrounding environment using image and depth data.” Pet. 50. None of those

citations establishes that limitations 2[a] or 17[e] are rendered obvious by McCulloch. For example, take McCulloch 8:17-30 that Petitioner relies on, which discloses an “inertial sensing unit 132” in the HMD. McCulloch 8:17-30. McCulloch makes it clear that the “inertial sensors are for sensing position, orientation, and sudden accelerations of head mounted display device 2.” *Id.* Thus, they are not used for sensing the controllers in the hands of the user. For another example, take McCulloch 12:18-21. This passage states that “the front facing capture devices 113 capture and provide image and depth data from which real objects are identified as well as their positions and often orientations relative to the display portion of the device.” This passage does not disclose that capture devices “track[] ... the PED to determine when the PED moves outside the zone” or “sense when the PED leaves the zone,” which are expressly required by limitations 2[a] and 17[e]. Petitioner fails to explain how identifying an object and estimating its position with respect to the HMD are the same as tracking an object held by the user’s hands relative to boundaries of a virtual 3D zone defined by the user.

Section V.D.3 of the Petition discusses limitation 1[b] that recites “determining, with a wearable electronic device (WED) worn on a head of the user, when the user is located inside the zone.” The fact that Petitioner references its argument for limitation 1[b], which is not only phrased differently but also encompasses a different scope than limitation 2[a], serves as additional evidence of

its failure to conduct a proper obviousness analysis. Unlike limitation 2[a], limitation 1[b] solely requires that the WED determines whether the user is within the designated zone. In contrast to limitation 2[a], limitation 1[b] does not require the inclusion of sensors in the WED or the tracking of the PED by those sensors. As such, Patent Owner is unable to understand the relevance of section V.D.3 of the Petition to limitation 2[a].

To the extent that Petitioner intends to rely on McCulloch 8:17-28 cited in section V.D.3 of the Petition to establish obviousness of limitation 2[a] over McCulloch, Petitioner is factually incorrect. Petitioner contends that “McCulloch’s HMD includes ‘an inertial sensing unit 132’ and ‘a location sensing unit 144,’ and its ‘inertial sensors are for sensing position, orientation, and sudden accelerations of head mounted display device 2.’” Pet. 53 (citing McCulloch 8:17-28). But as explained in §II.A.3.i.b.(3), this passage of McCulloch expressly states that the sensors located in the HMD are used for “for sensing position, orientation, and sudden accelerations of head mounted display device 2”—as opposed to sensing position of controllers. To render obvious limitation 2[a], Petitioner must explain if and how McCulloch’s use of inertial sensors in the HMD for sensing the position of HMD is somehow the same as (or works functionally the same as) sensing the controllers in the hands of the user. Petitioner fails to explain, nor can it.

Section V.D.4 of the Petition discusses limitation 1[c] that recites “highlighting, while the user is located in the zone and with a display of the WED, one of the multiple SLPs in the zone when the PED held in the hand of the user is pointed at the one of the multiple SLPs in the zone.” This limitation has nothing to do with limitation 2[a]. Patent Owner is unable to understand the relevance of section V.D.4 of the Petition to limitation 2[a]. To the extent that Petitioner intend to rely on the disclosure in McCulloch that its controllers “are used to manipulate and control virtual objects,” (Pet. 54), to imply that the controllers are necessarily tracked by sensors in the HMD, Petitioner’s is wrong.

As Petitioner concedes, McCulloch’s controllers can be a joystick or a pointing device. Pet. 54. McCulloch specifically provides an example of a conventional “mouse” for the pointing device. McCulloch 4:25-28. A capability that would allow “a controller device [to] be providing user input data for the selected object,” (*Id.*, 4:32-33), to a separate device has nothing to do with a capability that would allow for tracking the controller device by the sensors on the other device. A conventional mouse would allow a computer user to select icons on the computer desktop, but that does not mean that the computer can track the sense the physical location of the mouse in the user’s room. This is common sense.<sup>6</sup> Accordingly, it is

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<sup>6</sup> That Dr. Welch believes otherwise is problematic. *See* Ex. 2012 313:7-315:16.

unclear how Petitioner can reasonably conclude that McCulloch teaches limitations 2[a] and 17[e] because of McCulloch's disclosure that "moving a displayed selection arrow with a real controller device may be used to identify a user selected object for control." Pet. 54 (citing McCulloch 25:25-28).

**b. McCulloch's HMD sensors does not detect or track a controller in the hands of the user.**

For its second argument, Petitioner cites various portions of McCulloch as well as paragraph 476 of Dr. Welch's declaration to conclude that "McCulloch disclosed capture devices such as cameras and infrared transceivers (sensors) in its HMD for detecting and tracking infrared light, which may be emitted by a controller." Pet. 57-58. For example, Petitioner cites McCulloch 7:34-67. *Id.* But even Petitioner's expert completely denied that McCulloch in those lines discloses "that the HMD tracks controllers;" Dr. Welch repeatedly responded that "I never said that," and "I don't think I've ever said that. I'm not saying that." *See* Ex. 2012, 270:18-277:6. Dr. Welch even undermined Petitioner's reliance on paragraph 476 of his declaration to establish that McCulloch's HMD tracks the controllers: "I certainly don't say that in that sentence." *Id.* 276:20-277:3.

Dr. Welch cannot say McCulloch 7:34-67 discloses an HMD tracking a controller with sensors located at the HMD, because McCulloch 7:34-67 simply does not disclose the same. The cited passage merely discloses depth sensitive cameras

that can be used to determine “depth data.” McCulloch 7:34-40. And even with “a separate depth sensor,” McCulloch HMD merely “capture[s] and provide[s] depth data to objects and other surfaces in the field of view.” *Id.* McCulloch’s capture devices are not used to “track[] ... the PED to determine when the PED moves outside the zone” or “sense when the PED leaves the zone,” which are expressly required by limitations 2[a] and 17[e].

Petitioner also relies on McCulloch 8:7-39 to support its conclusory assertion, merely because McCulloch discloses sensors in the HMD. But Petitioner misses the point: Petitioner must show that the sensors in the HMD are used to track the controller or sense the controller per express language of limitations 2[a] and 17[e]. By contrast, in McCulloch’s HMD sensors are used to track the location of the HMD itself: “The inertial sensors are for sensing position, orientation, and sudden accelerations of head mounted display device 2. From these movements, head position, and thus orientation of the display device, may also be determined.” McCulloch 8:26-30.

Finally, Petitioner cites McCulloch 5:19-36. Petitioner seems to suggest that somehow because McCulloch’s HMD can use “companion processing module 4” to communicate with “the controller devices 211,” then the HMD must necessarily have sensors to track or sense the controllers. *See* Pet. 58. First, “companion processing module 4” cannot be a sensor—it is a processing unit, nor does it include

a sensor. McCulloch refers to Figure 9 for “examples of hardware components of the companion processing module 4.” McCulloch 5:35-36. McCulloch’s Figure 9, reproduced below, does not show any sensor for sensing or tracking controllers held in the hands of the user.

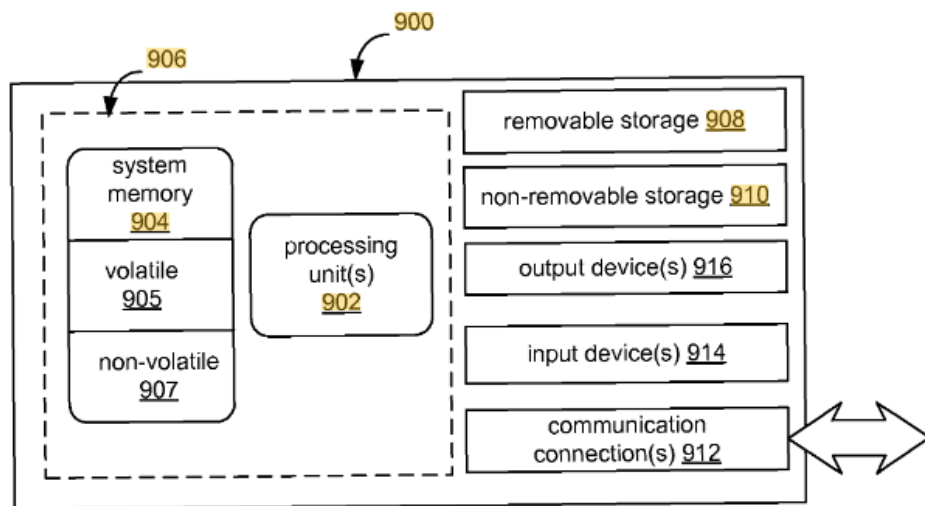


FIG. 9

Petitioner does not explain how the companion processing module 4 can be used to sense or track the controllers when it does not include a sensor within it. Furthermore, McCulloch 5:19-36 merely discloses that the HMD and controllers are in communication, but a disclosure that two devices are in communication with one another does not necessarily mean one tracks or senses another relative to boundaries of a 3D virtual zone.

**c. Using sensors on HMD to track a moving controller was not well-known.**

Much like its argument for Ground 1, Petitioner again cites some 13 paragraphs of Dr. Welch’s declaration to drop yet another conclusory sentence—and without providing any analysis—that “techniques using sensors on HMDs to track controllers ... were well-known.” Pet. 58 (citing Ex.1003 ¶¶88-98, 295-296). But as explained in §§II.A.3.i.b.(2)-(3) none of the examples outlined in the cited paragraphs of Dr. Welch’s declaration stands for a proposition that “techniques using sensors on HMDs to track controllers ... were well-known.”

As explained in §§II.A.3.i.b.(2)-(3), there exists a significant rationale behind why none of the examples cited by Dr. Welch supports the notion that sensors within a moving HMD worn by a user can track moving hand-held controllers—mainly because, as Dr. Welch conceded, a PHOSITA would find it extremely challenging to track moving controllers with sensors that are also in motion. *See* Ex. 2012, 227:5-228:13. “[N]o sane person of ordinary skill or sane person in general who knows something about sensors and system like this would ever attempt to do that.” *Id.* 233:17-235:10. The nonobviousness of Claim 2 (and 17) lies precisely in its disclosure of tracking moving trackers (i.e., the PED) with moving sensors within the WED.

For the forgoing reasons, Petitioner's obviousness analysis under Ground 2 fails as to Calims 17-20.<sup>7</sup>

**3. The proposed combination does not render obvious Claims 9-16.**

Petitioner's proposed combination does not teach or render obvious limitation 9[b]. As explained in §II.A.4, limitation 9[b] requires that the processor responsible for making the determination is located in the WED.

Petitioner advances the exact same argument as it raises for limitation 1[b] in Ground 2. Pet. 65. For limitation 1[b], Petitioner refers back to its argument for Ground 1. *Id.* at 53. For the reasons discussed in §II.A.4, Petitioner's argument fails. Additionally, Petitioner references portions of McCulloch that discloses sensors in the HMD. *Id.* But these cites portions do not teach that the act of determination is performed by a processor in the HMD.

For the forgoing reasons, Petitioner's obviousness analysis under Ground 1 fails as to 9 as well as Claims 10-14 depending from Claim 9.

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<sup>7</sup> For limitation 17[e] in Ground 2, Petitioner also relies on its argument for limitation 17[e] in Ground 1. The argument is deficient and must be rejected for the reasons explained in §II.A.

**i      Additionally, the proposed combination does not  
render obvious Claims 10 and 11.**

Limitation 10[a] recites “determining, with the WED, when the PED is pointed at one of the SLPs while the user is located in the zone.” Petitioner argues that McCulloch teaches this limitation because its “HMD receives position and orientation data from its controller, e.g., handheld IMU, and it would have been obvious to store SLP locations in McCulloch’s HMD’s memory.” Pet. 66. Petitioner provides no citation for this conclusory statement. Further, even if McCulloch’s controllers communicate information about their location to the HMD, that does not necessarily mean that the HMD can determine “when the PED is pointed at one of the SLPs while the user is located in the zone” as claimed.

Petitioner’s argument for limitation 10[b] suffers from same deficiencies as its argument in Ground 1. As explained in §II.A.4.i, the proposed combination does not disclose playing the binaural sound that emanates from the pointed to SLP, in response to such pointing. For the same reasons discussed therein, Claim 10 is not rendered obvious by the proposed combination.

Petitioner’s argument for limitation 10[b] suffers from same deficiencies as its argument in Ground 1. As explained in §II.A.4.i, the proposed combination does not disclose this limitation. For the same reasons discussed therein, Claim 11 is not rendered obvious by the proposed combination.

### **III. CONCLUSION**

For the reasons above, Petitioner's proposed grounds of unpatentability fail as to Claims 1-14 and 17-20. Thus, Patent Owner asks the Board to find the Challenged Claims patentable.

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**CERTIFICATE OF WORD COUNT**

Pursuant to 37 C.F.R. §42.24(d), the undersigned hereby certifies that the foregoing Patent Owner's Response contains 10,424 words using the word count feature of Microsoft Word.

Dated: May 17, 2024

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### CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §42.6(e), the undersigned hereby certifies that the above-captioned Eight KHZ LLC's Patent Owner Response, and its cited exhibits, were served via electronic mail, as authorized by Petitioner's Mandatory Notices, on May 17, 2024 at the following email correspondence addresses of record:

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