

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

META PLATFORMS, INC.,
META PLATFORMS TECHNOLOGIES, LLC, AND
TWISTED PIXEL GAMES, LLC
Petitioner,

v.

EIGHT KHZ, LLC,
Patent Owner

IPR2023-01023
Patent 10,798,509 B1

Record of Oral Hearing
Held Virtually: October 17, 2024

BEFORE: JUSTIN T. ARBES, LYNNE H. BROWNE, and
SCOTT RAEVSKY, *Administrative Patent Judges*.

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P R O C E E D I N G S

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JUDGE BROWNE: I'm Judge Browne, and with me are Judges Arbes and Raevsky. Before we begin, I do have a couple of housekeeping items. So, as this is a video conference, we ask that you identify yourself before speaking, and if you are referring to a demonstrative that you state the number of the slide that you are referring to. We do have copies of your demonstratives.

There is a court reporter in attendance, and we request that counsel remain for a few minutes after the arguments are submitted in case the court reporter has questions. Petitioner has a LEAP practitioner for this hearing, and will be given an extra 15 minutes of time for argument, giving them a total of 75 minutes for main argument and rebuttal. Petitioner may allocate the time as it likes between the LEAP practitioner and other counsel. Patent Owner will have 60 minutes of total argument time.

With regarding how the demonstratives were handled in this proceeding. First of all, the demonstratives should have been filed as exhibits, not papers. Second, and more importantly, our hearing order did not authorize the parties to stipulate a change to the due date for filing the demonstratives without prior approval of the panel. We do, however, understand that there may have been some confusion as to the meaning of the footnote in our order. However, going forward, the parties should note that if they want to change the due date, they need to get authorization from the panel, as having the demonstratives ahead of time gives us enough time to prepare for oral argument.

We'll now go on the record and begin with appearances. So, who

1 is here for Petitioner?

2 MR. HENRY: Thank you, Your Honor. Chris Henry, for
3 Petitioners, and with me is my colleague, Kimberly Li. Lead counsel, Inge
4 Osman is also here, joining remotely from another location. And I believe
5 that in-house counsel for Meta is on the line as well.

6 JUDGE BROWNE: Okay. And do you know how you will want
7 to split your time?

8 MR. HENRY: Yes. With respect to argument and rebuttal, Your
9 Honor, we would like to reserve 20 minutes for rebuttal. And then, Ms. Li,
10 the LEAP practitioner, will be handling a couple of claims in both grounds.

11 JUDGE BROWNE: Okay. Great. And who is here for the Patent
12 Owner?

13 MR. DYKEMA: This is Erik Dykema, Your Honor, for the Patent
14 Owner. With me sitting in my office is Paul Fraulo, who will be arguing
15 with me today.

16 MR. FRAULO: Good afternoon, Your Honor.

17 MR. DYKEMA: Also in the conference are lead counsel, Erick
18 Robinson, Homayoon Rafatijo, and I believe that Jayne Piana may be
19 joining as well, but they won't be speaking. It'll just be Mr. Fraulo and
20 myself.

21 JUDGE BROWNE: Okay. And when you begin your argument, I
22 will ask how much rebuttal time you'd like to reserve.

23 MR. DYKEMA: Thank you, Your Honor.

24 JUDGE BROWNE: We will make every effort to let you know
25 when your time is nearly up, but we also ask that you keep track of your
26 time. We will begin with the Petitioner, and you can proceed when you're

1 ready.

2 MR. HENRY: Thank you, Your Honor. I'll just share our
3 presentation to begin. Your Honor, can you see our demonstratives?

4 JUDGE BROWNE: We can see like a slide set.

5 MR. HENRY: Yes.

6 JUDGE BROWNE: Okay.

7 MR. HENRY: Thank you, Your Honor. Your Honors, Chris
8 Henry of Latham & Watkins, for Petitioners, Meta Platforms, Inc., Meta
9 Platforms Technologies, LLC, and Twisted Pixel Games, LLC.

10 As I mentioned earlier with me today is my colleague Kimberly Li.
11 She's a LEAP practitioner and she'll be addressing Dependent Claim 2, and
12 also issues relating to Independent Claim 17 in both grounds of the petition
13 when we get there.

14 Just to provide a quick overview of today's discussion, Petitioners
15 have presented two grounds of invalidity of the challenged claims, 1 through
16 14 and 17 through 20 of the '509 patent. The first ground relies on prior art
17 references, Pedrotti, Jang, and Begault. The second ground relies on prior
18 art references, McCulloch, Pedrotti, and Flaks. And both grounds render
19 obvious all of the challenged claims in the '509 patent. Patent Owner's
20 arguments to the contrary are off target, including because, as we'll discuss,
21 their positions are based on misinterpretations of what the challenged claims
22 actually say, recite and require, and they're technologically flawed.

23 In addition, it's worth noting at the outset that Patent Owner has
24 abandoned their expert at the institution stage, and so the only expert
25 opinions currently in this proceeding are those of Dr. Welch, who is
26 Petitioner's expert. Patent Owner has, in certain circumstances that we'll

1 discuss, resorted to quoting snippets of testimony from Dr. Welch out of
2 context and in order to attack his credibility as an expert in this proceeding.
3 We don't intend to belabor that point, but we do believe it's worth
4 mentioning at the outset because it's telling that those types of challenges
5 were presented by Patent Owner in this proceeding because in our view, they
6 generally are just distractions from the art, which, as we'll discuss, renders
7 obvious all of the challenged claims.

8 And with that, I'm going to turn directly to Ground 2 of the petition
9 if you'll allow me. Because we'd like to start there today. Because Ground 2
10 raises fewer disputes than Ground 1 of the petition. And so, as I mentioned,
11 Your Honors, Ground 2 is the McCulloch, Pedrotti, and Flaks grounds. By
12 way of brief overview, McCulloch is a reference titled controlling a virtual
13 object with a real controller device. What we've presented on slide 80 of
14 Petitioner's demonstrative is Figure 8D from McCulloch because it helps --

15 JUDGE BROWNE: So, excuse me. We're not actually seeing
16 the slide show. I think if you have the wrong -- if you're sharing the wrong
17 screen possibly.

18 MR. HENRY: Sure, let me make sure that we are sharing the
19 correct thing. If you'll just give me a minute to help with the tech. Thank
20 you. Apologies, Your Honor. We're getting it ironed out.

21 JUDGE BROWNE: That's fine. That's better.

22 MR. HENRY: Thank you, Your Honor, for letting me know. So,
23 do you see Figure 8D on slide 80?

24 JUDGE BROWNE: Yes, that's what we see.

25 MR. HENRY: Thank you. I appreciate that. And so, by way of
26 overview with respect to McCulloch, what we have as an individual here

1 that McCulloch refers to as Joe. That's the person playing an augmented
2 reality or mixed reality game in his living room. And what Joe is wearing is
3 a head-mounted display, his augmented reality glasses. That's item 2 in
4 Figure 8D. With respect to the challenged claims, that is the wearable
5 electronic device worn on the head of a user. What Joe is holding in his
6 hand, item 19, that's his controller. That's the real controller device
7 disclosed in McCulloch, and that's the PED in the claims. And what Joe is
8 doing in this picture is he's playing with a virtual object that happens to be a
9 virtual basketball in this description. That's item 30 with subscript 3. And
10 what Joe can do, and McCulloch describes, is he can control the virtual
11 basketball with the real controller device and he can throw it into the virtual
12 television. And then what you can see as depicted in Figure 8D is that the
13 virtual television can shatter. So, you see cracks and breaks in item 45N.
14 And you can actually also see shards of glass that fall down from the screen
15 in items 47 and 49. Of course, those are virtual shards of glass that fall.
16 He's not actually breaking the television.

17 And when Joe does this, as we'll discuss in more detail, at the
18 collision point, the system knows where he has thrown that basketball, and it
19 produces binaural audio for Joe so that he hears the binaural sound playing
20 from the location at which he's pointing and to which he's throwing that
21 basketball into the television.

22 In a little bit more detail, on slide 81, we've called out a Figure 2A
23 from McCulloch so that we can see some of the components that are
24 important for certain elements of the claims we'll be discussing one to get to
25 the claims. Figure 2 is a side view of the head-mounted display, the WED.
26 And so, we see in item 136, that's control circuitry, that box that has four

1 items in it. 210 and 244 are a processor and memory that's in the head-
2 mounted display. And then the head-mounted display also has location
3 sensing units and inertial sensing units in items 132 and 144. And as we've
4 called out on the left side of slide 81, what's also included on the head-
5 mounted display of McCulloch are cameras or front-facing sensors that are
6 depth-sensitive and can sense real objects in Joe's play space. And those are
7 item 113 on Figure 2A that's presented on this slide.

8 Turning to the next slide, I mentioned that the McCulloch system
9 discloses the use of binaural audio, and that's what slide 82 addresses.
10 McCulloch teaches a 3D audio engine. And with its 3D audio engine,
11 McCulloch can play audio data for virtual objects in its play space from their
12 3D space positions. And so, we know that McCulloch is teaching the
13 binaural audio generation and production that's required by some of the
14 limitations in the challenged claims.

15 This ground relies on McCulloch and Pedrotti, and it brings in
16 Pedrotti for the boundary and the fence that Pedrotti teaches. And so, what
17 we're presenting on slide 83 is Figure 14 from Pedrotti. And that's a
18 reference that discloses methods and systems to create safe areas around
19 users in virtual reality. And so, you can -- what's disclosed on the left side is
20 that the way Pedrotti does this, its processor determines the position of a
21 tracker at a number of sampling points as the user moves around a chosen
22 perimeter. And from those points determines the boundary, 1404, and that's
23 1404 in Figure 14 on the right. And you can see in the hash marks on that
24 figure the measured path of tracker motion. And what Pedrotti teaches is
25 that that tracker can be in the HMD, or that tracker can be in the control
26 alerts, and Joe or a user can walk around their living room and skirt their

1 coffee table or their couch and draw a boundary for virtual reality play as
2 depicted in Figure 14.

3 And so, what's shown on slide 84 is Figure 11 from Pedrotti
4 because the reason that Pedrotti draws these safe areas or these boundaries is
5 so that it can protect users playing games, playing virtual games. And so,
6 what's being shown here is when the user's hand or the user's head gets too
7 close to the boundary, Pedrotti will present the boundary, either in a grid-
8 like fashion or another virtual fence or other objects, other boundary images.
9 That's what Pedrotti is designed to do, to warn the user that the user is
10 approaching the boundary that the user set for safe play space.

11 Now, the reasons to combine McCulloch with Pedrotti's safe area
12 boundaries are straightforward. It's the fact that you have to have -- you
13 want these boundaries so that you don't run into the wall or trip over your
14 sofa or hit another object that's in your play space. And Pedrotti actually
15 teaches that if safe areas are useful for HMDs that block the user's entire
16 view of their play space, or they just block part of the physical world around
17 the user. And it gives the example of Google Glass, which was a well-
18 known augmented reality set of glasses that the user could see through in
19 which, as Pedrotti teaches, obscures only a small portion of the user's field
20 of vision. And so, the safety concerns that drove Pedrotti to its safe area
21 boundary methods and systems are equally applicable in the augmented
22 reality around McCulloch. And that's why a person of ordinary skill would
23 put these two references together.

24 Dr. Welch explained the same thing in his declaration that
25 McCulloch's system is susceptible to safety issues, including because as you
26 play an augmented reality and virtual objects appear, like a basketball or

1 helicopter or monsters or whatever other virtual objects that are presented in
2 your game, they can include things like your couch or your coffee table.
3 And so, you're going to be distracted by those, and you're going to want to
4 have boundaries that protect you from hitting a bookshelf, for example, as
5 you might extend a hand toward a bookshelf on the side, and that's equally
6 important in the AR realm as it is in a fully immersed VR realm that you
7 can't see through the headset at all.

8 The third reference in this ground I'll cover briefly is the Flaks
9 reference. It's a patent that issued from an application that was incorporated
10 by reference expressly in McCulloch for its -- and specifically for its
11 disclosures of the 3D audio engine that I mentioned before. And what Flaks
12 gives us is confirmation that the McCulloch 3D audio engine is producing
13 binaural audio. And we know that because Flaks describes processing with
14 head-related transfer functions or HRTFs, which are used to produce
15 binaural audio and discusses ensuring that the audio produced by its 3D
16 audio engine is binaural audio.

17 And as I mentioned on slide 88, we see the incorporation by
18 reference in McCulloch of Flaks. So, a person of ordinary skill in the art
19 would know to put these references together, including because McCulloch
20 says too.

21 JUDGE BROWNE: This is Judge Browne. I have a question. I've
22 quickly been looking through the petition in Ground 2. I couldn't find what
23 you show in Figure 82 -- I mean in slide 82, which is Figure 4A and this
24 description of the audio engine. Can you point that out to me where that is
25 in the petition?

26 MR. HENRY: Sure, we've cited on the bottom of the slide,

1 petition 45 to 46, where the audio engine is described.

2 JUDGE BROWNE: Sorry.

3 MR. HENRY: 4A is also mentioned in -- no, no problem, Your
4 Honor. And I believe that 4A is also mentioned in the overview of
5 McCulloch and by Dr. Welch and his discussions of McCulloch. And we'll
6 get to it in a little bit more detail as well because Dr. Welch goes on to
7 explain how subsequent disclosures in McCulloch teach that all of what you
8 see over there on the lefthand side of that Figure 4A, those software modules
9 and different routines that you can see there can be incorporated into the
10 HMD specifically. And that will be important for some of the limitations
11 we'll discuss, including because you see things like device data 198, which
12 McCulloch discloses can be HMD location data. And we're going to turn to
13 limitations where that is important in just a moment.

14 So, turning, we're going to begin with slide 9, tracking the Board's
15 institution decision. And the only limitation that was addressed by Patent
16 Owner in the Patent Owners' response in Ground 2 was limitation 9[b].
17 Now, some of the demonstratives submitted for today's oral argument also
18 discuss limitation 9[c]. So, I intend to spend more time on those two
19 limitations in this discussion of Ground 2 than the others. And I believe in
20 the interest of time, because we have a lot to cover today, we should -- we
21 can skip right to 9[b]. If the Board has questions on the preamble of Claim 9
22 and 9A, I'm happy to discuss it. But for now, I'm going to flip through to
23 9[b].

24 So, this limitation comes up, and it's disputed in both grounds. As
25 Your Honors can see, it requires determining with the wearable electronic
26 device when on the head of user, when a user is located inside the zone.

1 Now, Patent Owner has argued that this limitation requires a wearable
2 electronic device that is exclusively responsible for locating a user inside a
3 zone. And so cannot be -- you cannot be making that user location
4 determination with any other components. It has to be the wearable
5 electronic device that makes that determination. We disagree, and in the
6 institution decision, the Board recognized that that's not what the claims say,
7 and we agreed with the Board. But regardless, even if the Patent Owners'
8 position is accepted and you need to have a WED or an HMD that makes
9 this determination, the Ground 2 art renders this limitation obvious.

10 On slide 98, what we're presenting is just what I said before. This
11 is the entirety of the Patent Owners' argument with respect to Claim 9 and
12 limitation 9[b] in the Patent Owners' response. That's the only limitation
13 they challenge from 9[b]. They only challenge that the art doesn't have a
14 process of responsible for making determinations of user locations from
15 Ground 2. But as we see in Pedrotti, and we're presenting on slide 99,
16 Pedrotti's Figure 14 again, but what Pedrotti teaches is that it has a process,
17 and its system for safe area boundaries has a processor that knows where the
18 user's head and where the user's hands are located. Both are being tracked.
19 And if you're tracking the user's head, you're tracking the user. You're
20 determining where the user is located. And Pedrotti further discloses that
21 the processor that makes these determinations about user location may be in
22 the HMD. That's expressly in Pedrotti.

23 And if you turn to McCulloch, you see similar disclosures.
24 McCulloch on its own also discloses an HMD with a processor and sensing
25 units that identify and determine user location. We saw in Figure 2A that on
26 the temple of McCulloch's glasses, there's a processor. And here in the

1 callouts on slide 100, you can see that the sensing units that I also invited the
2 Board's attention to, include inertial sensing unit 132 and a location sensing
3 unit 144. Now, those can be GPS transceivers, and they are used for
4 determining not just the orientation or accelerations of the head-mounted
5 display device, but the position of the head-mounted display device, which a
6 user is wearing. So, these sensors in McCulloch, which are on the HMD,
7 along with McCulloch's processor, make the determinations of user location.
8 And that's what's shown in the callouts on slide 100.

9 On slides 101, 102, and 103, we've annotated this in a little bit
10 more detail to call out the particular points and components from McCulloch
11 that I've just mentioned. So, I'm going to bring them up. On slide 101, we
12 can see the processor 210. It's on the HMD. We see the control circuitry
13 136. The inertial sensing unit 132, and the location sensing unit is 144 on
14 the Figure 2A headset. And Figure 1B from McCulloch shows that
15 McCulloch refers to its head-mounted display as item 2 in certain figures,
16 and also points to it as the display device system item 8 in other figures.
17 And the reason we're calling that out is because, Your Honor, as I mentioned
18 when I first discussed Figure 4A, what 4A shows is that the display device
19 system 8 can have all of these components in it, including the components
20 that are responsible for image and audio processing and the device data,
21 which as we just saw, is data related to HMD location and position. So, if
22 Patent Owners' position is accepted, that the limitation 9[c] requires an
23 HMD that exclusively is responsible for the determination of the user
24 location, then McCulloch renders that obvious in addition to Pedrotti
25 rendering that obvious.

26 On slide 104, we're just noting that Flaks, likewise discloses that

1 for the 3D audio engine, a physical location of the user has to be tracked.
2 And so, this further renders this limitation obvious because you need to
3 know where the user is in order to properly localize by normal sound around
4 the user during a virtual reality immersive experience.

5 Now, turning to 9[c], it raises the same issues I just mentioned with
6 respect to determination. So, those carry over from limitation 9[b] to 9[c].
7 But now what we need to find in the art is a determination of when the user
8 is leaving the zone. And for that, we get that from Pedrotti because that's
9 how the Pedrotti system works. The Pedrotti makes the determinations of
10 when a user is leaving the zone because that's when Pedrotti displays the
11 specs to warn the user that the user is leaving the zone. That one's pretty
12 straightforward. And limitation 9[d] is not disputed, but it requires a display
13 of the 3D zone in response to that determination I just mentioned. And for
14 that, we get that the art renders that obvious because Pedrotti discloses the
15 presentation of fences and boundary images and boundaries when the user is
16 leaving the zone. And we know that the -- and that's on one of -- slide 108
17 in Figure 11 of Pedrotti. And we know that the McCulloch and Pedrotti
18 combination would do this because -- and would have the hardware that
19 would allow this presentation because McCulloch displays virtual images.
20 On slide 109, we're presenting some disclosures that make that clear. And
21 on slide 110, we're similarly presenting disclosures from McCulloch from
22 which a person of ordinary skill in the art would understand that the
23 McCulloch system, its hardware, could present the Pedrotti fence because
24 McCulloch discloses, among other things, that 3D mesh representations of
25 virtual objects can be presented.

26 Now, that is the walkthrough of Claim 9. I'm happy to field

1 questions about Claim 9 of Ground 2, if the Board has any, or I'll continue
2 on with Claim 10. I'll just pause for a minute and then go on.

3 JUDGE BROWNE: I don't think we have any questions.

4 MR. HENRY: Thank you, Your Honor. So, limitation 10[a] is the
5 next disputed limitation in Ground 2. And as I mentioned, we're walking
6 through the dependent claims. We started with Claim 9, independent. We're
7 walking through the dependent claims off Claim 9, and I'll return to a few
8 slides that show how this matches up with Independent Claim 1 because the
9 issues from 9, 10, and 11 cut across to Claim 1.

10 So, limitation 10[a], determining with the WED when the PED is
11 pointed at one of the SLPs while the user is located in the zone. This is
12 rendered obvious by the Ground 2 art. On slide 112, we've called out a few
13 disclosures from McCulloch, that teach a pointing device, that can be a
14 mouse or it can be a handheld inertial motion unit. And what the real
15 controller devices in McCulloch do is they are used to select objects and
16 they're used to control them. The selection can be seen in the callout on the
17 left on slide 112, column 4, lines 25 to 33, and then the control can be seen
18 on the callouts on the right of slide 112, where the user input with the
19 controller is actually control of the virtual object in the play space. Joe is
20 playing a game. He's controlling a basketball, a virtual basketball, so he
21 moves it up and down, or he's controlling a virtual helicopter so he can fly it
22 into the wall. And on the bottom of the column on the right, I'll just invite
23 the Board's attention to the example of non-NUI input, like moving a
24 displayed selection arrow with the real controller device, may be used to
25 identify a user-selected object for control.

26 And I draw the Board's attention to that because the selection

1 arrow is, of course, used to point at the object that you want to select. And
2 in addition, just non-NUI is a term that is a little bit odd. What it refers to is
3 its non-natural user interface input. So, McCulloch discloses gaze tracking
4 and gesture tracking, and those are natural user inputs. But it also discloses
5 non-natural user inputs where you're just pointing a controller at something,
6 could be a mouse, could be a handheld inertial motion unit. And that's what
7 it refers to as non-NUI input, including where that selection is facilitated
8 with a selection arrow, which as arrows do, can point to things. And I've
9 called up on slide 113, Joe, and the Figure 8 is again. And the reason I've
10 done this is because it really sort of brings to the forward the issues of
11 pointing the PED and shows that the McCulloch system determines where
12 Joe's PED, which we've highlighted in yellow, item 19, is pointing.

13 Now, what's shown in Figure 8B on slide 113, Joe points at that
14 virtual basketball, item 30, subscript 2, and he can move his controller up
15 and down. And in response, the basketball will move up and down. And
16 that's how the McCulloch system works, and that could be virtual basketball,
17 or it could be a whirring virtual helicopter, which is a sound-producing
18 virtual object, or it could be any number of virtual objects for gameplay.
19 McCulloch has references to other applications that discuss virtual monsters
20 that come out of bookcases and things of that sort. And so, when you have a
21 sound-producing object, and of course the virtual basketball and virtual
22 reality could also make sound. But when you're pointing at a virtual object
23 like that, including when it's a virtual sound-producing object, you are
24 pointing at an SLP as claimed because all an SLP is, is an area or a point
25 from which sound localizes. And so, when you're pointing at the image, it's
26 at a location with an SLP. And perhaps to make that clearer, I've called up

1 on slide 114, what happens when Joe points at the virtual television again.
2 And the reason I've done this is because Joe is pointing his handheld
3 portable electronic device at a collision point.

4 I have presented 8B and 8D in these slides 113 and 114. But in
5 8C, what you can see in McCulloch, if you go back and review it, is Joe
6 actually points his finger at the TV, and he identifies the TV as a force
7 feedback object for the McCulloch system. And the reason he does that is
8 because McCulloch's system is designed to provide collision images,
9 collision sounds, and also a rumble pad on the controller. So, he needs to
10 identify what a force feedback object is so that when he points his controller
11 that's controlling the basketball at the force feedback object and causes the
12 collision, the system determines where it's pointing and knows to provide
13 Joe collision effects, visuals, sound, and a rumble. And so, what we see in
14 the callout on the left of slide 114 is a callout from McCulloch about the
15 cracking and breaking of the display, and the figure won't change on slide
16 115, but the disclosure called out on the left of slide 115 does. And what
17 we're calling out there is how the 3D audio engine operates in McCulloch
18 and how it operates as it's going to play audio data during display of one or
19 more collisions or actions. And that audio is going to be played from the
20 location of the collision, the sound localization point for that collision
21 between the virtual basketball and the virtual television at which Joe is
22 pointing and at which the system determines he is pointing before it provides
23 all of these collision effects that McCulloch discloses.

24 JUDGE ARBES: Counsel, can I ask a question about the mapping
25 for that? You had, in a few earlier slides, slide 113, had explained how the
26 initial user pointing the controller at the imaginary basketball, that point in

1 space where the basketball 30 is at, that's the SLP, right, that position in
2 space?

3 MR. HENRY: Yes, sir. For any virtual object, that's an object that
4 is a point from which sound can be generated and be localized. So, yes, it's
5 an SLP. The basketball is an interesting example because you don't
6 typically think of basketballs as generating sound. But what McCulloch
7 describes is you point at a real basketball in 8A, you point at a real
8 basketball and then the system deletes the real basketball in your vision and
9 replaces it with a virtual basketball. And then you play with that. And, of
10 course, in virtual reality, that virtual basketball could be playing sounds. It
11 could be the Harlem Globetrotter theme. It could be any sort of sounds,
12 dribbling, squeaking, sneakers, all of these things that Dr. Welch has
13 described. Because now you're in virtual reality. So, sure, the real
14 basketball lying on the ground might not make sound. And so, you might
15 argue it's not at a sound localization point, but a virtual basketball certainly
16 could. And the McCulloch system describes other examples where you're
17 controlling a whirring helicopter, for example. In Figure 8B on slide 114, if
18 we were controlling the whirring helicopter, it would be making sound from
19 its location, which would indisputably be a sound localization point.

20 JUDGE ARBES: Well, if we can go back to the claim language
21 for a moment, the reason I'm asking is that the first limitation of determining
22 when the PED is pointed at one of the SLPs while the user is located in the
23 zone -- I understand your point about the user pointing at that point in space
24 of the imaginary basketball, that's the SLP. The next limitation though,
25 playing the binaural sound that originates from the one of the SLPs in the
26 zone in response to the WED determining that the PED is pointed at the one

1 of the SLPs. So, you had said later that the sound comes when I've moved
2 the imaginary basketball to the television. So, that's no longer the same
3 SLP, right?

4 MR. HENRY: That's right, Your Honor. In the example you just
5 gave, that wouldn't be the SLP for the initial point at the basketball. Of
6 course, when you point at the real basketball and it gets erased and a virtual
7 basketball appears, sound could play in response to that. But if you take
8 limitation 10[a] and 10[b] and you think about where we're in Figure 8D, the
9 system is determining with the WED when the PED is pointed at one of the
10 SLPs while the user is in the zone. That's the SLP for the collision point.
11 That's another SLP. And when it makes that determination in response to
12 that determination, it absolutely plays the binaural sound for that collision at
13 that same SLP.

14 JUDGE ARBES: Okay. So, if we say that the SLP that we're
15 talking about, the one of the SLPs, that is the point in space of the television,
16 how does that then map to the first limitation?

17 MR. HENRY: Perfectly, Your Honor, because you determine with
18 the WED when the PED is pointed at one of the SLPs. So, I'll just go
19 forward to Figure 8D in slide 115. So, the system determines that Joe is
20 pointing at the SLP, the SLP for the collision, where the basketball is
21 supposed to hit the television, and it makes that determination, and now it
22 says, okay, I've hit the force feedback location, and now I need to play the
23 collision sound. That's --

24 JUDGE ARBES: Okay. So, should we be disregarding the SLP,
25 the initial SLP of the imaginary basketball? We're just talking about the
26 television where it makes a sound. Do I understand your argument right?

1 MR. HENRY: Your Honor, I would say you're not disregarding it.
2 I would say the collision point example is the easiest one to understand why
3 McCulloch renders these limitations obvious, because you would have, in
4 virtual reality, a person of skill in the art would know you would have sound
5 or could have sound when you make the virtual reality basketball over to the
6 left before it hits the television. But it's easier to see how the claims line up
7 and are rendered obvious by McCulloch with the collision situation. And it
8 doesn't have to be the basketball in the television, Your Honor. It could be a
9 helicopter, right? And you could have two helicopters in front of you in a
10 helicopter game. And you could point at one, and in response to pointing at
11 one, it could start whirring, and then you could, and that would be sound.
12 That would be 10[a] and 10[b]. And then you could also fly it into the other
13 helicopter, or into the virtual television, or into the wall to create a collision.
14 And now again, the system has determined you are pointing at an SLP. And
15 in response to that pointing, it's going to play binaural sound from that SLP.
16 So, the antecedent basis lines up in all of these situations. It's just easiest to
17 see in the Figure 8D collision situation.

18 JUDGE ARBES: Okay. Perhaps in the interest of time, if we can
19 move on to the highlighting issue for this and perhaps tie that to the
20 discussion we just had about Figure 8D.

21 MR. HENRY: Yes, of course. Happy to do that, Your Honor.
22 And so, I'm going to flip through to limitation 11[a], highlighting while the
23 user is in the zone, a display of the web, a virtual image when the PED is
24 held and pointed at one of the multiple SLPs.

25 So, on slide 121, what we're showing here is McCulloch discloses
26 a visual effects library. And the visual effects library that McCulloch

1 discloses is used for animations, highlighting, and other types of visual
2 enhancements for particular actions, be collision events and collision effects.
3 And so, this -- a person of skill in the art would read McCulloch and would
4 understand that the visual effects library could be used for, for example,
5 Your Honor, the initial selection of the basketball where the virtual
6 basketball changes color or brightness because now you're using a virtual
7 basketball instead of a real basketball. Or, as Dr. Welch has explained,
8 where you put the basketball into the virtual television and you would still
9 have highlighting there in order to make a collision more engaging or more
10 entertaining. And so, in both spots, I think it's possible.

11 JUDGE ARBES: Counsel, can I ask about that? Because you've
12 used the word could a number of times here. What -- a person of ordinary
13 skill in the art, reading McCulloch, what would lead a person of ordinary
14 skill in the art to understand that it would operate in that way? I see the
15 discussion here about a visual effects library, but I don't see any discussion
16 in McCulloch, or Pedrotti for that matter, of doing this type of highlighting
17 when I'm pointed at something, when I'm selecting from a number of SLPs a
18 particular one. So, why would a person of ordinary skill in the art read
19 McCulloch that way?

20 MR. HENRY: Thank you for raising that, Your Honor. With the
21 particular actions here, as we discussed, McCulloch discloses selecting
22 virtual objects. That's one type of particular action here. We've also
23 discussed collision effects. That's another one. And why a person of skill in
24 the art would do this is because, as Dr. Welch explained, when you are using
25 the highlighting, what it does is it allows a person of skill in the art would
26 know you would highlight when you point at something because you need

1 dynamic visual feedback is what Dr. Welch described for the object
2 selection.

3 Because if you point your -- if Joe points his controller out at the
4 basketball, for example, but he doesn't get the highlight that McCulloch
5 discloses when he points at that basketball, he might click away endlessly
6 with his controller and miss the basketball. And it was a common and well-
7 known technique to provide this visual dynamic feedback for selecting
8 virtual objects in augmented reality, virtual reality, and mixed reality
9 scenarios. And then Dr. Welch actually describes it as being essential to
10 these scenarios so users know that they are selecting the objects that they're
11 targeting because it could be an object on a shelf amongst many different
12 objects you could select. And so, a person of skill in the art would know
13 McCulloch would do this to facilitate the ease of the user actually
14 controlling the objects that the user wants to play with in their play space.

15 JUDGE ARBES: So, counsel, one of the issues that I potentially
16 see with this argument is that -- I understand your point about citing other
17 references or other systems that might have done that, but it does not seem
18 that you are arguing to make a particular modification to McCulloch, that a
19 person of skill in the art would have combined the teachings of McCulloch
20 with another reference that's part of the ground to modify McCulloch to do
21 that. I think I understand your argument about other systems and other
22 references that you've cited, but I don't see an argument as to why a person
23 of ordinary skill in the art would have modified McCulloch.

24 MR. HENRY: Well, Your Honor, just two responses to that.
25 You're right. We are not saying you need to bring in another system to the
26 Ground 2 art in order to render obvious the claimed highlight.

1 But secondly, what we are saying is a person of ordinary skill in
2 the art would read McCulloch and would use the highlighting that
3 McCulloch discloses in order to facilitate the selection of virtual objects that
4 McCulloch discloses and that Pedrotti discloses. Because a person of skill in
5 the art brings to these references all of the knowledge of those other
6 references where highlighting is used to allow users to properly grab the
7 virtual objects that they want to play with. And so, when a user reads
8 McCulloch's disclosures of real controller devices, controlling virtual objects
9 and McCulloch's disclosure of highlighting, including for particular actions
10 and collision effects, in our view, a person of skill in the art would
11 implement McCulloch with highlighting of their virtual objects.

12 JUDGE ARBES: But counsel, why is that not a modification to
13 McCulloch?

14 MR. HENRY: Because McCulloch discloses that it uses its visual
15 effects for particular actions and for collision effects. And so, a person of
16 skill in the art would know that McCulloch's system is doing that.

17 JUDGE ARBES: But, correct me if I'm wrong, but it does not
18 disclose highlighting for that purpose, right?

19 MR. HENRY: Well, Your Honor, in our view, it does disclose
20 highlighting for the actions that we have described and that it shows Joe
21 doing in his living room. Those actions are the particular actions that it
22 discloses for selecting objects for pre-collision events and for collision
23 effects. And so, when Joe selects an object, a person of skill in the art would
24 know McCulloch's visual effects library highlights. And when Joe puts the
25 basketball or another object into the wall or television, a person of skill in
26 the art would know there would be highlighting at that point.

1 JUDGE ARBES: A couple questions. One, how do we know that
2 that is what McCulloch is referring to there when it uses the words particular
3 actions?

4 MR. HENRY: Because the actions that McCulloch describes are
5 the actions of selecting and controlling virtual objects. That's what it's
6 directed to.

7 JUDGE ARBES: Okay. And why in the context of the example
8 where the basketball has impacted the virtual screen and it shows the
9 shattered glass, the SLP then is the point in space of the television, the sound
10 is played as if it originates from that point in space, and there would be
11 highlighting in your view? Why would there be highlighting on the screen?

12 MR. HENRY: Well, Your Honor, there would be highlighting on
13 the screen because, as Dr. Welch explained, it makes the immersive
14 environment more engaging and entertaining for the user. It could be an
15 explosion of some sort. The '509 patent just describes highlighting as sort of
16 any visual way to distinguish from other visual effects. And so, highlighting
17 is a very broad term in the '509 patent. And so when you have these visual
18 effects that are triggered by the collision, you could have a change in color.
19 You could have brightness. All of those things Dr. Welch has described
20 would take place in order to make this environment for Joe more engaging
21 and entertaining.

22 JUDGE BROWNE: Can we go back to the slide that describes the
23 visual library?

24 MR. HENRY: Yes. This one, Your Honor, I think it's slide 121?

25 JUDGE BROWNE: Yeah. So, aren't the animations and
26 highlighting distinguished from other visual enhancements? I guess the

1 problem that I'm having is it seems to me that what's going on is the
2 basketball is being animated. It seems like that's sufficient to keep the user's
3 attention for them to understand that that item has been selected. And again,
4 the thing that we're struggling with is why then would highlighting need to
5 be used in addition? And does this disclosure here actually disclose using
6 those -- more than one of those options?

7 MR. HENRY: Your Honor, we read this as all of those animations
8 highlighting and other types of visual enhancements go into the latter part of
9 that sentence. So, they can all be associated with particular actions, pre-
10 collision events and collision effects, and we submit that that's the proper
11 way to read that disclosure. For example, with the basketball, you could
12 have an animation where the basketball would start to spin, right? But the
13 basketball could also change its color. It would brighten and that would be
14 highlighting. Or there could be other types of visual enhancements. For
15 example, a logo of your team could show up on the basketball. But this all
16 of the --

17 JUDGE BROWNE: Isn't all of that really speculative? I mean, I
18 don't think it's spelled out in the petition in that way. And I don't think what
19 you are saying to us now is how this was articulated in the petition itself.

20 MR. HENRY: Well, Your Honor, in the submissions, Dr. Welch
21 did explain that the highlighting would occur for the selection of objects and
22 for the collision effects. That's explained in our submissions and our papers.
23 We've made that particular point clear. I was attempting to discuss all three
24 of these things, which we didn't rely on the animations and the other types of
25 visual enhancements in the submissions because, in our view, the
26 highlighting was all that was required to be addressed because that is what is

1 in the limitations. And we submit that a person of skill would know and
2 would use the highlighting consistent with McCulloch's disclosures for the
3 reasons I mentioned, including object selection and with collision effects and
4 pursuant to this disclosure.

5 And I mentioned that I wanted to discuss how the claims align
6 between Claims 9, 10, and 11, which we just walked through in Claim 1. On
7 slides 125, 126, and 127, we can see how the issues that we just walked
8 through for 9, 10, and 11 map to Claim 1. The determining the user location
9 limitation in Claim 9 is in limitation 1[b], and obvious for the same reasons
10 we discussed. The highlighting limitation from Claim 11 is limitation 1[c],
11 and obvious for the reasons that we've discussed. And the limitation in
12 Claim 10 relating to the playing of binaural sound in response to pointing
13 has its analog in limitation 1[d], and is obvious for the reasons we've
14 discussed.

15 And now with the Board's permission, I'd like to let my colleague
16 Kimberly Li address Dependent Claim 2 and issues relating -- related issues
17 in Independent Claim 17. Thank you.

18 MS. LI: Good afternoon, Your Honors. This is Kimberly Li on
19 behalf of Petitioners. And I'll start with what's presented on slide 128, which
20 is the claim language of limitation 2[a]. So, to set this limitation in context
21 of Ground 2, McCulloch discloses that there are sensors in the WED and
22 also teaches that tracking with those sensors the PED. And in combination
23 with Pedrotti, McCulloch renders obvious tracking when the PED leaves the
24 Pedrotti type zone.

25 So, taking a look at the disclosures of McCulloch, what's presented
26 here on slide 129 is McCulloch's disclosure regarding those image capture

1 devices that are on the McCulloch HMD. And those cameras do sense and
2 capture image data, including data about the real objects within the display
3 field. And a real object includes, for example, McCulloch's controller
4 because that is an object that exists in the real world.

5 And so, moving on to additional disclosures of McCulloch
6 regarding those capture devices, those are described as depth sensitive. So,
7 they are sensing information, specifically the distance between McCulloch's
8 controller and McCulloch's HMD. Additionally, McCulloch discloses a
9 number of other types of sensors directed to depth sensing technology, and
10 these are all described here in this excerpt from column 7. And Patent
11 Owner also concedes this point. Patent owner states in its response that
12 McCulloch does disclose sensors in the HMD here.

13 Turning to slide 131, you're familiar with this Figure 4 now from
14 McCulloch, and this is presenting the computing environment of
15 McCulloch's HMD. That computing environment includes an image of
16 processing engine 191, as highlighted here in red, and that in turn also
17 includes an object recognition engine 192. And as discussed in column 17
18 of McCulloch, as shown here on this slide, that object recognition engine
19 detects, tracks, and identifies real objects. And so, through this McCulloch
20 does teach tracking with those sensors that are part of the HMD, the
21 controller of McCulloch. And Dr. Welch explains as such in his declaration
22 here, and his testimony is the only expert testimony here on record. And
23 additionally, Dr. Welch here explains that McCulloch's processor is able to
24 store that information regarding McCulloch's controller and compare that
25 with the boundaries that are from the Pedrotti type zone drawn with
26 McCulloch's controller in this combination of Ground 2.

1 And so, Dr. Welch's testimony here further is un rebutted. He also
2 discusses this idea of sensor fusion, that not only does McCulloch disclose
3 the cameras that are sensing where the controller is in relation to the HMD,
4 but that there are also additional sensors that provide information regarding
5 the controller's position to the HMD. And all of this can be information that
6 is combined in order to determine the location of the controller in relation to
7 the boundaries that are stored based on the Pedrotti drawing of boundaries,
8 the zone that is described here.

9 And so, turning to Patent Owner's arguments, Patent Owner frames
10 limitation 2[a] differently from what is actually recited in the claims. Patent
11 Owner says that the claim requires that these sensors track the PED.
12 However, that's not required based on the claim language. The claim
13 language states tracking with one or more sensors in the WED, and it's clear
14 that from McCulloch's disclosure that tracking does happen and that includes
15 the sensors in the WED to perform that tracking. There is no requirement
16 here that the sensors track. And Dr. Welch's testimony also supports this
17 point. He states that sensors do not track, rather they sense. Systems need
18 something else and other components that help perform that tracking, taking
19 that information from the sensors in order to do the calculation of where
20 whatever is being tracked is. And this is supported in how this language is
21 used in the art. And on slide 135 here, the language in Pedrotti, which is
22 part of the grounds -- which is part of the art for this ground, discusses that
23 trackers and processors work together in order to provide and conduct the
24 tracking.

25 Additionally, even looking at the claim language presented from
26 the '509 patent, Claim 17 recites that one or more sensors sense. So, this

1 again supports the notion that sensors sense, and they're used to track. With
2 respect to limitation 2[a], all that's required is to show that there are sensors
3 involved in the act of that tracking.

4 Patent Owner also argues in its Patent Owner response that
5 arguments for Ground 2 are based exclusively on Pedrotti, but that's not so,
6 as in the petition, we specifically discuss the disclosures of McCulloch
7 regarding its sensors on this HMD and how that combines with the Pedrotti
8 type zone. And on the other hand, Patent Owner also argues that Pedrotti,
9 excuse me, that McCulloch does not disclose when the PED moves outside
10 the zone. However, as I explained in the context of Ground 2, the
11 combination is that you're using McCulloch's system in order to implement
12 the Pedrotti type boundary. And the Pedrotti type boundary that is drawn
13 provides the information of where that boundary is, McCulloch's system is
14 able to track that as well in comparison to the location of the McCulloch
15 controller.

16 Patent Owner also presents an argument in sur-reply that
17 McCulloch's first person perspective would make it impossible for the user
18 to leave the Pedrotti type zone. That's contrary to the disclosures of
19 McCulloch, as shown here on slide 140. So, the first portion that's identified
20 here, McCulloch describes boundaries for the play space and that those
21 boundaries include mapping of real objects to that environment. So, there is
22 some sense of where the objects within McCulloch's scene or virtual
23 environment are in relation to real objects and features. Additionally,
24 McCulloch discloses that independent 3D map coordinates can also be used
25 in that system. So, not only is the McCulloch system doing relative
26 tracking, so perhaps in relation to the HMD, from the first person

1 perspective, but also there's also the third person perspective or universal 3D
2 map coordinates that are stored in McCulloch's processor.

3 Patent Owner also criticizes Dr. Welch based on his deposition
4 testimony. However, Patent Owner selectively quotes from this testimony
5 and we've reproduced on the slides here. The context of that testimony is
6 clear that Dr. Welch describes the disclosures in McCulloch supporting his
7 conclusion that the HMD does track the controller. This is the same case
8 with respect to another portion of Dr. Welch's testimony where he describes
9 the ability to track based on sensors and in relation to placing a tracker on a
10 controller. In this case, the hypothetical that was presented by Patent
11 Owner's counsel was incomplete and addressed something that was different
12 from the disclosures in McCulloch.

13 JUDGE BROWNE: Ms. Li, this is Judge Browne. I just wanted to
14 let you know you've got about three minutes and then you'll be cutting into
15 your rebuttal time.

16 MS. LI: Great. Thank you. I'll actually skip these slides here, but
17 we presented for Your Honors just the full context of Dr. Welch's testimony.
18 And with respect to Claim 2[b], my colleague, Mr. Henry, already discussed
19 limitation 9[d], which is similar to limitation 2[b].

20 And so, the last point that I want to address is just the comparison
21 between limitations 2[a] and 17[e]. As I discussed, all that was required for
22 17[e] with respect to this tracking and the sensors is that one or more sensors
23 need to sense when the PED leaves the zone. And Patent Owner actually
24 stated in its Patent Owner response on page 13 that Claim 17 does not
25 require an independent determination with respect to limitation 17[e]. And
26 so, in that sense, our discussion of limitation 2[a] addresses what needs to be

1 demonstrated for 17[e].

2 Should we move to Ground 3?

3 MR. HENRY: And, Your Honors, in the interest of reserving our
4 time for rebuttal, when we may discuss Ground 1 in response to what Patent
5 Owner says, if Your Honors don't have questions now, we'll just reserve and
6 discuss Ground 1 in rebuttal.

7 JUDGE BROWNE: That's great. You'll have 21 minutes for
8 rebuttal.

9 MR. HENRY: Thank you.

10 JUDGE BROWNE: Mr. Dykema, do you know how much time
11 you want to reserve for rebuttal?

12 MR. DYKEMA: Yes, Your Honor. We'd like to reserve 10
13 minutes for rebuttal, please.

14 JUDGE BROWNE: Ten minutes? Great. And you can begin
15 when you're ready.

16 MR. DYKEMA: Thank you, Your Honor. My colleague, Mr.
17 Fraulo, will be -- make our initial presentation, and then I'll handle the
18 rebuttal.

19 MR. FRAULO: Thank you, Your Honors. So, I'd like to start with
20 some background on the technology first. So, the '509 patent is based on the
21 idea of the size of a head-related transfer function. A head-related transfer
22 function basically maps the sound from a particular location and determines
23 how it's going to be tweaked in order to make it sound as it would in both
24 your left and your right ears. So, I think what a good illustration of how this
25 works is to think about how these head-related transfer functions are
26 typically recorded.

1 So, you'll put either a dummy head or an actual person inside of an
2 anechoic chamber, a chamber that does not -- that absorbs sound. It doesn't
3 reflect any sound off the walls. And they'll put a very small microphone in
4 the left and right ear of the individual whose head you're trying to map. And
5 they'll surround the person with speakers and play sounds from different
6 locations, and record how that person's head and their ear canals impact the
7 sound as it makes its way to the microphone in the individual's ears. So, the
8 head-related transfer functions are unique to a person's head. And, however,
9 in the actual technology when implemented, they often use a sort of
10 generalized version of the head-related transfer functions, which are, you
11 know, put together from averages or used -- or they use a dummy in order to
12 generate these transfer functions.

13 So, understanding that technology is important as we turn to
14 Figure 9B of the patent, which relates to SLPs. So, the SLP is integral to the
15 idea of a head-related transfer function. The sound comes from a particular
16 SLP. As shown in Figure 9B, these would be, you know, the small prisms,
17 the rectangular prisms that they show floating around the user. And these --
18 the sound localization points each map to a particular head-related transfer
19 function. And they do this in a discrete process. It's not a field or a general
20 solution. It's done discretely in order to allow the technology to be
21 implemented in a way that is not overly costly in terms of the processing. If
22 it were a field or a general solution, it would not be practical in order to
23 implement the technology.

24 So, you know, understanding the fact that SLPs are discrete and
25 they map, they each code have an individual head-related transfer function,
26 which allows sound to be mapped from the, you know, the virtual reality

1 space, and, you know, played in a way that is realistic to the user while in
2 the virtual reality space is very important background going into the '509
3 patent. And we'll see this played out later in terms of how this, you know,
4 impacts the various arguments. But as a preview, as an example, we just
5 heard the Petitioner explain how McCulloch's basketball was in SLP. But
6 the basketball is just kind of moving around the room and it's hitting into the
7 TV. SLPs are not objects that move about a space. And the combination
8 proposed by Petitioner conflates the idea of an object moving around a
9 virtual space with an SLP. And it assumes a relationship that is, you know,
10 it's not demonstrated in the prior art.

11 So, I'd like to --

12 JUDGE ARBES: Also, I think just to clarify, so we can
13 address it during your argument, I believe Petitioner was saying that the
14 relevant SLP, or one of the relevant SLPs that we can think of, is that point
15 in space right at the television where the imaginary basketball impacts the
16 television and a sound is coming from that point in space. So, perhaps you
17 can address that in your argument?

18 MR. FRAULO: Sure. And I'll just note that there's nothing in
19 McCulloch indicating that there is an SLP there. They're assuming --
20 Petitioner assumes that the objects that are described in McCulloch are
21 SLPs, but it's making a connection between virtual objects and SLPs that is
22 not actually in the art. And that was the point that I was getting towards
23 there.

24 So, turning to, you know, our first argument, which would be
25 on -- or actually, before we get to the arguments, I'd like to do a brief
26 overview of the references. So first, with respect to Pedrotti, Pedrotti is not

1 an audio technology. Pedrotti is a system and method for assisting a user
2 and remaining in a selected area while the user is in a VR environment.
3 Pedrotti is geared towards safety and trying to prevent, for example, a user
4 tripping over their couch. And it doesn't disclose the idea of SLPs. It
5 doesn't talk about sound really in any degree of depth. And what it does talk
6 about is, you know, the head-mounted display and the user's holding a
7 controller, and there's a tracker that provides information regarding a
8 position of the handheld controller. Pedrotti further discloses determining a
9 selected area, for example, a safe area that the user is able to walk through in
10 order to avoid physical obstacles in the physical world. So, Pedrotti is
11 directed towards safety while using a VR headset and has nothing to do with
12 producing realistic sound in VR, which is, you know, important aspect of the
13 '509 patent.

14 Jang is an apparatus and method for sound processing --

15 JUDGE BROWNE: So, this is Judge Browne. So, are you saying
16 that Pedrotti doesn't have any SLPs? Or are you just saying that that's not
17 the focus of that reference?

18 MR. FRAULO: So, yeah, our position is that Pedrotti does not
19 teach, you know, and I'll get to the specific arguments later. But Pedrotti is
20 not a disclosure that focuses on the generation of realistic sound. It doesn't
21 talk about --

22 JUDGE BROWNE: Well, is realistic sound claimed?

23 MR. FRAULO: So, the use of SLPs is, and the SLPs do appear in
24 the claim language. The use of SLPs is a method of generating sound that is
25 in line with what you're seeing and creating the immersive VR experience
26 that the technology in the '509 disclosure is directed towards. Does that

1 address Your Honor's concern?

2 JUDGE BROWNE: I guess our concern is we're not sure what any
3 of this has to do with the arguments that were presented in the Patent
4 Owner's response.

5 MR. FRAULO: Right. So, I was just giving a background of the
6 technology. And we also do claim binaural sound in the claim terms. So,
7 the use of both binaural sound and SLPs is an important aspect of the '509
8 patent and the claims. And so, I wanted to highlight, you know, the
9 technology behind that before delving into the specific arguments.

10 If you'd like, I can skip the overview of the prior art, and we can
11 just discuss the arguments. But I will note that while there's no specific
12 claim construction issues in, you know, briefed in the papers, some of the
13 issues that I've propped up do actually relate to the understanding of the
14 claim terms. I think that it's embedded in the 103 arguments themselves.
15 So, I will move past the claim construction issues and turn to the actual
16 arguments.

17 So, I'll go to slide 24. So, slide 24, this gets into our first argument
18 here, which is Dr. Welch's approach. So, Dr. Welch admits in his deposition
19 that he did not actually attempt to understand the scope and meaning of the
20 claim terms. He basically -- he looked at the particular limitations of the
21 claims, and he used those discrete parts of the claims in order to go to the
22 prior art and find it there. So, what he describes as his process is basically
23 the definition of hindsight bias. And he admits this, and it's demonstrated on
24 the record in his deposition. And that initial flaw in his approach is never
25 rectified and not properly addressed by Petitioner in its briefing.

26 So, turning to the issues with Ground 1. So, Ground 1 fails for at

1 least two reasons. The first is with respect to feature 1[c]. 1[c] is
2 highlighting while the user is located in the zone, and with a display of the
3 WED, one of the multiple SLPs in the zone when the PED held in the hand
4 of the user is pointed at the one of the multiple SLPs in the zone. So, you
5 can see here, for example, Your Honor, how the concept of an SLP and what
6 an SLP is, is essential. It's baked into the claim terms themselves, and
7 because it's misconstrued by Petitioner throughout their briefing and their
8 combination, the prior art combination doesn't make sense in view of the
9 technology and what it actually, you know, what the claim terms actually
10 mean.

11 So, turning to 1[c], Pedrotti does not disclose highlighting an SLP
12 as required by 1[c]. So, Petitioner relies on Pedrotti's disclosure that its
13 virtual fence can be glowing or colored if desired to be more visible to teach
14 the concept of highlighting. But Pedrotti's virtual fence is not a sound
15 localization point, and thus does not teach or suggest highlighting one of the
16 multiple SLPs. So, again here, this is -- the way they are trying to map the
17 prior art onto the claim features shows that they're not properly construing
18 what an SLP is and the prior art does not show the use of SLPs. They're
19 using a sort of analog here. So, a virtual fence is not an SLP and, you know,
20 having a virtual fence glow does not show the highlighting of an SLP.

21 JUDGE ARBES: Counsel, can I ask a question about that? The
22 challenged patent in column 14 talks about a SLP as a point or area where
23 sound is located. Can a two-dimensional rectangle like the virtual fence be
24 an area, a SLP that is an area?

25 MR. FRAULO: Good question, Your Honor. So, an SLP, it's
26 supposed to mimic or to be as realistic as possible, it's supposed to be

1 exactly like how sound would be emitted in the real world. And so a two-
2 dimensional object, typically, they don't exist in the real world. So, an SLP
3 as a location of sound should be three-dimensional. I would say that that is a
4 fair distinction to make, although not something that I believe we've argued
5 in our briefing. So --

6 JUDGE ARBES: But if that two-dimensional rectangle is in three-
7 dimensional space, can it ever be an SLP? My question relates to, I guess,
8 what exactly is an SLP? The patent talks about it as a point or area and then
9 shows, I believe, in one of the figures some three-dimensional boxes as
10 SLPs. So, is it your position that a two-dimensional rectangle in three-
11 dimensional space, like the virtual fence in Pedrotti, can never be an SLP?
12 And if so, why?

13 MR. FRAULO: So, I would say, yeah, a two-dimensional object is
14 not going to be an SLP. It would have to be three-dimensional because
15 sound comes from a three-dimensional space in the real world. So, it's
16 supposed to come, you know, the idea of the technology of using SLPs is to
17 create realistic sound. And as it's shown in Figure 13, it is three-
18 dimensional. Sound comes from three-dimensional space. So, the use of the
19 of a two-dimensional object, and an object in general is not an SLP. And in
20 terms of what an SLP is, an SLP, as I was saying before, the idea of a head-
21 related transfer function is essential to understanding what these SLPs are.
22 Yes, on its face, if you just look at the acronym, it is just a location where
23 the sound is coming from, as Petitioner claims, but the disclosure throughout
24 the '509 patent explains that the concept of an SLP is best understood
25 together with the concept of a head-related transfer function.

26 So, the SLP is where the sound is coming from, and the head-

1 related transfer function is localized to that particular SLP. And so, if there's
2 an object, and it's floating in space, you would find the SLP that's closest to
3 it. You'd emanate the sound from that SLP. The system would access a
4 bank or a library of heavy related transfer functions. It would use the one
5 specifically for that SLP, and then the transfer function would be used
6 together with the sound that is associated with the object in order to make
7 the most realistic sound that is localized to that particular point, the SLP
8 that's being selected. And that's how the idea of SLPs is integral to the idea
9 of heavy related transfer functions. And it's something that's completely
10 glossed over by Petitioner. So, I hope that answers Your Honor's question.
11 If there's a follow-up question, I'd be happy to address it.

12 JUDGE ARBES: Yes, actually, if we can -- let's assume for the
13 sake of argument that the virtual fence is not an SLP as we're talking about
14 it. What about the virtual objects in Pedrotti? And specifically, there is
15 disclosure in column 9 around line 43 of Pedrotti that talks about the display
16 of a virtual sword in the virtual world. Column 9 about line 43, and then
17 column 9 about line 33, displaying a virtual object, a virtual weapon in
18 three-dimensional space. Could that be an SLP?

19 MR. FRAULO: So, the virtual object is not an SLP, and
20 particularly the virtual objects in Pedrotti are not SLPs. So, this is an
21 argument that came up in Patent Owner's response. We explained that the
22 virtual object in Pedrotti is the virtual representation of the controller. So --

23 JUDGE ARBES: Counsel, can we talk specifically about that
24 language in column 9 then? Because I'm not sure I understand that point.
25 Both of those instances talk about displaying a virtual weapon, and that is
26 something that the user can see, and then it talks about extending the user's

1 hand to get that object. And the controller is in the user's hand, so that is
2 separate from the controller then. There is a display of a virtual sword at a
3 point in space, and that is different from the controller, right?

4 MR. FRAULO: I would agree with that understanding of the
5 sword being separate from the controller. However, I don't fit -- I disagree
6 that a virtual object in itself isn't --

7 MR. DYKEMA: Excuse me, Your Honor, can I respond to this,
8 please? This is Erik Dykema for the Patent Owner. I think the distinction
9 that we're trying to get at, Your Honor, is that in Pedrotti the, I'm sorry, in
10 the '509 patent, the controller or the portable electronic device that's held in
11 the user's hand points at the SLP. And the sword or the other virtual object
12 in the Pedrotti simply is a representation of the controller or of the PED.

13 JUDGE ARBES: Well, counsel, I understand your point when the
14 user has retrieved the virtual sword. The user has extended his hand, and
15 now the sword appears in the hand that is in some sense equated with a
16 controller. What I'm talking about is that time before that, because in
17 column 9, it talks about the display of a virtual sword, and then the user is
18 extending their hand toward it, and entering a command to pick it up. So,
19 that to me, in reading that disclosure, and correct me if I'm wrong, that
20 seems to imply a separateness between the point in space where the virtual
21 sword is and where my hand and the controller are, and I'm moving my hand
22 and controller toward it. Am I reading that disclosure wrong?

23 MR. DYKEMA: No, Your Honor, I think that's accurate. I think,
24 at first, the virtual sword if it -- I'm visualizing ourselves in this game, that's
25 what he's talking about. If the sword is on the ground, it is a separate object
26 from the controller, and then when the controller, or I'm sorry, when the user

1 exercises whatever commands are called for, whether it's clicking a mouse
2 or clicking a button or something to pick the sword up, as it says, and I'm
3 looking at Pedrotti column 9, approximately line 40, to pick up and hold that
4 virtual weapon.

5 Now, the virtual weapon replaces the controller or the
6 representation becomes the controller. It's not that Pedrotti doesn't disclose
7 virtual objects. We agree that it does, such as the sword. The problem is
8 that Pedrotti doesn't disclose that those virtual objects are sound localization
9 points. Not every object is a sound localization point. For example, the
10 virtual fence of Pedrotti, which is what Petitioner points to, there's no
11 disclosure in Pedrotti that when you point your controller or sword or
12 anything else at the fence, that it is highlighted or that it makes a sound.
13 That's what makes it not a sound localization point, Your Honor.

14 JUDGE ARBES: Okay. And that point I understand. What I'm
15 trying to drill down on is, if we just think about in isolation, that point in
16 three-dimensional space where the virtual sword is, that is a point in space,
17 but it's not an SLP, in your view, because Pedrotti does not have anything to
18 do with sound and it doesn't meet the other limitations. Is that right?

19 MR. DYKEMA: Yes, Your Honor. Because there's no disclosure
20 in Pedrotti that every single point, or every single object, or any particular
21 object is an SLP that it localizes sound, like binaural sound within the visual
22 field or in the virtual field of the virtual reality system, it's not an SLP. Just
23 being an object does not equate something to being an SLP.

24 MR. FRAULO: And building on that point, Your Honor, returning
25 to slide 27, Pedrotti does not disclose highlighting an SLP when pointed to
26 as required by 1[c]. So, Petitioner claims that Pedrotti's controllers

1 manipulate and control virtual objects in VR. But the Petitioner has
2 mischaracterized the manipulation and control of the virtual objects
3 described in Pedrotti, construing these objects as items that can be selected,
4 and then bridging the selection to a statement not found in the references that
5 the pointing pattern is often used for selection. So here, again, they start to
6 rely on their expert, Dr. Welch, in order to fill the gaps in the prior art. And
7 that is a theme that we see throughout the prior art combinations and
8 throughout the briefing that Petitioner has put forward. It is -- and we'll get
9 to that further later on, Your Honor. But Petitioner misinterpreted Pedrotti's
10 virtual object, turning to slide 28. Pedrotti's virtual object is a virtual
11 representation of the controller, not an SLP that the controller can point to.
12 And the virtual objects or enemies in the games, these result from striking
13 the enemy, not pointing at them. That's in the -- we addressed this in the
14 sur-reply, and other hypothetical examples are not based on prior art or
15 simply based in the expert's imagination and are inadmissible.

16 So, Jang also does not disclose highlighting in SLP. Jang relates a
17 dynamic selection of audio sources and relates to moving a character's
18 perspective. So, you know, the combination of Jang and Pedrotti from the
19 outset doesn't really make sense. And we briefed this in greater depth in the
20 preliminary response, but it's something that we -- it's a position we
21 maintain, although it wasn't emphasized, you know, due to constraints in the
22 reply and the sur-reply. But the combination of Pedrotti and Jang from the
23 outset doesn't make sense, you know, from our perspective. So, Petitioner
24 does not even argue that Jang teaches selecting an SLP by pointing at it.
25 Here again, they substitute the testimony of their expert for what is lacking
26 in the prior art. So, no references teach highlighting an SLP while the user is

1 located in the zone. So, this is a third aspect here of why 1[c] is not
2 disclosed. And Pedrotti's system is used by the user in a zone but doesn't
3 disclose highlighting only while the user is in the zone or while the user is in
4 the zone and the PED is pointed at an SLP. So, this is another issue with the
5 prior art mapping on to 1[c].

6 So, turning to 1[d], neither Pedrotti, nor Jang, nor Begault teach
7 the features of 1[d]. And just to read 1[d] again, it's playing with the WED
8 worn on the head of the user, the binaural sound that emanates from the one
9 of the multiple SLPs in response to the one of the multiple SLPs being
10 pointed at by the PED held in the hand of the user. So, here again, that
11 explanation of how SLPs are different than virtual objects, it's a very
12 important distinction that comes into, you know, understanding why the
13 Petitioner's mapping of the prior art onto 1[d] doesn't make sense. So,
14 neither Jang nor Pedrotti teach pointing to an SLP. And for that reason
15 alone, 1[d] is not taught. Pedrotti has nothing to do with SLPs inside its
16 safety zone, while Jang teaches only changing the prioritization of sound
17 based on user perspective changes. And Begault provides a user interface
18 that enables configuration of sound sources. So, none of these three pieces
19 of prior art actually address the binaural sound emanating from the SLP in
20 response to being pointed at by the PED.

21 JUDGE ARBES: Counsel, just for clarity, can you explain what
22 makes something an SLP? If I define a three-dimensional virtual space and
23 then I have a particular point within that space and I have the X, Y, Z
24 coordinates for that, it is a point in three-dimensional space, what makes that
25 an SLP or not an SLP?

26 MR. FRAULO: Right. So, the SLPs would be something that is

1 layered into the space, not necessarily shown it could be, but not necessarily
2 shown and it's used in order to take the virtual objects and the events, the
3 sound that occurs in the virtual space, map it onto the SLP, and then emanate
4 the sound from that SLP using the head-related transfer function in order to
5 make the sound realistic to the user while in the virtual space. So --

6 JUDGE ARBES: But isn't that what's done with the SLP? I'm
7 trying to figure out the exact definition or distinguishing feature that makes
8 something an SLP.

9 MR. FRAULO: Absolutely. And I would argue, Your Honor, that
10 what the SLP does explains what the SLP is. And that's why I keep going
11 back to the explanation of how the SLP is kind of incorporated into the '509
12 patent, into the claims, and how it's actually used.

13 MR. DYKEMA: If I may address that question a little bit more.
14 This is Erik Dykema for the Patent Owner. In our view, according to the
15 teachings of the '509 patent, for a point in space, a point in three-
16 dimensional space, whether that's just an empty point or a virtual object is on
17 that point in the virtual space, the point in virtual space needs to have a
18 sound associated with it. It has to be able to make a sound when -- in the
19 context of these patent claims when the object is pointed at, for example, by
20 the PED. And then that sound, that sound that it makes has to be binaural
21 sound that's calibrated according to, as Mr. Fraulo was saying, the head-
22 related transfer function so that the user perceives as coming from that
23 direction in 3D space of the SLP.

24 So, to elaborate on this distinction, you know, if -- imagine a 3D
25 point space where, if it was selected, or pointed, or whatever, the computer
26 makes a beep. But that beep is not physically localized in the 3D space so

1 that the user's ears perceive it as coming from a particular direction of
2 wherever that 3D point is. Then that point is not, even though it makes a
3 sound, it's not a sound localization point within the meaning of the '509
4 patent. It's this teaching about binaural sound that Pedrotti lacks and that
5 there's just not a showing in the combination of references, in our view.

6 Let's move on to Ground 2.

7 MR. FRAULO: Okay. So, we're going to skip ahead to Ground 2.
8 I would, just before we move on, I would like to note that the Petitioner
9 relies on the VR book heavily in order to fill the gaps in the prior art. And I
10 would like to note for the Court that, you know, the case law that we cited
11 here In re IPR Licensing, where the Court clarified that, you know, what's
12 being done here is improper. And I would also note the *Arendi* case that's
13 cited in our sur-reply that explains that common sense cannot be used in
14 order to fill the gaps in between the prior art and to make up for what is
15 missing in the prior art disclosure.

16 All right. So, moving ahead to slide 50. Okay. In order to make
17 best use of our time, we're flipping ahead in order to focus on Claim 9 and in
18 Ground 2, which is where Petitioner determined it made sense to focus most
19 of their arguments today. So, as we explained in slide 50, 9[b] requires
20 determining what the wearable electronic device worn on a head of the user
21 when the user is located inside the zone. Thus, the processor that is
22 determining user location must be located in the WED. In Ground 2,
23 Petitioner advances the same argument for 9[b] as it does for 1[b], which in
24 turn refers to its argument for Ground 1. As such, for the same reasons
25 discussed with respect to Ground 1, this argument fails. McCulloch does not
26 teach that the determination step occurs by way of a processor located in the

1 HMD.

2 So first, I wanted to address an issue, or an argument made by
3 Petitioner, which is the construction of the word with. This is something
4 that is addressed by the Board in the institution decision. So, we don't -- the
5 claim does not exclude the use of a base station or, you know, other objects
6 involved in the other devices external to the WED or PED. It doesn't
7 exclude them. And so, we're not saying that those devices can't be involved
8 in the overall process. And it also doesn't have the word exclusively, but if
9 the actual function is not being performed by the WED, then you're
10 essentially reading out the word with, you know, from Claim 9, feature 9[b],
11 which clearly states it's with a wearable electronic device worn on the head
12 of the user. So, it's the determining that is happening with the wearable
13 device. And if the main, you know, the meat and bones of that process is
14 ported elsewhere, then you can't, you know, you can't argue with a straight
15 face that it's still the WED that is performing that part of that aspect of the
16 overall process.

17 And here again, actually, I want to point out that McCulloch does
18 not actually teach SLP sound localization of an object. So, an object is not
19 an SLP, as I was saying earlier, and because the argument here with respect
20 to 9[c] is based on the idea that this basketball or the collision point of the
21 basketball with the TV is, you know, is an SLP, here again, the argument is
22 flawed for the same reason. You know, the virtual objects are not
23 themselves SLPs. The prior art would have to actually talk about SLPs, such
24 as, you know, Jang does talk about SLPs, but it doesn't -- you can't take Jang
25 and combine it in a reasonable sense with McCulloch or Pedrotti.

26 And for that reason, you know, Petitioner is trying to read the idea

1 of an SLP into McCulloch, in this case, before it was Pedrotti, but it's not
2 there. The discussion of SLPs is not there in McCulloch, and it's basically
3 they're assuming because there is sound in virtual space and virtual objects
4 make sound, that there must be SLPs. It's not, but the disclosure is not there.
5 So, as with 9[b], the features of 9[c] are also not taught by the prior art in
6 Ground 2. 9[c] requires determining with the WED worn on the head of the
7 user when the user is leaving the zone.

8 Specifically, nowhere in the prior art is it taught that the WED can
9 be used to determine that the user left the zone. In the prior art, the
10 processor within the WED does not track user position. Sensors in WED, as
11 described in Pedrotti, are not positioned to detect PED leaving the zone, and
12 McCulloch does not teach using WED sensors to track the PED. The
13 portions of McCulloch that were highlighted earlier, only the -- the
14 arguments were based on the idea that the technology would allow,
15 basically, the process to have occurred in the way that it's claimed. But this
16 is the definition of hindsight bias. They're using the claims and saying, well,
17 it's possible to look at the headset and to look at this, you know, Figure 9 and
18 these open-ended sentences that talk about the, you know, the presence of
19 sensors on the WED. It's possible that they could have been doing this, but
20 the disclosure is not there in the prior art.

21 And here again, Petitioner tries to use the testimony of its expert,
22 Dr. Welch, to fill the gap. However, you know, for lack of a better term, we
23 caught, you know, Dr. Welch on this issue. And he admitted in his
24 deposition that it makes no sense for the WED to be the device that is
25 tracking the PED. He admitted that it just -- a person of skill in the art
26 would not have done it that way. And for that reason, the prior art by, you

1 know, Petitioner's expert's own admission teaches away from the
2 combination and the reading of the prior art that Petitioner is attempting to
3 put forward here with respect to McCulloch and Ground 2.

4 So, turning to limitation 17[e], which recites that the WED
5 includes one or more sensors that sense when the PED leaves the zone. As
6 with 9[c], nowhere in the prior art is it taught that the WED can be used to
7 determine that the user left the zone. And the prior art, the processor within
8 the WED does not track user position. And I'd like to quickly point out for
9 the Court that the distinctions between Claim 2, 9[c], and 17[e] are not
10 addressed by Petitioner in its briefing in the IPR petition. They gloss over
11 the varying language between these three claims and portions of claims, and
12 they don't address the fact that the language is different and what is required
13 by each is different.

14 And we've gone into detail of this in Patent Owner's reply, and we
15 also addressed it in the sur-reply and explained that each of these three
16 claims and claim terms, or sorry, claims and features of claims, each of these
17 three is different. And for example, in Claim 2, it's sensing, and in Claim 9,
18 it's determining. And in 17 it's sensing, and in 9 it's determining. And
19 Claim 2 explicitly calls out the use of the processors in order to accomplish
20 the function. So, because the firm language is different and Petitioner failed
21 to address it, they failed to make a prima facie case with respect to any of
22 these three different features in the prior art in their IPR petition.

23 So, the VR book does not disclose WED tracking. The VR book,
24 which is put forward by, you know, together with Petitioner's expert as a sort
25 of stopgap to fill in the gaps in what's not disclosed in the prior art. It's
26 basically Petitioner's expert's crutch here to point to a large disclosure that he

1 can basically say that it was known and testify that the various items that are
2 missing were common sense. But if you actually, you know, if the Board
3 did decide that the VR book could be considered as part of these prior art
4 combinations, it's our contention that the VR book itself does not even
5 contain the necessary disclosure.

6 And turning to slide I think it's 54. So, limitation 10[a] recites
7 determining with the WED when the PED is pointed at one of the SLPs
8 while the user is located in the zone. Petitioner argues that McCulloch's
9 controllers communicate information to the HMD, but even if so, this
10 doesn't mean the HMD can determine when the PED is pointed at one of the
11 SLPs while the user is located in the zone.

12 Limitation 10[b] recites and --

13 JUDGE ARBES: I'm sorry counsel, going back to 10[a], can you
14 explain that a bit further? Why in the example that Petitioner pointed to of
15 the user pointing at the basketball, why would that not meet the point of that
16 limitation?

17 MR. FRAULO: Sorry, if you'll give me a second.

18 MR. DYKEMA: Your Honor, why don't I pull up our Patent
19 Owner's response, and I will respond to that question in my rebuttal portion,
20 if that's okay.

21 MR. FRAULO: Thank you, Your Honor. So, turning to limitation
22 10[b], and playing the binaural sound that originates from the one of the
23 SLPs in the zone in response to the WED determining that the PED is
24 pointed at the one of the SLPs. So, Petitioner's proposed combination
25 suffers from the same deficiencies as with Ground 1. Specifically, there's no
26 disclosure of playing binaural sound emanating from the pointed to SLP. I

1 think that's it.

2 I think we're at -- yeah, so, yeah, if there's no further question, we'd
3 like to reserve the remaining, I believe it's 18 minutes for rebuttal, Your
4 Honors.

5 JUDGE BROWNE: That's fine. I actually have it as 17 minutes,
6 but 18's fine. I gave Petitioner a bit more time in their original arguments.
7 So, Petitioner's counsel, you may begin your rebuttal when you're ready.

8 MR. HENRY: Thank you, Your Honor. I'll share my slides if I
9 have to address some of this, but I'd like to just start at an issue that should
10 be relatively straightforward, but I think was a bit muddled when Patent
11 Owner made their argument.

12 As you recognized, an SLP in the '509 patent is just a point or area
13 where sound is localized. That's it. That's what an SLP is. It's not some
14 convoluted articulation of what an SLP means via realistic sound or any of
15 the other things that Patent Owner argued in an attempt to circumvent the
16 art. With respect to the to the production of that sound, the art nails it. We
17 have binaural sound being produced at sound sources in Jang in Ground 1
18 that's clearly disclosed, and we have been upfront with the fact that the
19 combination of Pedrotti and Jang is driven by the fact that while Pedrotti
20 discusses virtual objects and recognizes that sound is important, it doesn't go
21 on to describe how sound might be produced for a fulsome, immersive
22 environment. And so, that's why Jang would come in by a person of
23 ordinary skill in the art would make that combination.

24 With respect to Ground 2, McCulloch has a 3D audio engine which
25 produces sound for the virtual objects at the location at which those virtual
26 objects are found. And Flaks similarly describes a 3D audio engine where

1 sound sources are where sound is produced binaurally for sound sources at
2 their locations, at the locations where virtual objects flow.

3 I'll bring one disclosure from Flaks to the Board's attention, and
4 this was cited in our petition. Flaks discloses that to the listener A, the
5 sound in the 3D audio signal may appear to be originating from some virtual
6 sound source 29. As one example, the virtual sound source could be an
7 object being displayed on the display. It is very clear here as Patent Owner's
8 counsel said at one point in their argument that if you have an object and it
9 has sound and it has a location, you have an SLP. So, that's very
10 straightforward. It's a point or area from which sound localizes. Yes.

11 JUDGE ARBES: Counsel, can I ask, when you say area, can it be
12 a two-dimensional rectangle in three-dimensional space like the virtual fence
13 in Pedrotti? And if so, how does that work? How does sound originate from
14 a two-dimensional rectangle like that?

15 MR. HENRY: Yes, Your Honor, it could be an area in that space.
16 It could be a rectangle or a square. And the way it would happen is you
17 would have an SLP that was defined for that area and you would have
18 HRTFs that would put sound into that area, somewhere in that area. It
19 would likely go to a point in that area, depending on the HRTFs that you
20 use. But the HRTFs hit different people's ears differently. And so, when
21 you're processing that sound, it's going to be directed based on the HRTFs
22 that you use to that area. But it could be a two-dimensional rectangle.

23 Now, I would just follow up on that, Your Honor, and say that
24 Pedrotti's fence is not necessarily a 2D grid. Pedrotti discloses that its fence
25 can be other shapes. It doesn't have to be just grid like, and it discloses that
26 other objects can be used in order to be consistent with the thematic

1 presentation of the virtual world that a user is in when they're playing a
2 game. And so, as you might have seen in some of our demonstratives, that
3 could be bars, right, on a prison. That could be a hummingbird distracter
4 that comes up when you get close to the edge of the fence. And so, those
5 things were known in the art. These are it doesn't have to be 2D, but it could
6 be, just like a point is an SLP, Your Honor. If there is a point from which
7 sound originates and it's localized sound, then you have an SLP. And
8 what --

9 JUDGE ARBES: Just for clarity and to close the loop on
10 Pedrotti --

11 MR. HENRY: Sure.

12 JUDGE ARBES: What exactly is the one of the SLPs that you are
13 mapping to the claim? Is it the virtual fence? Is it the virtual object, like a
14 virtual sword? Or is it both? What is your exact argument?

15 MR. HENRY: Your Honor, our lead argument is that it's the
16 virtual objects, which persons of skill in the art would know are sound-
17 producing objects, and which in the combination would be sound-producing
18 objects when you're using Jang's teachings of binaural sound used for virtual
19 objects in the zone. Secondly, we responded and we explained that the
20 fence could be an SLP as well because Patent Owner argued that all that is
21 pointed to by the controller pointing would be the fence and said the fence
22 couldn't be an SLP, but of course it could be an SLP, because Pedrotti
23 discloses that its fence, which is an area, which is a shape, generates sound.
24 It can generate an audio horn.

25 And now you may hear from Patent Owner, okay, but that's just a
26 generic audio warning that comes from the fence and then isn't an SLP

1 because it's not binaural. But that's why we have the combination. And you
2 go to Jang and you go to Begault, which Patent Owner ignores and Begault
3 discusses that in virtual reality, binaural sounds like bumping and crashing
4 are used to indicate when people exceed boundaries. And so, that would
5 happen with Pedrotti's fence. As a user is pointing their controller towards
6 the fence as Pedrotti discloses and getting closer and closer to the fence, then
7 the fence comes up and it generates a sound. That generation of that sound
8 would be binaural audio in accordance with the teachings of Begault.

9 And Dr. Welch has explained that you would couple those things
10 together because then you would have a more intuitive virtual environment.
11 For example, if you were extending your hand towards Pedrotti's fence and
12 pointing at it and the fence is an SLP and the sound you want to generate is
13 coming from the SLP, the sound, a person of skill in the art would know you
14 don't want the sound coming from behind your head and to the back.
15 Rather, you want the sound, as Begault teaches, to be where you are
16 exceeding the boundary and extending past the fence.

17 JUDGE ARBES: Okay. One more question. If we can ignore the
18 virtual sense, I'm sorry, virtual fence arguments for a moment and just focus
19 on the virtual objects, you argue in your reply about pages 6 to 7, talking
20 about the weapon example from Pedrotti with the sword, and that the user is
21 extending their hand toward that and picking it up. Where was that argued
22 in the petition?

23 MR. HENRY: Your Honor, that was argued in the petition with
24 the presentation of the interaction with virtual objects. I can get you a cite in
25 just a minute, but what was described in the petition was that a user of the
26 Pedrotti system would understand that you're taking the controller, you're

1 extending it toward virtual objects in order to pick it up, for example, and to
2 play with it as Pedrotti discloses. And a person of ordinary skill in the art
3 would understand that in combination, you are going to have binaural sound
4 generated for the virtual objects in your virtual area in accordance with
5 Jang's teachings and Begault's teachings. So, you are pointing at and then
6 interacting with the SLPs for the virtual objects like the weapon, like a gun,
7 like a lightsaber, for example, and these are things that Dr. Welch described.

8 JUDGE ARBES: Okay. Just to be clear, I'm a bit more concerned
9 with the connection to the highlighting. So it -- and correct me if I'm wrong,
10 but the secondary references, Jang and Begault, are not relevant to
11 highlighting at all, right?

12 MR. HENRY: Your Honor, with one proviso, that's effectively
13 correct. But what we've pointed out with in respect to Begault, Begault has
14 a disclosure, which is another disclosure that Patent Owner doesn't look at,
15 and we have menus. You have menu items disclosed in Begault, including
16 the 5.12 GUI with all the different SLPs in different areas that go to
17 spatialization of sound. In addition, there's a citation in Begault where you
18 have just menu selection. And although it's grainy in that Begault textbook,
19 you can select different items in a menu. And when you do that, you get a
20 box around the menus as you page through and leaf through different items
21 in Begault. And in our view, we would submit that is also highlighting in
22 response to pointing with a controller. I also, Your Honor, I just want to --

23 JUDGE ARBES: Okay. Counsel, if you can provide us with a
24 citation to the petition where that point was argued and also the earlier point
25 that I raised, we would appreciate it.

26 MR. HENRY: The citations for the earlier points are at 19 to 20 in

1 the petition and also 13. And then if I could -- and the Begault, I will get to
2 the Begault citations. I believe it's around Begault 159 to 162, with the
3 Begault reference, which is Exhibit 1007. And I actually have a slide on it,
4 Your Honor. If I can bring it up, if you'll just allow me to have a second to
5 bring it up. Are you able to see the presentation?

6 JUDGE ARBES: We are not, but if you can just give us a slide
7 number, we have it.

8 MR. HENRY: Okay. We'll get you the slide number on the
9 demonstrative for that.

10 Your Honor, I did want to mention just a few other things. And
11 when we get you that slide number, and it looks like I've raised my hand
12 argument, which was not intended. All right. So, a few other things I
13 wanted to discuss and address. I said we wouldn't belabor the point at the
14 outset that the Patent Owner is challenging the credibility of Dr. Welch. I
15 just wanted to mention again because you heard a number of times that Dr.
16 Welch was caught, or Dr. Welch used the VR book as a crutch, or Dr. Welch
17 did not do an appropriate analysis of the claims informing his opinions.
18 None of that is true.

19 If you look at the testimony that we provided, Dr. Welch was not
20 caught in any question where he's taking inconsistent positions during his
21 deposition. That's just not true. And in the analysis of the claims, he, like
22 Patent Owner and Petitioner and the Board at the institution decision,
23 approached these claims recognizing that they don't need particular
24 constructions for any particular elements. And he explained at his
25 deposition that that is different than not understanding the claims, not
26 presenting particular constructions of claim limitations is different from

1 analyzing the claims under their plain and ordinary meaning, which is the
2 approach that all parties to this proceeding have taken. And we have not
3 glossed over the claims either. We have stepped through every limitation
4 and every claim of the challenged patent and we have shown why the art in
5 both Grounds renders every challenged claim obvious.

6 I want to get you that slide number, Your Honor, and then I can, I
7 think I can wrap. So, just allow me a moment to get you the slide number
8 for the Begault.

9 I do see that I was correct that some of the icons in the Begault are
10 mentioned on slide 51, pages 159 to 160 in Begault. And the touch panel,
11 which I mentioned from the Begault, is on slide 53. Is the -- slide 53 is the
12 activating the bumping and crashing frame. So, slide 51 has the other
13 disclosures.

14 If the Board has no further questions on Petitioner's positions, then
15 we can rest our argument now.

16 JUDGE BROWNE: There being no questions, Patent Owner, if
17 you would like to begin your rebuttal.

18 MR. DYKEMA: Thank you, Your Honor. I'd like to briefly
19 respond to the question from Judge Arbes. I apologize if I slaughtered your
20 name right there, sir. And then if the Board has any questions, I'm happy to
21 field them. And if not, I have just a few brief points I'd like to cover.

22 First off, the Board just asked, just before we switched people here,
23 you know, why doesn't McCulloch disclose pointing? And I'd like to break
24 it down into sort of two separate steps. The first is that setting aside whether
25 McCulloch discloses the pointing, we don't believe that the pointing in some
26 of the arguments that were presented by counsel just now relating to

1 McCulloch and its pointing were set forth in the petition. The petition itself
2 doesn't speak about all of the arguments that counsel just made regarding
3 McCulloch.

4 Now, setting that aside, again, I believe that we have a little bit of
5 difference of opinion here between the Patent Owner and the Petitioner here
6 as to what is necessary to have a sound localization point. And that also
7 touches on this same issue. It is, in our view, the Petitioner's position that
8 the sound localization point is any point in the 3D space that if it can
9 generate a sound of any sort, we believe reads the word localization, or the L
10 in SLP, out of the claim.

11 Reading the '509 patent, it's clear that a sound localization point
12 must localize the sound to a fixed space or a fixed point in the 3D space.
13 And thus, not every single sound that's generated by a prior art reference, for
14 example, is a localized sound. And again, the reference to Begault, as I
15 understand it, is that by using the controller, for example, the user could
16 throw the virtual basketball into the virtual television of Begault, and a
17 sound would be created.

18 Again, the disclosure in McCulloch is not quite that detailed. It
19 certainly describes that the user can grab or select the virtual basketball. It
20 doesn't, though, select or it doesn't describe that, you know, when the user
21 does that, that either highlights the basketball or makes a sound at that point.
22 And then it does disclose that the basketball can be thrown into the virtual
23 television. But it doesn't necessarily follow that that happens when the user
24 points the controller at the television. Now, it could be like that. And the
25 Petitioner did use the word -- make a lot of good arguments. It could be this
26 way or it could be that way. But for those of us who don't know --

1 JUDGE ARBES: Counsel, doesn't Figure 8D show the user
2 pointing the controller at the basketball at the screen?

3 MR. DYKEMA: I'm not totally sure what 8D shows, Your Honor.
4 To me, it looks like the controller is pointed at the ceiling. Again, I'm not --

5 JUDGE ARBES: Assuming -- but there's a sequence of figures in
6 McCulloch, right? So, the user initially, like in Figure 8B, is pointing at the
7 virtual basketball and then presumably is going to move his left arm to the
8 right from Figure 8B to 8C to 8D, and now his arm is pointed where the
9 basketball has gone. Is that understanding of the operation of McCulloch
10 wrong?

11 MR. DYKEMA: No, I understand, Your Honor. Yeah, the
12 controller is pointing at the basketball. The problem here, again, Your
13 Honor, is that the basketball is -- it's not clear from McCulloch that the
14 basketball is a sound localization point. Petitioner's argument from earlier in
15 this proceeding was that the sound localization point, or the sound emanates
16 from the collision between the basketball and the television, but that's not
17 what the user selected or pointed at initially. They pointed at the basketball.
18 Our contention would be that what McCulloch discloses is that when objects
19 in the 3D space collide, the basketball collides with the TV or the floor or
20 something else, that collisions can have effects, visual effects, or in certain
21 cases perhaps sound effects, but that's different from pointing a controller at
22 a sound localization point and having sound result or the highlighting result
23 from that pointing. Does that make sense?

24 Again, for the same reason, Your Honor, while Petitioner argued
25 that selecting or pointing at an object could result in highlighting, and that
26 McCulloch did disclose highlighting amongst a list of many other visual

1 effects that could happen or it could be incorporated into a virtual reality
2 system, McCulloch simply, and other references, indeed, simply don't
3 disclose highlighting in response to pointing. And I would argue that this is
4 a fault that sort of flows through many of the Petitioner's different arguments
5 on both grounds. In Pedrotti, you know, the virtual fence is highlighted
6 when the user approaches it, not when the user points at it. Simply arguing
7 that there is highlighting, which was known, and there's a virtual fence, does
8 not actually disclose that the references teach, I'm sorry, it's not an argument
9 that the references teach or disclose the highlighting or the sound in response
10 to the pointing.

11 I'd like to briefly touch on a couple other points just in response to
12 the Petitioner's rebuttal. First, Your Honor, again, I just want to be clear.
13 We're not attacking Petitioner's expert's credibility or his fitness as an expert.
14 What we're criticizing in our papers is his approach to analyzing the
15 limitations. The problem is not that he isn't knowledgeable about the art or
16 anything like that. The problem is that, as my colleague Mr. Fraulo
17 described, what Petitioner's expert appears to have done is look at our patent
18 claims, the claims of the '509 patent, break them down in their constituent
19 parts, and then go fishing in the prior art to find a reference to each one of
20 those parts, and then recombine them accordingly into the claims. And that
21 is simply not an improper approach for the same reason that all this Board's
22 precedents and, in fact, the Federal Circuit's precedents point out amounts to
23 the impermissible hindsight bias. We have no problem with the Petitioner's
24 expert personally or his credibility, Dr. Welch.

25 I'd like to quickly just raise two other brief arguments with respect
26 to Claims 9 and 17, Your Honor. One is that, and this maybe have been

1 glossed over before, but we deal with it a lot more in the papers, is that for
2 claim limitation 9[b], we believe it's a requirement of the claims that the
3 determination step happen with the WED and not with another processor.
4 Again, as Mr. Fraulo discussed when he was speaking, the Board's initial
5 determination expressed, and we don't disagree, that there can be nothing
6 else involved. It's not that there can't be a base station involved possibly in
7 the process, but that if the determining step itself doesn't happen in the
8 WED, then we've read this limitation out of the claim. And we think that
9 that's an important sort of missing element from the Petitioner's presentation
10 here, which in our view amounts to a failure of proof. There simply is not
11 a -- there's not a disclosure in the petition or in the Petitioner's arguments
12 that the determining step happens in the WED in the prior art.

13 Likewise, Your Honors, I'd like to quickly take a look at Claim
14 17B. And here, again, we believe that the Petitioner has sort of made a -- or
15 there's been a failure of proof here in Claim 17. It arises again from sort of
16 the cursory way in which the petition tries to address these elements in the
17 prior art. So, Claim 17 refers back to Claim 2 and says that the limitations
18 found in 17 are disclosed by the prior art for the same reasons as discussed
19 with Claim 2. But, again, as Mr. Fraulo discussed before, the language of
20 Claim 17 and Claim 2 is simply different. They disclose different things.
21 I'm sorry, they claim different things, but the claim scope is different.

22 In particular, in Claim 17, the claim is directed to a WED that
23 includes one or more sensors that sense when the PED leaves the zone. In
24 other words what the sensors in the WED are sensing or detecting is that the
25 PED leaves the zone. It crosses the boundary from being inside the zone to
26 being outside of the zone. In contrast, the language of claim limitation 2[a],

1 which is the analysis that Petitioner points to in the petition to explain why
2 17 is obvious, claim limitation 2[a], the language is that there is tracking,
3 with one or more sensors in the WED, tracking the PED to determine when
4 the PED moves outside the zone. And I realize that there may be a slight bit
5 of uncertainty about what that refers to because moves outside the zone is
6 susceptible of, all by itself, could either mean cross the boundary, as
7 Petitioner seems to assert. But we think that's not the right interpretation.

8 And the reason for that is that if you look earlier to what Claim 2
9 depends on, which is Claim 1, Claim 1 makes clear that the activity is
10 happening inside the zone. Claim limitation 1[c] requires that the user is
11 located inside the zone. And thus, we think that the proper interpretation of
12 claim limitation 2[a], particularly the language, when the user, I'm sorry,
13 when the PED moves outside the zone, isn't a claim or isn't a limitation to
14 moving from inside the zone to outside the zone. Rather, what's disclosed or
15 what's claimed in claim limitation 2[a] is movement of the PED outside the
16 zone, if that makes sense. So, in other words, the language in claim
17 limitation 17, or Claim 17, claims being in the zone and leaving the zone.
18 The language in claim limitation 2[a] discusses movement outside the zone.
19 So, whatever it may be, if it's a safe zone, a dotted line on the ground, the
20 PED is moving, for example, back and forth outside the zone, moving
21 around, but it's not about crossing the boundary.

22 And the reason this is important, Your Honor, again, is that in
23 these proceedings, the Petitioner is held to the arguments and the evidence
24 they set forth in their grounds. And these grounds are simply different.
25 These different claim language in different claims that are about different
26 things. And for this reason, Your Honor, we believe that, again, the

1 Petitioners' presentation on Claim 17 simply fails to meet their burden of
2 proof because they haven't put forth evidence that relates to that specific
3 limitation.

4 If the Board has any questions, I'm happy to entertain them.

5 JUDGE BROWNE: I don't think we have any more questions. I'd
6 like to thank you both for your participation. We appreciate hearing what
7 you have to say. We also appreciate having a LEAP practitioner here,
8 giving that person the opportunity to appear before us.

9 And with that, the case is submitted. Thank you.

10 MR. HENRY: Thank you, Your Honors.

11 MR. DYKEMA: Thank you, Your Honors.

12 (Whereupon the above-entitled matter went off the record at 5:11
13 p.m.)

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