Agenda

Overview

The Board Should Reject Patent Owner's Results-Driven Claim Constructions

All Claims Are Unpatentable Over Lyren and Reif

Clement, Osman, and/or Sauk Render Claims Obvious

Earliest Priority for the '179 and '184 Patents' Is Their Filing Dates

Lockwood v. Am. Airlines, Inc.

"In order to gain the benefit of the filing date of an earlier application under 35 U.S.C. § 120, each application in the chain leading back to the earlier application must comply with the written description requirement of 35 U.S.C. § 112.

* * *

It is the disclosures of the applications that count. ***Entitlement to a filing date does not extend to subject matter which is not disclosed, but would be obvious over what is expressly disclosed.*** It extends only to that which is disclosed. While the meaning of terms, phrases, or diagrams in a disclosure is to be explained or interpreted from the vantage point of one skilled in the art, all the limitations must appear in the specification. The question is not whether a claimed invention is an obvious variant of that which is disclosed in the specification. ***Rather, a prior application itself must describe an invention, and do so in sufficient detail that one skilled in the art can clearly conclude that the inventor invented the claimed invention as of the filing date sought.***"

***Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1571-72 (Fed. Cir. 1997) (emphases added) (citations omitted)**

Earliest Priority for the '179 and '184 Patents' Is Their Filing Dates

The '140 Parent Application fails to reasonably convey possession of:

Limitation	Claims	Disclosed?
Warning/alerting by reducing volume and/or altering binaural sound **(how to warn/alert)**	'179 and '184 patent, cls. 1-20	
Warning/alerting user is leaving [3D virtual] environment/ image in the environment **(when to warn/alert)**	'179 and '184 patent, cls. 1-20	
Determining/sensing with the WED/HMD, when the user is leaving the [3D virtual] environment	'179 patent, cls. 1-20	

- **Because '179/'184 patents' earliest priority date is their filing date, Lyren and Reif are prior art**

Undisputed *that the combination of Lyren and Reif renders each of the Challenged Claims obvious*

Challenged Claims Lack Written Description Support

1 **Warning/Alerting By Reducing Volume and/or Altering Binaural Sound**

All Claims, '179/'184 Patents

2 **Warning/Alerting that the User is Leaving the [3D Virtual] Environment or Image in the Environment**

All Claims, '179/'184 Patents

3 **Determining/Sensing, with the WED/HMD, When the User is Leaving the [3D Virtual] Environment**

All Claims, '179 Patent

Every Independent Claim Recites Warning/Alerting by Reducing Volume and/or Altering Binaural Sound

'179 Patent Independent Claims

Claim 1

warning the user that the user is leaving the 3D virtual environment by filtering, by the DSP, the binaural sound to alter audio cues to prevent the user from experiencing external localization of the sounds and by lowering a volume of the sounds being provided to the user.

Claim 7

alerting the user that the user is leaving the environment by altering processing of the binaural sound to degrade audio cues in order to prevent the user from experiencing external localization of the binaural sound.

Claim 14

alerting the user that the user is leaving the environment by altering processing of the binaural sound to degrade audio cues in order to prevent the user from experiencing external localization of the binaural sound.

Ex. 1001 ('179 Patent), Claims 1, 7, and 14

'184 Patent Independent Claims

Claim 1

warning the user that the user is leaving the 3D virtual environment by filtering, by the DSP, the binaural sound to alter a spectral cue and lower a volume of the sound playing to the user.

Claim 7

alerting the user that the user is leaving the environment by altering processing of the sound by the DSP to degrade a spatial cue and to lower a volume of the sound playing to the user.

Claim 14

alerting the user that the user is leaving the virtual image in the environment by altering processing of the binaural sound by the DSP and reducing a volume of the binaural sound that localizes to the user at the virtual image.

Ex. 1001 ('184 Patent), Claims 1, 7, and 14

'140 Application Does Not Disclose Warning/Alerting By Reducing Volume and/or Altering Binaural Sound

'140 Parent Application

For example, the alert is an audible alert and/or a visual alert to a person. By way of example, such alerts include, but are not limited to, one or more of a displaying a visual warning, providing an audible sound, displaying or transmitting a message, altering or adding or removing an image or indicia, providing a command or instruction or notice to a process or computer program, actuating a light (such as a light emitting diode or LED), displaying a visual or perceivable indication or warning, playing an announcement, playing a video, and providing another indication that notifies a user.

IPR2023-01019, -01020, Ex. 1028 at 136:3-10

'140 Parent Application

Consider an example in which a child runs behind a car as it is backing up. A camera at the back of the car provides a video and audio alert in stereo to the driver. The driver, however, does not see or hear the alert so the car switches the alert to a binaural sound that emanates a sound alert from a location of the child.

IPR2023-01019, -01020, Ex. 1028 at 138:24-27

"Implicit" Disclosure Is Not Sufficient for Written Description

Patent Owner Response

The '140 Application also supports that the adjustments in binaural sound, such as a change in sound format from binaural to mono or stereo or the reduction in volume as disclosed in the '140 Application, would implicitly alert or warn the user that the user is leaving the environment/3D virtual environment. Begault Supp., ¶¶33, 51, 59-60; 66-70. As discussed above, the '140 Application describes events

IPR2023-01019, POR at 59;
***see also* IPR2023-01020, POR at 50**

Novartis Pharms. Corp. v. Accord Healthcare, Inc.

"'[T]he hallmark of written description is disclosure.'" . . . Silence is generally not disclosure."

* * *

Novartis contends the written description requirement may be satisfied by "implicit disclosure" as distinct from express or inherent disclosure. Novartis Br. 50-51. Yet it fails to identify any case holding that "implicit disclosure" (whatever that means) is sufficient. . . . If an implicit disclosure is one that would render the limitation obvious to a skilled artisan, such a disclosure cannot under our precedent satisfy the written description requirement. *Lockwood*, 107 F.3d at 1572 ("A description which renders obvious the invention for which an earlier filing date is sought is not sufficient.").

***Novartis Pharms. Corp. v. Accord Healthcare, Inc.*,**
38 F.4th 1013, 1017 & n.2 (Fed. Cir. 2022)
(first quote, citations omitted

'140 Application Does Not Inherently Disclosure Warning/Alerting by Reducing Volume and/or Altering Binaural Sound

Patent Owner's Expert, Dr. Begault's Deposition

Q. So it sounds like you are saying that changing binaural sound to stereo or mono would provide an alert or warning to user?

A. No. Not necessarily. It depends.

Ex. 1147 (Begault Dep.) at 86:22-87:5 (objection omitted)

'140 Application Does Not Inherently Disclosure Warning/Alerting by Reducing Volume and/or Altering Binaural Sound

'140 Parent Application

Consider the example above in which Alice wears earphones and localizes a voice of Bob in front of her during a phone call. The car has a sensor that determines Alice is on a binaural call and instructs an HPED of Alice to switch the call to mono. As another example, when Alice enters the car, a system in the car pairs with the HPED and automatically switches the call from binaural to mono. As another example, a GPS device or object recognition device (such as a camera with object recognition software) determine that Alice is entering or in the car and provides a signal to the HPED or other source of the call to switch the call from binaural to mono.

IPR2023-01019, -01020, Ex. 1028 at 136:3-10

Patent Owner's Expert, Dr. Begault's Deposition

Q. Why does Alice need an alert to know that she is in a car or leaving a car?

A. **The alert isn't about the -- whether or not she's leaving or entering a car. The alert has to do with the fact that now you are confirming that your audio is coming to you in monaural, for instance, because you are in a car. If it didn't do that, then there would be some problem with the system.**

Ex. 1147 (Begault Dep.) at 266:5-14 (objection omitted)

Earliest Priority For The '179 And '184 Patents' Is Their Filing Dates

The '140 Parent Application fails to reasonably convey possession of:

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Warning/alerting by reducing volume and/or altering binaural sound **(how to warn/alert)**	'179 and '184 patent, cls. 1-20	✖
Warning/alerting user is leaving [3D virtual] environment/ image in the environment **(when to warn/alert)**	'179 and '184 patent, cls. 1-20	
Determining/sensing with the WED/HMD, when the user is leaving the [3D virtual] environment	'179 patent, cls. 1-20	

- **Because '179/'184 patents' earliest priority date is their filing date, Lyren and Reif are prior art**

Undisputed *that the combination of Lyren and Reif renders each of the Challenged Claims obvious*

Challenged Claims Lack Written Description Support

1 Warning/Alerting By Reducing Volume and/or Altering Binaural Sound

All Claims, '179/'184 Patents

2 Warning/Alerting that the User is Leaving the [3D Virtual] Environment or Image in the Environment

All Claims, '179/'184 Patents

3 Determining/Sensing, with the WED/HMD, When the User is Leaving the [3D Virtual] Environment

All Claims, '179 Patent

Every Independent Claim Recites Warning/Alerting That the User Is Leaving a [3D Virtual] Environment/Image in the Environment

'179 Patent Independent Claims

Claim 1

warning the user that the user is leaving the 3D virtual environment by filtering, by the DSP, the binaural sound to alter audio cues to prevent the user from experiencing external localization of the sounds and by lowering a volume of the sounds being provided to the user.

Claim 7

alerting the user that the user is leaving the environment by altering processing of the binaural sound to degrade audio cues in order to prevent the user from experiencing external localization of the binaural sound.

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alerting the user that the user is leaving the environment by altering processing of the binaural sound to degrade audio cues in order to prevent the user from experiencing external localization of the binaural sound.

Ex. 1001 ('179 Patent), Claims 1, 7, and 14

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alerting the user that the user is leaving the environment by altering processing of the sound by the DSP to degrade a spatial cue and to lower a volume of the sound playing to the user.

Claim 14

alerting the user that the user is leaving the virtual image in the environment by altering processing of the binaural sound by the DSP and reducing a volume of the binaural sound that localizes to the user at the virtual image.

Ex. 1001 ('184 Patent), Claims 1, 7, and 14

'140 Application Does Not Disclose Warning/Alerting That the User Is Leaving a 3D Virtual Environment

'140 Parent Application

Consider the example above in which Alice wears earphones and localizes a voice of Bob in front of her during a phone call. The car has a sensor that determines Alice is on a binaural call and instructs an HPED of Alice to switch the call to mono. As another example, when Alice enters the car, a system in the car pairs with the HPED and automatically switches the call from binaural to mono. As another example, a GPS device or object recognition device (such as a camera with object recognition software) determine that Alice is entering or in the car and provides a signal to the HPED or other source of the call to switch the call from binaural to mono.

IPR2023-01019, -01020, Ex. 1028 at 120:20-27

'179 Patent, Claim 1

1. A method comprising:
storing head-related transfer functions (HRTFs) in memory of a head mounted display (HMD) worn on a head of a user;
displaying, with a display of the HMD worn on the head of the user, a three-dimensional (3D) virtual environment that includes a virtual image;
processing, by a digital signal processor (DSP) in the HMD, sounds with the HRTFs to generate binaural sound that is provided to the user and that externally localizes in empty space to the virtual image in the 3D virtual environment;
sensing, with one or more sensors in the HMD, when the user leaves the 3D virtual environment that includes the virtual image; and
warning the user that the user is leaving the 3D virtual environment by filtering, by the DSP, the binaural sound to alter audio cues to prevent the user from experiencing external localization of the sounds and by lowering a volume of the sounds being provided to the user.

Ex. 1001 ('179 Patent), Claim 1

'140 Application Does Not Disclose Warning/Alerting That the User Is Leaving an Environment

'140 Parent Application

Consider the example above in which Alice wears earphones and localizes a voice of Bob in front of her during a phone call. The car has a sensor that determines Alice is on a binaural call and instructs an HPED of Alice to switch the call to mono. As another example, when Alice enters the car, a system in the car pairs with the HPED and automatically switches the call from binaural to mono. As another example, a GPS device or object recognition device (such as a camera with object recognition software) determine that Alice is entering or in the car and provides a signal to the HPED or other source of the call to switch the call from binaural to mono.

IPR2023-01019, -01020, Ex. 1028 at 120:20-27

'179 Patent, Claim 14

14. A method executed by one or more electronic devices, the method comprising:

storing head-related transfer functions (HRTFs) in memory;

displaying, with a wearable electronic device (WED) worn on a head of a user, a virtual image in an environment;

processing, by a digital signal processor (DSP), sound with the HRTFs to generate binaural sound that externally localizes in empty space from the virtual image in the environment;

determining, with the WED, when the user is leaving the environment; and

alerting the user that the user is leaving the environment by reducing a volume of the binaural sound that localizes from the virtual image and that is being provided to the user.

Ex. 1001 ('179 Patent), Claim 14

'140 Application Does Not Disclose Warning/Alerting That the User Is Leaving an Image in the Environment

'140 Parent Application

Consider the example above in which Alice wears earphones and localizes a voice of Bob in front of her during a phone call. The car has a sensor that determines Alice is on a binaural call and instructs an HPED of Alice to switch the call to mono. As another example, when Alice enters the car, a system in the car pairs with the HPED and automatically switches the call from binaural to mono. As another example, a GPS device or object recognition device (such as a camera with object recognition software) determine that Alice is entering or in the car and provides a signal to the HPED or other source of the call to switch the call from binaural to mono.

IPR2023-01019, -01020, Ex. 1028 at 120:20-27

'184 Patent, Claim 14

14. A method executed by one or more electronic devices, the method comprising:

storing head-related transfer functions (HRTFs);

displaying, with a wearable electronic device (WED) worn on a head of a user, a virtual image in an environment;

processing, by a digital signal processor (DSP), sound with the HRTFs to generate binaural sound that externally localizes to the user at the virtual image in the environment; and

alerting the user that the user is leaving the virtual image in the environment by altering processing of the binaural sound by the DSP and reducing a volume of the binaural sound that localizes to the user at the virtual image.

Ex. 1001 ('184 Patent), Claim 14

'140 Application Lacks Sufficient Written Description of the Claimed Genus

Ariad Pharms., Inc. v. Eli Lilly & Co.

[T]he description must "clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed." In other words, the test for sufficiency is whether the disclosure of the application relied upon reasonably conveys to those skilled in the art that the inventor had possession of the claimed subject matter as of the filing date.

* * *

[A] sufficient description of a genus instead requires the disclosure of either a representative number of species falling within the scope of the genus or structural features common to the members of the genus so that one of skill in the art can "visualize or recognize" the members of the genus.

***Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1350-51 (Fed. Cir. 2010) (en banc) (citations omitted)**

'140 Application Lacks Sufficient Written Description of the Claimed Genus

D Three Enters., LLC v. SunModo Corp.

Having determined that the 2009 Application discloses a washerless assembly, we must determine whether a PHOSITA would recognize "upon reading the [2009 Application]" that any attachment brackets as claimed in the Washerless Claims could be used in washerless assemblies. We agree with the District Court that washerless assemblies using attachments other than attachment bracket 1700, which has "W[-]shaped prongs," are not adequately disclosed, because the 2009 Application in no way contemplates the use of other types of attachment brackets in a washerless assembly, . . . As we have stated, "**[i]t is not sufficient for purposes of the written description requirement of § 112 that the disclosure, when combined with the knowledge in the art, would lead one to speculate as to the modifications that the inventor might have envisioned, but failed to disclose**."

D Three Enters., LLC v. SunModo Corp., 890 F.3d 1042, 1050-51 (Fed. Cir. 2018) (citations omitted)

'140 Application Lacks Sufficient Written Description of the Claimed Genus

Petitioner's Expert, Dr. Roginska, Supplemental Declaration

alert that the user is leaving a visually immersive environment. For example, 3D virtual environments add several complications not addressed or relevant in physical environments. For instance, 3D virtual environments require users or the system to first define the area within which the 3D virtual environment may safely exist. *E.g.*, Ex.1080 15:13-24; Clement 4:26-46. POSAs would have also understood that these

Ex. 1146 (Roginska Suppl. Decl.) ¶ 81

Ex.1080 15:13-24; Clement 4:26-46. POSAs would have also understood that these 3D virtual environments require that special consideration is given to users leaving such environments to ensure their safety as they leave such environments, including to avoid motion sickness and safely transition back to the real world. Clement 5:6-12. They also require unique tracking consideration to detect when users leave the specific identified boundary. Ex.1080 4:49-5:24. None of these, or similar questions, are addressed or considered in the '140 Application, and therefore a POSA would not have understood the '140 Application to disclose warning the user that it is leaving an immersive virtual environment.

Ex. 1146 (Roginska Suppl. Decl.) ¶ 81

Figure 6 Does Not Disclose Warning/Alerting That the User Is Leaving A [3D Virtual] Environment/Image in the Environment

'140 Parent Application

Figure 6 is a method to determine a location of a person and to take an action when the person moves into a restricted area.

Block 600 states determine a location of a person while the person moves and localizes sound to a sound localization point that is away from but proximate to the person.

Block 610 makes a determination as to whether the person moves into a restricted area.

If the answer to the determination is "yes" then flow proceeds to block 620 that states take action.

If the answer to the determination is "no" then flow proceeds to block 630 that states maintain binaural sound at SLP while the person moves.

IPR2023-01019, -01020, Ex. 1028 at 119:9-32

'140 Parent Application Figure 6

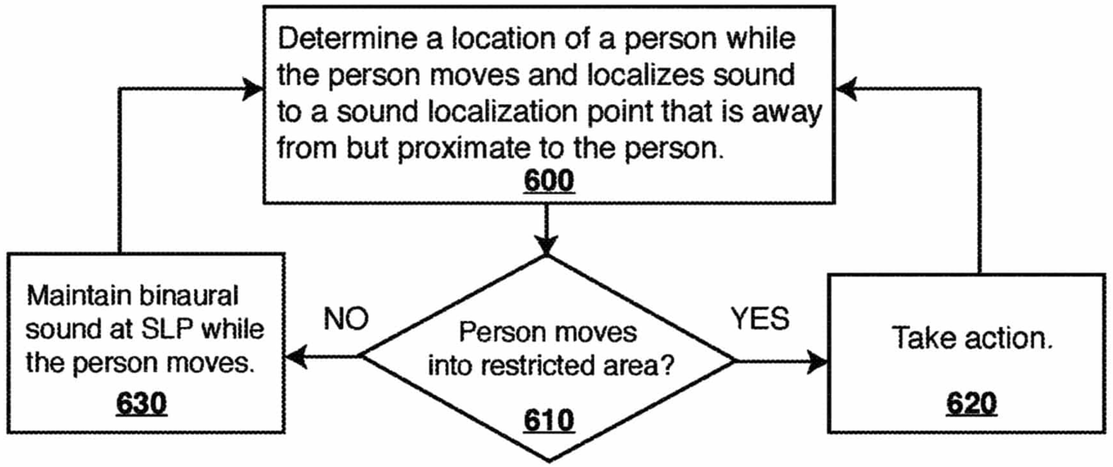


Figure 6

IPR2023-01019, -01020, Ex. 1028, Fig. 6

Figure 6 Does Not Disclose Warning/Alerting That the User Is Leaving A [3D Virtual] Environment/Image in the Environment

Patent Owner Sur-Reply

otherwise altering it. POR.48-60. When describing Figure 6, the '140 Application expressly states that, at block 600, the user starts in an environment where "sound [is localized] to a sound localization point that is away from but proximate to the person," or a 3D virtual environment. Ex.1028, 119:21-23. When the user moves into a restricted area, or "an area, location, or a point that prohibits SLPs," an event is detected, which causes the audio to alter the 3D sound being experienced by the user. *Id.*, 119:21-32. Thus, when the user leaves one physical environment (i.e., the non-restricted area) and moves into another physical environment (i.e., the restricted area) the user is alerted by the change in the 3D sound being provided by the user. Begault Supp., ¶52.

IPR2023-01019, POSR at 18

'140 Parent Application Figure 6

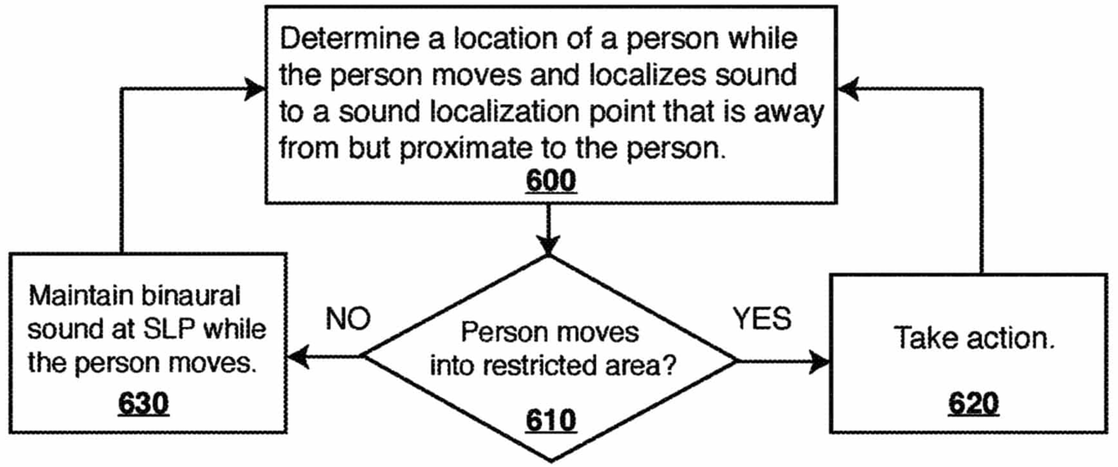


Figure 6

IPR2023-01019, -01020, Ex. 1028, Fig. 6

Figure 6 Does Not Disclose Warning/Alerting That the User Is Leaving A [3D Virtual] Environment/Image in the Environment

'140 Parent Application

Examples of restricted areas include, but are not limited to, an area, a location, or a point that prohibits SLPs or sound localization, an area in which it is dangerous to localize sound, a vehicle, or other location. Examples of such locations include at or near a construction zone or other inherently dangerous or hazardous area, inside an automobile, on a motorcycle or other motorized vehicle, in a library or a hospital or a sports arena or an elevator or a school or classroom, on a public transport (such as a bus, train, or airplane). Restricted areas can also include areas where a person or object is located or areas where another SLP is located. Restricted areas further include areas that are too small or confined so that the area impedes, limits, or restricts a SLP or external localization of sound.

IPR2023-01019, -01020, Ex. 1028 at 120:1-11

Boilerplate Disclosure Does Not Reasonably Convey to a Skilled Artisan That the Inventor Had Possession of the Claims

Patent Owner Sur-Reply

The '140 Application also discloses that "[e]xamples herein can take place in physical spaces, in computer rendered spaces (VR), in partially computer rendered spaces (AR), and in combinations thereof." *Id.* at 168:15-16; *see also* POR.54. In

IPR2023-01019, POSR at 18-19; IPR2023-01020, POSR at 19

Petitioner's Expert, Dr. Roginska, Supplemental Declaration

82. Dr. Begault seems to try to combine disparate embodiments to find disclosure of leaving a visually immersive environment. Ex.2012 ¶¶ 53-55. But the '140 Application never describes "a virtual space where 3D audio is not permitted" contrary to Dr. Begault's attempt to combine embodiments to find such a teaching. Ex.2012 ¶ 55. Nor is there any reason why a POSA would have understood the '140 Application to be teaching modifying Figure 6 to apply to visually immersive environments.

Ex. 1146 (Roginska Suppl. Decl.) ¶ 82

'140 Application Does Not Disclose Warning/Alerting in Response to Leaving a [3D Virtual] Environment /Image in the Environment

Patent Owner Response

¶¶63-64. Further, the '140 application provides an example where Alice decides to leave a 3D visually rendered space, by turning off her display, which causes altering of the binaural sound to a chosen location for communications with no visual image. Ex. 1028 127:28-128:7.

IPR2023-01020, POR at 48-49

'140 Parent Application

Consider an example in which Alice and Bob are both in a 3D visually rendered space talking binaurally face-to-face in full-duplex with each person in a medial plane of the other. Because they can see each other's visual representation, they experience accurate sound localization of each other's voices. Soon Alice turns off her display and is left with only the binaural audial experience of their talk (i.e., Bob's SLP no longer has an accompanying visual image). Due to the lack of a visual cue, Alice cannot accurately locate the SLP of Bob's voice. The system detects that her screen is off, knows Bob's SLP is in her medial plane, and knows she has no head tracking hardware. The system makes a verbal announcement to Alice ("Adjusting localization") and moves Bob's SLP to a predetermined position that Alice has chosen for all communications with no visual image. Alice is familiar with where this location is and looks to Bob's SLP as she continues the conversation with Bob.

Ex. 1028 at 127:28-128:7

'140 Application Does Not Disclose Warning/Alerting in Response to Leaving a [3D Virtual] Environment /Image in the Environment

Patent Owner Response

In addition, even assuming, *arguendo*, that the '140 Application does not explicitly provide an ***example*** that the WED determines that the user is leaving the 3D virtual environment, the '140 Application describes events related to the user's physical and virtual environment that trigger altering binaural sound:

- "a change in the ability to detect … *position in a physical or a virtual environment*;"
- "cues indicating … a *changing in a physical or virtual environment*;" and
- "a degradation in the *visibility of a user's physical or virtual environment*."

IPR2023-01019, POR at 56; *see also* IPR2023-01020, POR at 49

'140 Parent Application

Among other things, events can be triggered by changes in a user's or a remote user's network conditions, system resources, hardware, software, operating system notifications, the passage of time, the granting or denial of various resource and/or file permissions, a change in the ability to detect motion and/or object location and/or orientation and/or position in a physical or a virtual environment, or a change in the ability to detect an environment, its shape, acoustic properties, or noise level. Events

Ex. 1028 at 140:31-141:4

'140 Application Does Not Disclose Warning/Alerting in Response to Leaving a [3D Virtual] Environment /Image in the Environment

Patent Owner Response

In addition, even assuming, *arguendo*, that the '140 Application does not explicitly provide an ***example*** that the WED determines that the user is leaving the 3D virtual environment, the '140 Application describes events related to the user's physical and virtual environment that trigger altering binaural sound:

- ✗ "a change in the ability to detect … *position in a physical or a virtual environment*;"
- ✗ "cues indicating … a *changing in a physical or virtual environment*;" and
- "a degradation in the *visibility of a user's physical or virtual environment*."

IPR2023-01019, POR at 56; *see also* IPR2023-01020, POR at 49

'140 Parent Application

ability to detect an environment, its shape, acoustic properties, or noise level. Events are also triggered according to one or more audio cues detected in a user's or a remote user's physical or virtual environment such as cues indicating a location, position, or orientation, or a change in them, cues indicating a reference frame of a user or a remote user, a lateral or vertical motion, a change in distance, a change in a physical or a virtual environment such as its shape, acoustic properties, noise level, or placement of objects or structures in the environment. Events can also be triggered by a change in the spatial or positional congruency between shapes or things within multiple physical or virtual environments, or by a request from a user or a remote user or their application software, operating system, or hardware.

Ex. 1028 at 141:4-13

'140 Application Does Not Disclose Warning/Alerting in Response to Leaving a [3D Virtual] Environment /Image in the Environment

Patent Owner Response

In addition, even assuming, *arguendo*, that the '140 Application does not explicitly provide an ***example*** that the WED determines that the user is leaving the 3D virtual environment, the '140 Application describes events related to the user's physical and virtual environment that trigger altering binaural sound:

- ✗ "a change in the ability to detect … *position in a physical or a virtual environment*;"
- ✗ "cues indicating … a *changing in a physical or virtual environment*;" and
- ✗ "a degradation in the *visibility of a user's physical or virtual environment*."

IPR2023-01019, POR at 56; *see also* IPR2023-01020, POR at 49

'140 Parent Application

Events can be triggered by a change in a user's ability to associate visual cues or images with the associated audio cues, such as a visually rendered character vanishing from an augmented or virtual environment, the presence or absence of a physical object, a failure of a visual display system, a degradation in the visibility of a user's physical or virtual environment, or the impairment or failure of a user's physical eyesight. For example, when a listener externalizes a SLP in his cone of confusion, a system switches the SLP to stereo or mono to prevent irritation of the user, or when judged appropriate can move that SLP out of the cone of confusion instead. A user is irritated by the positional blurring he perceives to SLPs that do not have a corresponding visual anchor, and the system switches accordingly. As another example, a user who has lost visual display of an environment being presented in stereo or mono can benefit by having the system switch the presentation of the audio to binaural. Such a switch occurs if a determination is made that an environment can be spatially perceived through audio only.

Ex. 1028 at 141:15-28

Boilerplate Language Is Not Sufficient to Show Adequate Disclosure of the Claims

D Three Enters., LLC v. SunModo Corp.

This boilerplate language at the end of the 2009 Application's specification is not sufficient to show adequate disclosure of the actual combinations and attachments used in the Washerless Claims. *See Knowles Elecs. LLC v. Cirrus Logic, Inc.*, 883 F.3d 1358, 1367-68 (Fed. Cir. 2018) (finding lack of adequate written description where only general soldering was disclosed in a specification, but claims disclosed a specific means of soldering).

***D Three Enters., LLC v. SunModo Corp.*, 890 F.3d 1042, 1050-1051 (Fed. Cir. 2018)**

Patent Owner's Cited Cases Do Not Suggest a Different Outcome

Northrop Grumman Corp. v. Intel Corp.

Moreover, the patent teaches one skilled in the art that "the present invention may be made to conform to any one of a variety of data transfer algorithms." '229 patent, col. 17, ll. 55-57. Contrary to the finding of the district court and the assertions of 3Com, the patent does not rest upon a mere "boilerplate" suggestion of broad application. It goes on to provide substantive, albeit general, support for that declared intention:

> Implementation of a desired algorithm is readily accomplished in the present invention by defining functional states around the desired sequences, assigning bit patterns for each defined state, and making the appropriate connections for each assigned bit pattern in sequence logic 220.
>
> *Id.*, col. 17, ll. 57-63.

* * *

We recognize that our construction of claims 1 and 13 results in according those claims substantial breadth, and that the breadth of the claims may raise questions as to their validity. Any question as to validity, however, is for the district court to address on remand, inasmuch as the only issue before us on this appeal is claim construction.

***Northrop Grumman Corp. v. Intel Corp.*, 325 F.3d 1346, 1355-56 (Fed. Cir. 2003) (emphasis added)**

Patent Owner's Cited Cases Do Not Suggest a Different Outcome

DealerTrack, Inc. v. Huber

While in some circumstances this may be taken as rote language, the additional context of the list cannot:

> "Although illustrated as a wide area network, it should be appreciated that the communications medium could take a variety of other forms, *for example*, a local area network, a satellite communications network, a commercial value added network (VAN) ordinary telephone lines, or private leased lines. . . . The communications medium used need only provide fast reliable data communication between its users."

Id. col.17 l.67 — col.18 l.9 (emphases added). ***The specification thus gives a basic definition of a communications medium as anything that "need only" provide "fast reliable data communication between its users***." *Id.* The list itself is explicitly prefaced with a description that the enumerated articles are "example[s]." The natural reading of this paragraph, and the only reading that does not violate this court's repeated prohibition against importing limitations from the specification, is of a non-exhaustive list that, if anything, broadens the definition of "communications medium."

***DealerTrack, Inc.* v. *Huber*, 674 F.3d 1315, 1322 (Fed. Cir. 2012) (emphasis added)**

Patent Owner's Cited Cases Do Not Suggest a Different Outcome



Honeywell Int'l, Inc. v. United States

It is true that figures 2 and 3 of the original application disclosed an embodiment using a local display (37) consisting of three monochromatic CRTs (51-53). But the original application also explained that "[i]n the case of the local display 37 using separate cathode ray tubes 51-53 ***or other display transducers***, it is possible to more easily filter offending colors from reaching the [NVG]." Moreover, the original application stated that "[w]hile specific configurations of the local display . . . 37 have been described, it is understood that the present invention can be applied to a wide variety of display and vision aid devices." While original figure 3 may have disclosed a CRT, there is no reason, in light of the other statements in the specification, to limit the disclosure to only CRTs.

***Honeywell Int'l, Inc. v. United States*, 609 F.3d 1292, 1301 (Fed. Cir. 2010)**

Patent Owner's Cited Cases Do Not Suggest a Different Outcome

Honeywell Int'l, Inc. v. Nikon Corp.

Though the parties asked the Court to construe a rather lengthy claim phrase, the dispute here is really only about the term "viewing angle." . . . The Court concludes that Defendants' position that the patent is limited to "vertical" luminance tailoring is an errant construct of the patent's description of a particular exemplary application (i.e., airplane cockpits). . . . [T]he Court will not limit claims to examples in the specification.

* * *

Indeed, the language in the '371 specification referring to other embodiments is not boilerplate "catch-all" legalese, but rather reflects a deliberate effort by the patentee to use an example to help describe the invention and its embodiments. . . . Pairing a description of a specific, concrete use of the invention with a generalized description of the invention, the specification thus uses an example in the usual way to clarify the broader concept.

***Honeywell Int'l, Inc. v. Nikon Corp.*, 589 F. Supp. 2d 433, 441-42 (D. Del. 2008) (citations omitted)**

Earliest Priority For The '179 And '184 Patents' Is Their Filing Dates

The '140 Parent Application fails to reasonably convey possession of:

Limitation	Claims	Disclosed?
Warning/alerting by reducing volume and/or altering binaural sound **(how to warn/alert)**	'179 and '184 patent, cls. 1-20	✗
Warning/alerting user is leaving [3D virtual] environment/ image in the environment **(when to warn/alert)**	'179 and '184 patent, cls. 1-20	✗
Determining/sensing with the WED/HMD, when the user is leaving the [3D virtual] environment	'179 patent, cls. 1-20	

- **Because '179/'184 patents' earliest priority date is their filing date, Lyren and Reif are prior art**

Undisputed *that the combination of Lyren and Reif renders each of the Challenged Claims obvious*

Challenged Claims Lack Written Description Support

1 Warning/Alerting By Reducing Volume and/or Altering Binaural Sound

All Claims, '179/'184 Patents

2 Warning/Alerting that the User is Leaving the [3D Virtual] Environment or Image in the Environment

All Claims, '179/'184 Patents

3 Determining/Sensing, with the WED/HMD, When the User is Leaving the [3D Virtual] Environment

All Claims, '179 Patent

All Independent Claims of '179 Patent Recite Determining / Sensing, With the WED/HMD, When the User Is Leaving the [3D Virtual] Environment

'179 Patent Independent Claims

Claim 1

determining, with the WED, when the user is leaving the environment; and

Claim 7

sensing, with one or more sensors in the HMD, when the user leaves the 3D virtual environment that includes the virtual image; and

Claim 14

determining, with the WED, when the user is leaving the environment; and

Ex. 1001 ('179 Patent), Claims 1, 7, and 14

'140 Application Does Not Disclose Determining/Sensing, with the WED/HMD, When the User Is Leaving the [3D Virtual] Environment

Patent Owner Response

1. The detection of the event triggering the change in audio is based on the physical location of the user, as can be tracked via a location and movement tracker of the WED/HMD. *See id.*, 120:20-27.

IPR2023-01019, POSR at 23

'140 Parent Application

Consider the example above in which Alice wears earphones and localizes a voice of Bob in front of her during a phone call. The car has a sensor that determines Alice is on a binaural call and instructs an HPED of Alice to switch the call to mono. As another example, when Alice enters the car, a system in the car pairs with the HPED and automatically switches the call from binaural to mono. As another example, a GPS device or object recognition device (such as a camera with object recognition software) determine that Alice is entering or in the car and provides a signal to the HPED or other source of the call to switch the call from binaural to mono.

Ex. 1028 at 120:20-27

'140 Application Does Not Disclose Determining/Sensing, with the WED/HMD, When the User Is Leaving the [3D Virtual] Environment

'140 Parent Application

Blocks and/or methods discussed herein can be executed and/or made by a user, a user agent (including machine learning agents and intelligent user agents), a software application, an electronic device, a computer, firmware, hardware, a process, a computer system, and/or an intelligent personal assistant. Furthermore, blocks and/or methods discussed herein can be executed automatically with or without instruction from a user.

Ex. 1028 at 167:9-14

By way of example, electronic devices include, but are not limited to, a computer, handheld portable electronic devices (HPEDs), wearable electronic glasses, watches, wearable electronic devices, portable electronic devices, computing devices, electronic devices with cellular or mobile phone capabilities, digital cameras, desktop computers, servers, portable computers (such as tablet and notebook computers), electronic and computer game consoles, home entertainment systems, handheld audio playing devices (example, handheld devices for downloading and playing music and videos), appliances (including home appliances), personal digital assistants (PDAs), electronics and electronic systems in automobiles (including automobile control systems), combinations of these devices, devices with a processor or processing unit and a memory, and other portable and non-portable electronic devices and systems.

Ex. 1028 at 159:5-16

'140 Application Does Not Disclose Determining/Sensing, with the WED/HMD, When the User Is Leaving the [3D Virtual] Environment

Patent Owner Sur-Reply

103:21-36 (reference numbers omitted). This scenario 114, taken with the disclosure regarding Figure 6, which describes altering the audio being experienced by the user upon detection the user is moving into a restricted area (119:21-23, 25-32), reasonably conveys to a POSITA that the inventors had possession of the claimed invention. *See also* '140 Application, 170:21-22 ("[M]ethods discussed within different figures can be added to or exchanged with methods in other figures.").

IPR2023-01019, POSR at 25

'140 Parent Application

In scenario 114, a user 150 wears an optical head mounted display (OHMD) 152 that simultaneously provides a plurality of sound localization points 154, 155, 156, and 157 during a conference call with four individuals (each individual being represented with a visual image and accompanying SLP). As such, the sound localization points 154 – 157 coincide with visual displays or images of people with whom the user 150 talks. As shown in the transition from box 160A to box 160B, sound localization point 154 (appearing as a visual image of person) walks through a door and out of view of the user 150. When this occurs, the SLS providing sound to the OHMD 152 switches the voice of the corresponding person to mono, and the system providing video to the OHMD 152 removes the accompanying visual image of the person from being displayed to the user 150.

Ex. 1028 at 103:21-36

'140 Application Does Not Disclose Determining/Sensing, with the WED/HMD, When the User Is Leaving the [3D Virtual] Environment

Novozymes A/S v. Dupont Nutrition Biosciences APS

"Working backward from a knowledge of [the claims], that is by hindsight," ***[Patent Owner] seeks to derive written description support from an amalgam of disclosures plucked selectively from the 2000 application.*** *Ruschig*, 379 F.2d at 995. . . . With such an approach "it is all very clear what route one would travel through the forest of the specification to arrive at [the claimed invention]." *Ruschig*, 379 F.2d at 995. However, viewing the matter from the proper vantage point "of one with no foreknowledge of the [claimed invention]," we agree with the district court that the particular variants claimed in the '723 patent lack meaningful support in the written description of the 2000 application. *Id*.

***Novozymes A/S v. Dupont Nutrition Biosciences APS*, 723 F.3d 1336, 1349 (Fed. Cir. 2013)**

Earliest Priority For The '179 And '184 Patents' Is Their Filing Dates

The '140 Parent Application fails to reasonably convey possession of:

Limitation	Claims	Disclosed?
Warning/alerting by reducing volume and/or altering binaural sound **(how to warn/alert)**	'179 and '184 patent, cls. 1-20	✗
Warning/alerting user is leaving [3D virtual] environment/ image in the environment **(when to warn/alert)**	'179 and '184 patent, cls. 1-20	✗
Determining/sensing with the WED/HMD, when the user is leaving the [3D virtual] environment	'179 patent, cls. 1-20	✗

- **Because '179/'184 patents' earliest priority date is their filing date, Lyren and Reif are prior art**

Undisputed *that the combination of Lyren and Reif renders each of the Challenged Claims obvious*

Agenda

Overview

The Board Should Reject Patent Owner's Results-Driven Claim Constructions

All Claims Are Unpatentable Over Lyren and Reif

Clement, Osman, and/or Sauk Render Claims Obvious

- POSAs Would Have Combined Clement and Osman with Sauk
- Combination Teaches Each Element of the Challenged Claims
- Clement and Osman Alone Render Obvious Claim 14 of the '179 Patent

Clement, Osman, and/or Sauk Render Claims Obvious

1 **POSAs Would Have Combined Clement and Osman with Sauk**

'179/'184 Patents, cls. 1, 3, 4, 6-10, 14-19

2 **Combination Teaches Each Element of the Challenged Claims**

'179/'184 Patents, cls. 1, 3, 4, 6-10, 14-19

3 **Clement and Osman Alone Render Obvious Claim 14 of the '179 Patent**

Undisputed That POSAs Would Have Combined Clement and Osman

Clement

SUMMARY

In one aspect, a method of operating an audio visual system configured to generate a virtual immersive experience may include activating a tracking device and tracking a position of a user electronic device in a real world space, detecting a transition condition, and performing a transition process to transition out of the virtual world generated by the user electronic device in response to the transition condition.

Ex. 1005 (Clement) at 1:21-30

In some embodiments, the transition may include a fade of sound content. For example, when transitioning from the virtual world to the real world, audio content associated with the virtual world may fade out, accompanied by a fade in of ambient sound. In some embodiments, the fade out of virtual audio content and the fade in of ambient sound may accompany the fade out of virtual images and the fade in of real world images. In some embodiments, the fade out of virtual audio content and the fade in of ambient sound may be accomplished serially, so that the ambient sound is not superimposed on, or output at the same time as, the virtual audio content.

Ex. 1005 (Clement) at 9:20-31

Undisputed That POSAs Would Have Combined Clement and Osman

Osman

A sound localization function f (also known herein as a sound function, a localization function, and sometimes plainly as a "function") is a function or algorithm that generates a localized sound based on a sound and the location in space perceived as the origin of the sound. The localized sound, when played through speakers, gives the impression to the listener that the sound originated in the desired location, even though the sound is really originating at the speakers. The function f can be mathematically expressed as:

$$ls=f(s, l) \quad (1)$$

Where s is the sound (e.g., a dog bark), l is the location where the sound is supposed to originate, and ls is the localized sound. One example of a sound localization function is a Head-Related Transfer Function (HRTF), which is a response that characterizes how an ear receives a sound from a point in space. A pair of HRTFs for the ears may be utilized to synthesize a binaural sound that seems to come from a particular point in space. The HRTF can also be described as the modifications to a sound from a direction in free air to the sound arriving at the eardrum. These modifications include the

Ex. 1006 (Osman) at 4:37-57

Undisputed That POSAs Would Have Combined Clement and Osman

Surrounded by sound: how 3D audio hacks your brain

A century-old audio technology is making a comeback thanks to VR

By Mona Lalwani on February 12, 2015 10:30 am

* * *

Slowly but surely, binaural is becoming a linchpin in virtual reality development. Oculus' most recent prototype, Crescent Bay, unveiled at CES last month, integrates binaural technology with Rift's head tracking for complete audio-visual immersion. And while Sony's Project Morpheus hasn't announced final specifications of the product yet, their emphasis on 3D audio is evident. As Adam Somers of Jaunt put it, "Binaural audio is critical to an immersive experience within the context of VR. We consider audio to be 50 percent of the immersive experience."

Ex. 1065 at 1, 6

Three-dimensional audio makes virtual reality so much better it's crazy

Dave Smith Apr 3, 2015, 1:06 PM

* * *

"It's extremely important. It's crucial to the experience actually," he told me. "If I'm far away, just like in real life, my voice fades in AltSpace; and if I'm close, my voice is going to be louder.

"If you're on my left or right I can tell who's talking. If we're 5 or 6 people in a circle, I can tell this person is talking because I can see they're blinking and their sound's coming from there."

Ex. 1066 at 1, 3

POSAs Would Have Combined Clement and Osman with Sauk

Clement

As noted above, in some embodiments the system may generate a warning indicator and/or initiate the transition process upon detection of obstacles, i.e., stationary obstacles, already present in the room, such as, for example, furniture and the like. The warning indicator may include, for example, a visual indicator and/or an audible indicator and/or a physical indicator such as, for example a buzz or vibration of the HMD **100**. The system may also generate a warning indicator and/or initiate the transition process upon detection of new obstacles detected as the tracking device **310** scans and updates the configuration of the space **300**, such as, for example the opening of the door **315** shown in FIG. **5**B. In some embodiments, the system may also gen-

Ex. 1005 (Clement) at 8:10-22

In some embodiments, the tracking device **310** may not just track the physical position and movement of the user A in the space **300**, but may also detect when the user A is within a predetermined distance, or threshold, of a boundary or edge of the tracking area **320**, at which loss of tracking may be imminent. As shown in the example illustrated in FIG. **3**B, this loss of tracking by the tracking device **310** may be considered imminent when, for example, the zone Z approaches the boundary of the tracking area **320**, in advance of when the user actually moves into an area of the space **300** which cannot be tracked by the tracking device **310**. For example, the system may issue a warning or indicator, and/or may automatically initiate a fluid or graceful transition out of the virtual world when the user is at position **4**, even though the user is still in the tracking area **320** at position **4**, so that by the time the user reaches position **5**, the transition out of the virtual world will be complete, and the user may avoid disorientation and/or discomfort due to the loss of tracking.

Ex. 1005 (Clement) at 5:55-6:6

POSAs Would Have Combined Clement and Osman with Sauk's Relevance Signal

Sauk

B. Selective Relevance Mode

The selective filtering techniques described above can be utilized by BSS **400** in another configuration which combines a plurality of audio dimensions such as 3-D (binaural), 2-D (stereophonic), and 1-D (monophonic). For example, in certain circumstances, a user may not want to eliminate all background audio information. However, rather than keeping the less relevant audio in the same audio dimension with their desired binaural sound sources, a user could change the less relevant audio to a monophonic (1-D) or stereophonic (2-D) dimension. The effect of changing an audio format for sounds from binaural to monophonic or stereophonic audio signifies a different level of relevancy or importance for such audio. This process also removes any localization cues for that audio. The decibel level of the 1-D, 2-D or 3-D audio can be adjusted to whatever the listener desires for that dimension.

Ex. 1007 (Sauk) at 11:26-40

such audio in a different audio format. For example, rather than reproducing such audio in a 3-D binaural format, the audio can be presented in 1-D monophonic format. Because this audio is not presented with the same audio effect, it is perceived differently by a user. The user can use this distinction to selectively focus on the voices of members of their own group.

Ex. 1007 (Sauk) at 11:64-12:3

POSAs Would Have Also Combined Clement and Osman with Sauk with Sauk's Hazard Warning

Sauk

C. Alerts and Warnings

In addition to voice communication, other types of information can be superimposed into the sound field using type 1 and type 2 metadata. For example, sensor information can be detected by using one or more sensors **401**. This sensor information can be integrated into a format corresponding to signal **600**. This signal is then transmitted to various users **109-1**, **109-2**, . . . **109-*n*** and received using a BSS **400** associated with each user. The sensor **401** can be any type of sensor including a sensor for biological, nuclear, or chemical hazards. Moreover, the sensor **401** is designed to broadcast a signal **600** if a hazard **403** is detected. The signal **600** will include enunciated data **602** and metadata **604** as necessary to alert users of the hazard. For example, the enunciated data will include audio data or a data pointer to a particular earcon which is to be used by BSS **400**. The enunciated data can be used to communicate to a user the nature of a hazard. The metadata **604** can include type 1 metadata and type 2 metadata.

Ex. 1007 (Sauk) at 12:14-32

The type 2 metadata can include GPS coordinates of a sensor that detected a hazard or an estimated GPS location of the hazard as detected by the sensor. When this RF signal is received by a user's radio, the user's BSS **400** will use the type 2 metadata to determine where the sensor **401** is relative to the user, and provide the user with an earcon as specified by the enunciated data. The earcon would translate the received enunciated data to a phrase like, "chemical toxin detected, stay away!" and would be heard in the soldier's 3-D sound environment. In particular, the sound environment manager **494** will use GPS coordinates provided by the sensor **401** and GPS coordinates provided of the user (as provided by the internal GPS generator **402**) to determine the direction of the hazard **403** relative to the user. The audible warning would thus alert the user that he is too close to the lethal toxin, and by listening to the 3-D binaural audio, the user would be able to ascertain a direction of the sensor **401** (and/or the associated hazard). Consequently, the user would know which direction to move away from in order to escape the affected area.

Ex. 1007 (Sauk) at 12:33-51

POSAs Would Have Combined Clement and Osman with Sauk

Dr. Roginska's Supplemental Declaration

38. POSAs would have understood from Sauk that binaural alerts can be used to alert/warn the user of immediate hazards, and that less relevant audio can be transitioned to mono/stereo to alert that user that the audio is becoming less important/relevant. Ex.1003, ¶¶ 83, 113, 173. POSAs would have understood that these alerts/warnings could be used together to introduce multiple layers of warnings: transitioning less relevant sound to mono/stereo would encourage a user to focus on the remaining binaural warning indicating an immediate hazard. A POSA would have combined Sauk with Clement and Osman to use a binaural alert when the user is *approaching* a hazard (as taught by Sauk) such as a wall (as taught by Clement). *See, e.g.*, Ex.1003 ¶ 113 (describing additional audible warnings for safety and to prevent injury based on Sauk's disclosure of audio warnings for safety hazards). The spatial aspect of this alert allows the user to know where the hazard is and in which direction to move to avoid the hazard. Sauk 12:46-51.

Ex. 1146 (Roginska Suppl. Decl.) ¶ 38

POSAs Would Have Incorporated Both Sauk's Hazard Warning and Its Relevance Signal

Patent Owner Response

As recognized by the Board, "Petitioner provides no persuasive reason why one of ordinary skill in the art would have ignored Sauk's disclosure of adding binaural sound for alerts and instead look to ***Sauk's non-alert context*** for removing binaural sound." Decision, 22. Even in Sauk's non-alert context, the Selective

IPR2023-01019, POR at 22-23; *see also* IPR2023-01020, POR at 18-19

Dr. Roginska's Supplemental Declaration

41. But a POSA does not need to ignore Sauk's disclosure of binaural alerts when approaching hazards. To the contrary a POSA would have been motivated to apply that teaching to Clement and Osman—binaural alerts when the user is approaching a hazard such as an obstacle. Ex.1003 ¶¶ 111-13, 175. Though the fact that the user is *leaving* the environment is relevant, a POSA would have understood that the *audio* from the environment—or from the image in the environment—becomes less important or relevant as the user transitions out of the environment and/or approaches a hazard. Therefore, the POSA would have been motivated to apply Sauk's teachings about relevance to that audio and degrade it to a mono or stereo dimensionality. It would make no sense to add directionality to the sound from the image in the environment as the user exits the environment and approaches a hazard that could be from a direction that's different than the image, as there is no danger coming from the image. In other words, the user is leaving the image, not approaching the image.

Ex. 1146 (Roginska Suppl. Decl.) ¶ 41

POSAs Would Understand Sauk's Hazard Warning and Relevance Signal Are Complementary

Dr. Roginska's Supplemental Declaration

42. A POSA would have been motivated to transition out of binaural audio to alert the user that it is leaving the environment whether or not the user is approaching an immediate hazard (which generates its own binaural alert). By transitioning the environment's audio to mono/stereo, users can "selectively focus" on more relevant sounds, Sauk, 11:64-12:3, e.g., the environment the user is entering. Ex.2014 270:4-271:1. Degrading of the environment's audio and the binaural hazard alert are complementary alerts, helping the user to focus on and avoid an immediate hazard. Roginska ¶¶ 112-113, 175. But even in scenarios without the immediate hazard, transitioning the environment's audio to mono/stereo helps the user with a smooth transition out of the environment and helps them focus on the physical environment which has become more relevant.

Ex. 1146 (Roginska Suppl. Decl.) ¶ 42

Sauk Does Not Teach Away from Clement

Patent Owner Sur-Reply

Sauk's Selective Relevance Mode, however, retains less relevant audio, which clearly ***teaches away*** from Petitioner's conceded goals and solution of Clement to provide "a 'smooth, or graceful, transition… from the virtual world to the real world" where the "user will no longer see or hear images or sounds from the virtual environment." Sauk, 11:29-31 ("a user may not want to eliminate all background audio information").

IPR2023-01020, POSR at 7; *see also* IPR2023-01019, POSR at 7

Clement

In some embodiments, the tracking device **310** may not just track the physical position and movement of the user A in the space **300**, but may also detect when the user A is within a predetermined distance, or threshold, of a boundary or edge of the tracking area **320**, at which loss of tracking may be imminent. As shown in the example illustrated in FIG. **3**B, this loss of tracking by the tracking device **310** may be considered imminent when, for example, the zone Z approaches the boundary of the tracking area **320**, in advance of when the user actually moves into an area of the space **300** which cannot be tracked by the tracking device **310**. For example, the system may issue a warning or indicator, and/or may automatically initiate a fluid or graceful transition out of the virtual world when the user is at position **4**, even though the user is still in the tracking area **320** at position **4**, so that by the time the user reaches position **5**, the transition out of the virtual world will be complete, and the user may avoid disorientation and/or discomfort due to the loss of tracking.

Ex. 1005 (Clement) at 5:55-6:6

POSAs Would Have Combined Clement and Osman with Sauk

Patent Owner Sur-Reply

Petitioner, for the first time, suggests that Sauk's Selective Relevance Mode could be added to its Hazard Alert (which, as established, is a binaural alert that provides locational awareness), resulting in less relevant audio being switched to stereo or mono to remove distraction ***and*** an additive binaural alert to help the user focus on avoiding hazards.[4] Reply 8-9. This additive binaural alert is not present in any of the claims, which each require altering the binaural audio experienced by the user, and is thus irrelevant.

IPR2023-01020, POSR at 8-9; *see also* IPR2023-01020, POSR at 7-8

Petition

In addition and in the alternative, a POSA would have known that other types of alerts may be more effective in some situations to address the relevancy or immediacy of the transition. *See* Motivation to Combine section, above (discussing, *inter alia*, Clement providing warning of hazards such as obstacles and Sauk's disclosures of various methods of doing so). Particularly relevant here, Clement teaches warning the user when the user is leaving and transitioning out of the environment because the user is heading towards a real wall in the real world, as opposed to a less important transition when the user is not headed towards danger. Clement 7:28-8:35. One way to inform the user of the immediacy or relevance of the transition is to provide an additional audible indication, such as degrading the "binaural [audio] to monophonic or stereophonic audio [to] signif[y] a different level of relevancy." Sauk 11:25-41. Indeed, Dr. Begault conceded that switching from

* * *

stereo audio or monaural audio as a form of alert? … A. Yes."). A POSA would have implemented that technique here to provide various levels of transitions/warnings to ensure user safety. Roginska ¶¶ 171-183.

IPR2023-01019, Pet. at 25-26; IPR2023-01020, Pet. at 24-25

Combination of Clement, Osman, and Sauk Does Not Rely on User Selection

Sauk

B. Selective Relevance Mode

The selective filtering techniques described above can be utilized by BSS **400** in another configuration which combines a plurality of audio dimensions such as 3-D (binaural), 2-D (stereophonic), and 1-D (monophonic). For example, in certain circumstances, a user may not want to eliminate all background audio information. However, rather than keeping the less relevant audio in the same audio dimension with their desired binaural sound sources, a user could change the less relevant audio to a monophonic (1-D) or stereophonic (2-D) dimension. The effect of changing an audio format for sounds from binaural to monophonic or stereophonic audio signifies a different level of relevancy or importance for such audio. This process also removes any localization cues for that audio. The decibel level of the 1-D, 2-D or 3-D audio can be adjusted to whatever the listener desires for that dimension.

Ex. 1007 (Sauk) at 11:26-40

In order to implement the foregoing effects, separate binaural audio environments can be defined for each predetermined group of users. Thereafter each BSS **400** can use received metadata to determine a group of a user from which enunciated data originated. Enunciated data received from various users within a user's predetermined group will be presented in a binaural format. In particular, the sound environment manager **494** will use the type 1 metadata **604-1** to determine if a signal originated with a member of particular group. Enunciated data originating from members of the same group will be reproduced for a user of each BSS **400** in a 3-D binaural audio environment. Each BSS **400** can process enunciated data for group members using type 2 metadata to create binaural audio to represent where members of that user's group are located.

* * *

such audio in a different audio format. For example, rather than reproducing such audio in a 3-D binaural format, the audio can be presented in 1-D monophonic format. Because this audio is not presented with the same audio effect, it is perceived differently by a user. The user can use this distinction to selectively focus on the voices of members of their own group.

Ex. 1007 (Sauk) at 11:41-56, 11:64-12:3

Combination of Clement, Osman, and Sauk Does Not Rely on User Selection

Patent Owner Sur-Reply

argument raised for the first time in Petitioner's reply. The Petition does not contain any argument that Clement discloses an "automatic determination of relevance," perhaps because Clement does not once mention the term relevancy or any associated word. Indeed, in Clement the transition is not a function of determined relevancy to a user; instead it is based upon "discrepancies in the immersive experience and disorientation" that may be caused by user movement. Clement

IPR2023-01020, POSR at 12

Clement

(57) **ABSTRACT**

A system and method of operating an audio visual system generating a virtual immersive experience may include an electronic user device in communication with a tracking device that may track a user's physical movement in a real world space and translate the tracked physical movement into corresponding movement in the virtual world generated by the user device. The system may detect when a user and the user device are approaching a boundary of a tracking area and automatically initiate a transition out of the virtual world and into the real world. A smooth, or graceful, transition between the virtual world and the real world as the user encounters this boundary may avoid disorientation which may occur as a user continues to move in the real world, while motion appears to have stopped upon reaching the tracking boundary.

* * *

user approaches an obstacle. In the example shown in FIG. **4**, the user is within the predetermined threshold, or zone, approaching a wall of the space **300** at position **4**. Thus, at position **4**, the system may initiate a gradual transition out of the virtual world experience, so that, by the time the user reaches position **5**, the transition out of the virtual world is complete and the user may avoid collision with the wall. A

Ex. 1005 (Clement) at Abstract, 7:40-46

Clement, Osman, and/or Sauk Render Claims Obvious

1 POSAs Would Have Combined Clement and Osman with Sauk

'179/'184 Patents, cls. 1, 3, 4, 6-10, 14-19

2 Combination Teaches Each Element of the Challenged Claims

'179/'184 Patents, cls. 1, 3, 4, 6-10, 14-19

3 Clement and Osman Alone Render Obvious Claim 14 of the '179 Patent

Clement, Osman and/or Sauk Teach Each Element Of The Ground I Claims

Disputed Limitations:

	Lower[ing]/reducing a volume of the binaural sound to warn	Independent Claims: '179 patent, 1, 14; '184 patent, 1, 7, 14
	Determining/sensing, with a WED, when a user is leaving an environment/3D virtual environment	Independent Claims: '179 patent, 7, 14
	Degrading audio cues to alert/filtering to warn/altering processing to alert	Independent Claims: '179 patent, 1, 7; '184 patent, 1, 7, 14
	Switching binaural sound to stereo based on visibility of a virtual image	Claims: '179 patent, 4, 6, 9; '184 patent, 4, 6, 9
	Warning when the user leaves a virtual room but remains in the 3D virtual environment	Claims: '179 patent, 3; '184 patent, 3

Combination of Clement and Osman Teaches Lower[ing] /Reducing a Volume of Binaural Sound To Warn/Alert

Patent Owner Response

Even if Clement were combined with Sauk, the hypothetical combination does not disclose limitation 14[e]. Clement discloses a "fade-out" but does not disclose binaural audio. Begault Supp., ¶97. Clement's fade-out is only based on the *x-y*

IPR2023-01019, POR at 25-26; IPR2023-01020, POR at 22

Petition

POSAs would have implemented Clement's HMD with Osman's binaural sound for several reasons. First, Clement expressly discloses an "audio visual system" that "generate[s] a virtual immersive experience," including "audio content associated with the virtual world." Clement 1:24-30, 9:20-31. A POSA would have further understood that doing so enhances realism, or the sense of "presence," for users, making the experience more fully immersive. A virtual environment and its images seem more realistic when they have a realistic sound aspect. Conversely, when sound does not match the imagery, the optical illusion begins to break down, creating disbelief and detracting from the users' sense of presence. This sense of presence is important in VR—it makes VR compelling, effective, and immersive. Osman 1:24-43; Ex.1065; Ex.1066. Further, binaural sound was used to enhance

IPR2023-01019, Pet. at 12; *see also* IPR2023-01020, Pet. at 12-13

Combination of Clement and Osman Teaches Lower[ing] /Reducing a Volume of Binaural Sound To Warn/Alert

Patent Owner Response

Even if Clement were combined with Sauk, the hypothetical combination does not disclose limitation 14[e]. Clement discloses a "fade-out" but does not disclose binaural audio. Begault Supp., ¶97. Clement's fade-out is only based on the *x-y*

IPR2023-01019, POR at 25-26; IPR2023-01020, POR at 22

Patent Owner Sur-Reply

with Osman teaches limitation 14[e]. Reply.11 Petitioner's "entirely new rationale" raised for the first time in Reply should be rejected. *See Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369-70 (Fed. Cir. 2016) ("It is of the

IPR2023-01019, POSR at 9

Petition

Clement teaches this element. When Clement's HMD determines that the user is "approaching/nearing the boundary" (i.e., leaving the environment), Clement alerts or warns the user by initiating a "transition" that may, for example, "fade out" the virtual audio (including the audio that localizes to the virtual image), i.e., reduce its volume as recited in the claim. Clement 9:20-31, 12:30-13:10, 5:55-6:6 ("when

* * *

you heard of [virtual boundaries] before 2014? A. Yes.").[6] In the combination, this audio (that has its volume reduced) is the binaural sound generated in 14[c] above.

IPR2023-01019, Pet. at 23-24; *see also* IPR2023-01020, Pet. at 23-24

Combination of Clement and Osman Teaches Lower[ing] /Reducing a Volume of Binaural Sound To Warn/Alert

Patent Owner Response

Even if Clement were combined with Sauk, the hypothetical combination does not disclose limitation 14[e]. Clement discloses a "fade-out" but does not disclose binaural audio. Begault Supp., ¶97. Clement's fade-out is only based on the *x-y*

IPR2023-01019, POR at 25-26; IPR2023-01020, POR at 22

Patent Owner Sur-Reply

with Osman teaches limitation 14[e]. Reply.11 Petitioner's "entirely new rationale" raised for the first time in Reply should be rejected. *See Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369-70 (Fed. Cir. 2016) ("It is of the

IPR2023-01019, POSR at 9

Petition

4. 14[c]: a DSP processing sound using HRTFs to generate binaural sound that externally localizes in empty space from the virtual image

Osman teaches this element, and as already discussed a POSA would have implemented Osman's processing in an HMD such as Clement's.

IPR2023-01019, Pet. at 18; *see also* IPR2023-01020, Pet. at 18

Combination of Clement and Osman Teaches Lower[ing] /Reducing a Volume of Binaural Sound To Warn/Alert

Patent Owner Response

Even if Clement were combined with Sauk, the hypothetical combination does not disclose limitation 14[e]. Clement discloses a "fade-out" but does not disclose binaural audio. Begault Supp., ¶97. Clement's fade-out is only based on the *x-y*

IPR2023-01019, POR at 25-26; IPR2023-01020, POR at 22

Osman

Where s is the sound (e.g., a dog bark), l is the location where the sound is supposed to originate, and ls is the localized sound. One example of a sound localization function is a Head-Related Transfer Function (HRTF), which is a response that characterizes how an ear receives a sound from a point in space. A pair of HRTFs for the ears may be utilized to synthesize a binaural sound that seems to come from a particular point in space. The HRTF can also be described as the modifications to a sound from a direction in free air to the sound arriving at the eardrum. These modifications include the shape of the listener's outer ear, the shape of the listener's head and body, the acoustical characteristics of the space in which the sound is played, and so on. All these characteristics influence how a listener can accurately tell what direction a sound is coming from. Due to the physical differences of each person, each person has a different HRTF. Embodiments of the invention for sound localization are described using HRTF, but any other form of sound localization that accounts for the physical characteristics of a listener can be utilized with embodiments of the invention.

Ex. 1006 (Osman) at 4:48-67

Claims Recite Reducing the Volume of Binaural Sound, Not Reducing the Volume of a Binaural Alert

Patent Owner Response

Second, as shown above, while Clement does not disclose binaural audio, Clement does disclose reducing the volume of the virtual audio (e.g., "fade-out") as an alert to the user. Sauk, to the contrary, suggests that the volume of the binaural audio alert ("chemical toxin detected, stay away!") would ***not be reduced*** to warn users of the real-world danger of a toxic chemical spill. Begault, ¶36; Roginska

IPR2023-01019, POR at 24; *see also* IPR2023-01020, POR at 20

'179 Patent, Claim 14

14. A method executed by one or more electronic devices, the method comprising:

storing head-related transfer functions (HRTFs) in memory;

displaying, with a wearable electronic device (WED) worn on a head of a user, a virtual image in an environment;

processing, by a digital signal processor (DSP), sound with the HRTFs to generate binaural sound that externally localizes in empty space from the virtual image in the environment;

determining, with the WED, when the user is leaving the environment; and

alerting the user that the user is leaving the environment by reducing a volume of the binaural sound that localizes from the virtual image and that is being provided to the user.

Ex. 1001 ('179 Patent), Claim 14

Clement, Osman And/or Sauk Teach Each Element of the Ground I Claims

Disputed Limitations:

✓	Lower[ing]/reducing a volume of the binaural sound to warn	Independent Claims: '179 patent, 1, 14; '184 patent, 1, 7, 14
	Determining/sensing, with a WED, when a user is leaving an environment/3D virtual environment	Independent Claims: '179 patent, 7, 14
	Degrading audio cues to alert/filtering to warn/altering processing to alert	Independent Claims: '179 patent, 1, 7; '184 patent, 1, 7, 14
	Switching binaural sound to stereo based on visibility of a virtual image	Claims: '179 patent, 4, 6, 9; '184 patent, 4, 6, 9
	Warning when the user leaves a virtual room but remains in the 3D virtual environment	Claims: '179 patent, 3; '184 patent, 3

Combination Teaches Determining/Sensing, with a WED, When a User Is Leaving an Environment/3D Environment

Clement

In the absence of a specific command to transition from the virtual world, the HMD **100** and/or the tracking device **310** may determine a current position of the user in the tracking area **320** at block **1030**, as described above. If it is determined, at block **1040**, that the user is within a set threshold or range of the boundary of the tracking area **320**, at which loss of tracking by the tracking device **310** may be imminent, the transition process may be initiated at block **1050**. The transition process is shown in more detail in FIG. **11**.

Ex. 1005 (Clement) at 12:20-29

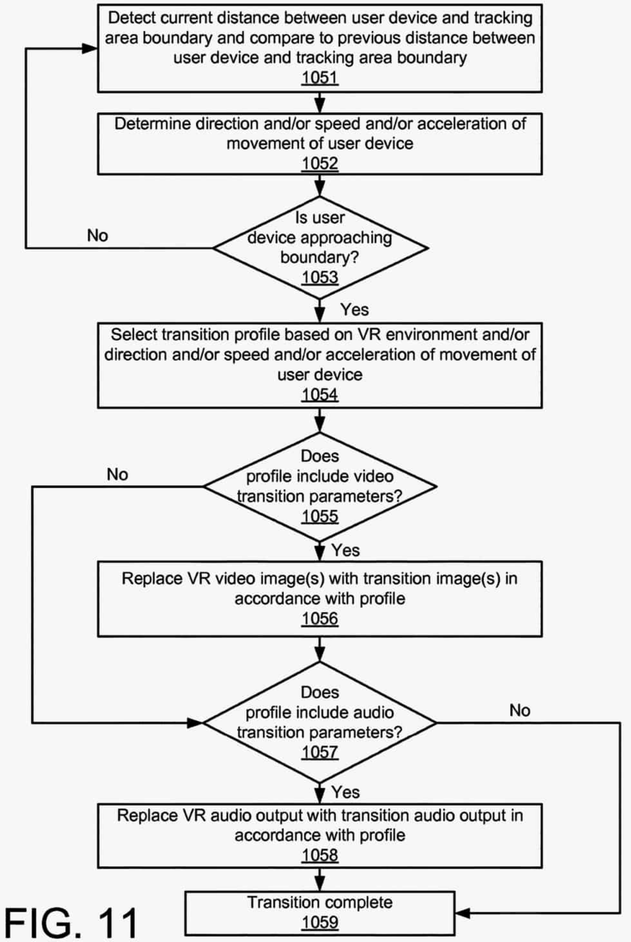


FIG. 11

Ex. 1005 (Clement), Fig. 11

Combination Teaches Determining/Sensing, with a WED, When a User Is Leaving an Environment/3D Environment

Clement

In some embodiments, the tracking device **310** may detect the user's proximity to a boundary of the tracking area **320**, or that the user is within a threshold distance of a boundary of the tracking area **320**. In some embodiments, the HMD **100** may include a sensor that detects that the user user's proximity to a boundary of the tracking area **320**, or that the user is within a threshold distance of a boundary of the tracking area **320**. For example, one of the sensors of the sensing system **160** (such as, for example a proximity sensor **163**) and/or the camera **180** of the HMD **100** may detect this proximity to the boundary, and the control system **170**/ processor **190** may initiate the transition process as described above.

Ex. 1005 (Clement) at 7:4-16

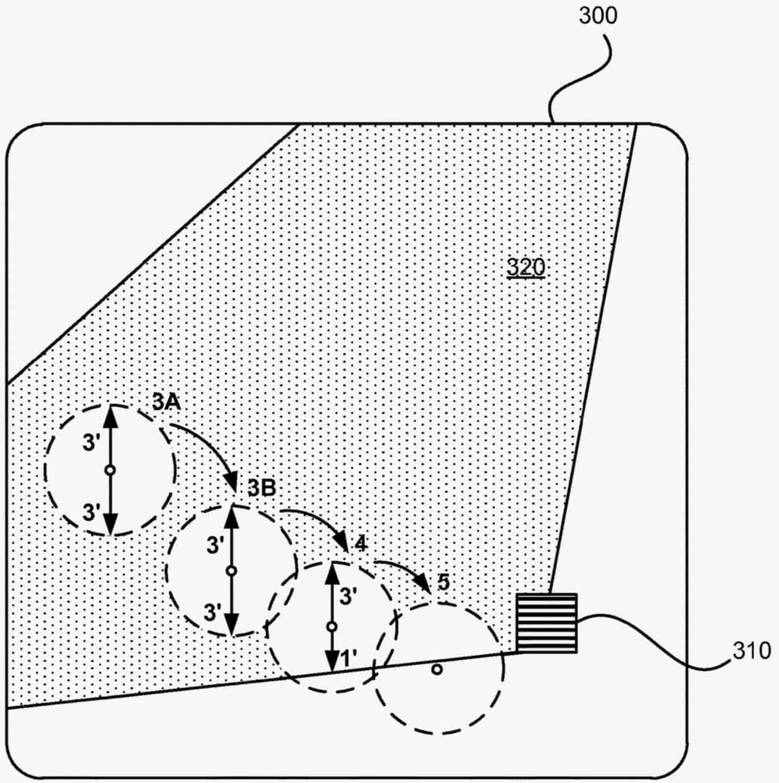


FIG. 3C

Ex. 1005 (Clement), Fig. 3C

Combination Teaches Determining/Sensing, with a WED, When a User Is Leaving an Environment/3D Environment

Patent Owner Response

the view of the tracking device 310. Clement fails to disclose ***how*** the sensors of the HMD would detect "***when the user is leaving the environment***" based on a proximity to a boundary of the tracking area 320 *with the HMD* without the tracking device 310. Instead, Clement *must* employ the tracking device 310 ***for tracking a user's position within the tracking area 320*** along with the HMD for ***tracking a user's proximity to physical obstacles***, such as a wall. In other words, Clement does not disclose how its HMD detects when the user is leaving the tracking area 320 without relying on the tracking device 310.

IPR2023-01019, POR at 29

'179 Patent

Electronic device **2002** includes one or more components of computer readable medium (CRM) or memory **2020**, one or more displays **2022**, a processor or processing unit **2024**, one or more interfaces **2026** (such as a network interface, a graphical user interface, a natural language user interface, a natural user interface, a reality user interface, a kinetic user interface, touchless user interface, an augmented reality user interface, and/or an interface that combines reality and VR), a camera **2028**, one or more sensors **2030** (such as micro-electro-mechanical systems sensor, an activity tracker, a pedometer, a piezoelectric sensor, a biometric sensor, an optical sensor, radio-frequency identification sensor, a global positioning satellite (GPS) sensor, a solid state com-

Ex. 1001 ('179 Patent) at 39:25-37

Wearable electronic device **2008** includes computer readable medium (CRM) or memory **2070**, one or more displays **2072**, a processor or processing unit **2074**, one or more interfaces **2076** (such as an interface discussed herein), a camera **2078**, one or more sensors **2080** (such as a sensor discussed herein), a motion or location tracker **2082**, one or more speakers **2084**, HRTFs **2086**, a head tracking system or head tracker **2088**, an imagery system **2090**, a sound localization system **2092**, and one or more microphones **2094**.

Ex. 1001 ('179 Patent) at 40:7-15

Combination Teaches Determining/Sensing, with a WED, When a User Is Leaving an Environment/3D Environment

Uber Techs., Inc. v. X One, Inc.

The specification of the '593 patent is entirely silent on how to transmit user locations and maps from a server to a user's mobile device, suggesting that a person of ordinary skill in the art was more than capable of selecting between the known methods of accomplishing this.

***Uber Techs., Inc. v. X One, Inc.*, 957 F.3d 1334, 1339 (Fed. Cir. 2020)**

Petitioner's Expert, Dr. Roginska's, Supplemental Declaration

100. I also note that the '179 patent does not provide any express disclosure of a WED determining that the user is leaving an environment independently of a stationary tracking device. And the various sensors and trackers in the WED of the '179 patent were well-known in the art, including head trackers and location trackers. *See* '179 patent, Figure 20; *see also* Ex.1003 ¶ 45 ("'head tracking' is a 'core element[] for VR experiences.'") (citing Ex.1067 at 263).

Ex. 1146 (Roginska Suppl. Decl.) ¶ 100

Combination Teaches Determining/Sensing, with a WED, When a User Is Leaving an Environment/3D Environment

Petitioner's Expert, Dr. Roginska's, Supplemental Declaration

the user to the boundary of the tracking area. Clement 7:7-16. Indeed, POSAs knew before the time of the alleged inventions that HMDs could independently determine position and orientation information and when a user is leaving an environment using cameras, light-emitting trackers, inertial sensors (e.g., accelerometers and/or gyroscopes), and any type of tracker (e.g., magnetic, optical, electrical, sonar, radar, ultrasonic, or any combination thereof). *See* Ex.1080 (Pedrotti) 5:8-24; 4:59-61 ("Such trackers, and the processors which determine the position and orientation of such trackers, are well know to those of skill in the art."); *see also* Ex.1150 (Donner) [0013] (HMD based display system "determines the current pose (that is, one or both of position and rotational orientation)" of the HMD "relative to reference coordinate frame (that is, 'world space') and then generates imagery of a scene from a perspective associated with that pose (that is, 'screen space')."), [0027-0028] (hardware includes an inertial management unit (IMU) (including, for example a gyroscope, magnetometer, and accelerometer), image capture, image sensors, structured-light or time-of flight (ToF) depth sensor). From these teachings a POSA would have been able to use the sensors on Clement's HMD to determine that the user is leaving the environment independent of a stationary tracking device.

Ex. 1146 (Roginska Suppl. Decl.) ¶ 99

Combination Teaches Determining/Sensing, with a WED, When a User Is Leaving an Environment/3D Environment

Donner

[0013] In operation, the display system **100** executes a VR or AR application that determines the current pose (that is, one or both of position and rotational orientation) of the HMD device **102** (and thus the user's head **104**) relative to a reference coordinate frame (that is, "world space") and then generates imagery of a scene from a perspective associated with that pose (that is, "screen space"). That is, the display system **100** generates and displays imagery that maps the world space to the screen space of the HMD device **102** based on the determined pose of the HMD device **102**. The displayed imagery may be completely computer-generated (that is, VR imagery), or the imagery may be a combination of imagery captured of the local environment (e.g., imagery captured via one or more image sensors mounted on the HMD device **102**) and an AR overlay that is rendered so as to reflect the current user pose, or the imagery may be an AR overlay on a transparent "display" through which the local environment is viewable. As shown in FIG. **1**, in implementations with both a left-side display and a right-side display, left-eye-specific imagery may be rendered and displayed in the left-eye display **112** concurrent with the rendering and display of right-eye-specific imagery in the right-eye display **114**, thereby enabling a stereoscopic 3D display of scene represented by the displayed imagery.

Ex. 1150 ¶ 13

Clement, Osman And/Or Sauk Teach Each Element of the Ground I Claims

Disputed Limitations:

✓	Lower[ing]/reducing a volume of the binaural sound to warn	Independent Claims: '179 patent, 1, 14; '184 patent, 1, 7, 14
✓	Determining/sensing, with a WED, when a user is leaving an environment/3D virtual environment	Independent Claims: '179 patent, 7, 14
	Degrading audio cues to alert/filtering to warn/altering processing to alert	Independent Claims: '179 patent, 1, 7; '184 patent, 1, 7, 14
	Switching binaural sound to stereo based on visibility of a virtual image	Claims: '179 patent, 4, 6, 9; '184 patent, 4, 6, 9
	Warning when the user leaves a virtual room but remains in the 3D virtual environment	Claims: '179 patent, 3; '184 patent, 3

It Would Have Been Obvious To Alter Processing of Binaural Sound To Alert/Warn

Patent Owner Response

Petitioner suggests that Clement and Sauk in combination teach this feature, specifically referencing Clement's "fade out" from the virtual world when approaching real-world obstacles (e.g., walls) and a supposed "converting the 'binaural [audio] to monophonic or stereophonic audio [to] signif[y] a different level of relevancy" described in Sauk 11:25-41. However, neither reference alters processing of binaural sound to alert the user that the user is leaving the virtual image in the environment. Begault, ¶39; Begault Supp., ¶80.

IPR2023-01020, POR at 24

Petitioner's Expert, Dr. Roginska's, Supplemental Declaration

50. Dr. Begault also states that "Sauk does not use the change in spatial audio rendering in any of the three modes to function as an alert." But as I noted previously, a POSA would have known to use a degradation of spatial cues as an alert/warning. *See* Ex.1003, ¶ 112; *see also* Ex.2012 ¶ 29 ("A PHOSITA would recognize that, prior to the advent of virtual reality, cueing a transition between visual and auditory environments through the use of sound is a familiar concept as old as the history of scene changes in dramatic stage arts" including in virtual auditory environments using "first monaural, then binaural audio…."); *see also id.*

Ex. 1146 (Roginska Suppl. Decl.) ¶ 50

It Would Have Been Obvious To Alter Processing of Binaural Sound To Alert/Warn

Patent Owner Response

Petitioner suggests that Clement and Sauk in combination teach this feature, specifically referencing Clement's "fade out" from the virtual world when approaching real-world obstacles (e.g., walls) and a supposed "converting the 'binaural [audio] to monophonic or stereophonic audio [to] signif[y] a different level of relevancy" described in Sauk 11:25-41. However, neither reference alters processing of binaural sound to alert the user that the user is leaving the virtual image in the environment. Begault, ¶39; Begault Supp., ¶80.

IPR2023-01020, POR at 24

from a location of the child."). As such, the user would be implicitly alerted that the user is leaving the first environment, including leaving a physical environment and leaving a 3D virtual environment, due to the sound format change. Begault Supp., ¶¶59, 70.

IPR2023-01020, POR at 51-52

It Would Have Been Obvious To Alter Processing of Binaural Sound To Alert/Warn

Patent Owner Response

Petitioner suggests that Clement and Sauk in combination teach this feature, specifically referencing Clement's "fade out" from the virtual world when approaching real-world obstacles (e.g., walls) and a supposed "converting the 'binaural [audio] to monophonic or stereophonic audio [to] signif[y] a different level of relevancy" described in Sauk 11:25-41. However, neither reference alters processing of binaural sound to alert the user that the user is leaving the virtual image in the environment. Begault, ¶39; Begault Supp., ¶80.

IPR2023-01020, POR at 24

Patent Owner's Expert, Dr. Begault, Deposition

Q. What is the change in binaural sounds that's used as an alert or warning?

A. Well, as indicated here, moving the sound localization point. Removing the sound localization point, switching or changing to stereo or monaural sound.

Q. And how does this act as an alert or warning?

A. Well, the warning is that a person is getting within a predescribed -- or a pre-prescribed distance to an object.

Q. It doesn't say alert or warning here, does it?

A. The literal words "alert" or "warning" don't occur here. But what would happen is a very salient change in auditory cuing would occur, which is, effectively, an alert or a change that is significant to a listener.

Ex. 1147 (Begault Dep.) at 236:22-237:19 (objections omitted)

Sauk Teaches Changing Binaural Audio To Mono or Stereo

Patent Owner Sur-Reply

Petitioner continues to misconstrue Sauk's Selective Relevance Mode as disclosing changing binaural sound playing to the user to stereo or mono. Reply 13. While Sauk discloses that the ***user*** could change the less relevant audio to a monophonic or stereophonic dimension (Sauk 11:34-36), any such change does not occur in real-time with binaural audio playing to the user. Instead, as discussed in the POR, relevancy is "predetermined" and "thereafter" a determination is made as to whether a "signal originated" from a source associated with the predetermined relevancy, and only then resulting in enunciated data being "reproduced" in the proper relevancy format (e.g., binaural for relevant, stereo or mono for less relevant). Sauk, 11:42-56; POR 24, 27, 29-30.

IPR2023-01020, POSR at 13

Sauk

The selective filtering techniques described above can be utilized by BSS **400** in another configuration which combines a plurality of audio dimensions such as 3-D (binaural), 2-D (stereophonic), and 1-D (monophonic). For example, in certain circumstances, a user may not want to eliminate all background audio information. However, rather than keeping the less relevant audio in the same audio dimension with their desired binaural sound sources, a user could change the less relevant audio to a monophonic (1-D) or stereophonic (2-D) dimension. The effect of changing an audio format for sounds from binaural to monophonic or stereophonic audio signifies a different level of relevancy or importance for such audio. This process also removes any localization cues for that audio. The decibel level of the 1-D, 2-D or 3-D audio can be adjusted to whatever the listener desires for that dimension.

In order to implement the foregoing effects, separate binaural audio environments can be defined for each predetermined group of users. Thereafter each BSS **400** can use received metadata to determine a group of a user from which enunciated data originated. Enunciated data received from various users within a user's predetermined group will be presented in a binaural format. In particular, the sound envi-

Ex. 1007 (Sauk) at 11:26-51

Sauk Teaches Changing Binaural Audio To Mono or Stereo

Petitioner's Expert, Dr. Roginska's, Supplemental Declaration

49. Nevertheless, even replacing the binaural sound with stereo/mono would still meet the claims, because the binaural sound would still be filtered to alter a spectral cue (cl. 1), have a spatial cue degraded (cl. 7), and altered (cl.14) because the audio provided to the user is filtered, degraded, and altered such that the spatial cues (e.g., ILD, ITD) are not present in the audio from the environment played to the user, where the previously had been present in the audio from the environment played to the user. Institution Decision at 24-25; Sauk, 11:34-40; Ex.1003 ¶¶ 178-82. The same is true for the "filtering . . . to alter audio cues" ('179 claim 1) and "altering processing . . . to degrade audio cues" ('179 claim 7) recited in the '179 patent. In fact, the '179 patent discloses that one "way of changing a sound" from binaural to non-binaural is "to render the original source with different spatial parameters or to re-render a sound source with different spatial parameters in order to adjust, degrade, or eliminate … audio cues." Ex.1001 5:33-62.

Ex. 1146 (Roginska Suppl. Decl.) ¶ 49

'179 Patent, Claim 14

Another way of changing a sound from being perceived as binaurally captured audio or binaurally manufactured audio to being perceived as non-binaural audio is to render the original source with different spatial parameters or to re-render a sound source with different spatial parameters in order to adjust, degrade, or eliminate certain human audio cues. For example, a SLS renders a source sound using an HRTF to adjust SLPs, renders the sound source to specific alterations per an ITD and/or interaural level difference (ILD), or discontinues rendering or using the HRTF or ITD/ILD calculations while continuing to render other aspects of the audio without pause. As another example, a SLS continues rendering, without pause, and sets the spatial coordinates of any or all SLPs to points within a radius of a head of a listener or to points within a cone of confusion of a listener, in his medial plane, or directly above his head. As another example, the parameters of a rendering process can be set to "zero out" one or more dimension's coordinates input to the rendering algorithm in order to "flatten" the output by one or more dimensions.

Ex. 1001 ('179 Patent) at 5:42-62

Clement, Osman and/or Sauk Teach Each Element of the Ground I Claims

Disputed Limitations:

✓	Lower[ing]/reducing a volume of the binaural sound to warn	Independent Claims: '179 patent, 1, 14; '184 patent, 1, 7, 14
✓	Determining/sensing, with a WED, when a user is leaving an environment/3D virtual environment	Independent Claims: '179 patent, 7, 14
✓	Degrading audio cues to alert/filtering to warn/altering processing to alert	Independent Claims: '179 patent, 1, 7; '184 patent, 1, 7, 14
	Switching binaural sound to stereo based on visibility of a virtual image	Claims: '179 patent, 4, 6, 9; '184 patent, 4, 6, 9
	Warning when the user leaves a virtual room but remains in the 3D virtual environment	Claims: '179 patent, 3; '184 patent, 3

Combination Renders Switching Binaural Sound Based on Visibility of a Virtual Image Obvious

Patent Owner Response

being displayed by the WED. For instance, Sauk teaches the opposite with regard to removing binaural audio or spatial audio context when members of the same group "lose sight of each other." Sauk, 10:52-60. That is, Sauk describes using a binaural sound environment for members of the same group, such that their voice communication would information everyone in the group of their approximate location by visualizing virtual positions for the speakers" after they "lose sight of each other" to keep members aware of each of their group member's location. *Id.*

IPR2023-01020, POR at 35; *see also* IPR2023-01019, POR at 43

Petitioner's Expert, Dr. Roginska's, Supplemental Declaration

64. While Sauk teaches using binaural sound when members of a group "lose sight of each other," POR 35 (quoting Sauk 10:52-60), this disclosure does not relate to a "virtual image" that is no longer visible to the user. I previously cited various passages from Osman and Jang that inform a POSA that when a virtual image is not displayed, its audio is often less relevant and is processed differently. ¶ 197. In contrast, the members of Sauk's group remain relevant because they continue to exist; their lack of visibility is not because the user has turned away from them. But virtual images, as in games, often become much less relevant, and eventually entirely irrelevant, when they disappear from the display. Ex.1003 ¶¶ 197, 213. This diminished relevancy is typical in the gaming context, and therefore gives POSAs a reason to apply Sauk's switching to 1-D or 2-D audio.

Ex. 1146 (Roginska Suppl. Decl.) ¶ 64

Combination Renders Switching Binaural Sound Based on Visibility of a Virtual Image Obvious

Osman

sound coming from the right. However, it should be noted that a good HRTF model will greatly improve the accuracy of sound localization for objects outside the field of display. This is because inaccuracies in virtual surround systems are ignored by the brain in the presence of visual feedback. If the player thinks that the sound is coming from a visible object, even if there is some error in the sound transmission, the brain uses the visual information to identify the sound origin. However, when the sound originates outside the field of view, the extra visual cue for sound localization is lost. In this case, a good HRTF enhances sound localization for objects outside the field of view.

Ex. 1006 (Osman) at 7:31-42

Petitioner's Expert, Dr. Roginska's, Supplemental Declaration

65. Dr. Begault does not appear to dispute the knowledge of a POSA. Ex.2012 ¶¶ 92-93. Instead he asserts that Osman describes that spatial awareness is more important when objects are not in view. *Id.* ¶ 93 (quoting Osman 7:31-42). Instead, a POSA would understand that this passage simply teaches what POSAs understood: when images are not in view, a good 3D sound model is important, assuming the sound is still relevant. But this passage does not contradict the general knowledge of a POSA that virtual images that are not in view are generally less relevant than those that are in view and it does not suggest that images that are not in view need 3D sound or that they are generally relevant. *See, e.g.*, Osman (Ex. 1006), 10:33-43 ("In one embodiment, the acoustic signals for the localized sounds are delivered with a higher volume when the object or person originating the sound is shown on the display of the portable device, or in the display 412 connected to

Declaration for *Inter Partes Review* of USP 10,368,179 and 10,448,184

game console 422. . . . When the sound origin is not on the display, the volume of the sound is lower.")

Ex. 1146 (Roginska Suppl. Decl.) ¶ 65

Clement, Osman and/or Sauk Teach Each Element of the Ground I Claims

Disputed Limitations:

✓	Lower[ing]/reducing a volume of the binaural sound to warn	Independent Claims: '179 patent, 1, 14; '184 patent, 1, 7, 14
✓	Determining/sensing, with a WED, when a user is leaving an environment/3D virtual environment	Independent Claims: '179 patent, 7, 14
✓	Degrading audio cues to alert/filtering to warn/altering processing to alert	Independent Claims: '179 patent, 1, 7; '184 patent, 1, 7, 14
✓	Switching binaural sound to stereo based on visibility of a virtual image	Claims: '179 patent, 4, 6, 9; '184 patent, 4, 6, 9
	Warning when the user leaves a virtual room but remains in the 3D virtual environment	Claims: '179 patent, 3; '184 patent, 3

Combination Renders Warning When the User Leaves a Virtual Room but Remains in the 3D Virtual Environment Obvious

Petitioner's Expert, Dr. Roginska's, Declaration

209. A POSA would further understand that the transition between virtual rooms would also have been implemented in the combination of Clement and Osman. As described in Jang (Ex. 1015), such transitions were well-understood. Further, because Clement already teaches audio transitions as warnings when approaching the boundary, a POSA would have had a reasonable expectation of success in implementing similar audio and visual transitions between virtual rooms. Such an implementation would be able to use the elements already present in the combination, including the existing position tracking systems and binaural audio processing systems. Thus, a POSA would have found it obvious to implement the audio transitions known in the prior art to also warn the user of switching between virtual rooms while the user remains in the virtual environment.

Ex. 1003 (Roginska Decl.) ¶ 209

Clement, Osman and/or Sauk Teach Each Element of the Ground I Claims

Disputed Limitations:

✓	**Lower[ing]/reducing a volume of the binaural sound to warn**	Independent Claims: '179 patent, 1, 14; '184 patent, 1, 7, 14
✓	**Determining/sensing, with a WED, when a user is leaving an environment/3D virtual environment**	Independent Claims: '179 patent, 7, 14
✓	**Degrading audio cues to alert/filtering to warn/altering processing to alert**	Independent Claims: '179 patent, 1, 7; '184 patent, 1, 7, 14
✓	**Switching binaural sound to stereo based on visibility of a virtual image**	Claims: '179 patent, 4, 6, 9; '184 patent, 4, 6, 9
✓	**Warning when the user leaves a virtual room but remains in the 3D virtual environment**	Claims: '179 patent, 3; '184 patent, 3

Clement, Osman, and/or Sauk Render Claims Obvious

1 POSAs Would Have Combined Clement and Osman with Sauk

'179/'184 Patents, cls. 1, 3, 4, 6-10, 14-19

2 Combination Teaches Each Element of the Challenged Claims

'179/'184 Patents, cls. 1, 3, 4, 6-10, 14-19

3 Clement and Osman Alone Render Obvious Claim 14 of the '179 Patent

Clement and Osman Alone Render Obvious Claim 14 of the '179 Patent

Patent Owner Sur-Reply

Petitioner asserts the Petition does not depend on Sauk for claim 14 (Reply.11) but previously presented arguments for limitation 14[e] that rely only on a combination of Clement and Sauk. Pet.23 (citing *only* Clement and Sauk in section discussing limitation 14[e]). Petitioner now asserts that the combination of Clement with Osman teaches limitation 14[e]. Reply.11 Petitioner's "entirely new rationale"

IPR2023-01019, POSR at 9

Petition

6. 14[e]: alerting the user that the user is leaving the environment by reducing the sound's volume

Clement teaches this element. When Clement's HMD determines that the user is "approaching/nearing the boundary" (i.e., leaving the environment), Clement alerts or warns the user by initiating a "transition" that may, for example, "fade out" the virtual audio (including the audio that localizes to the virtual image), i.e., reduce its volume as recited in the claim. Clement 9:20-31, 12:30-13:10, 5:55-6:6 ("when the user A is within a predetermined distance, or threshold, of a boundary or edge of the tracking area 320 … the system may issue a warning or indicator"), Fig. 11 (step 1058), cls.4, 13, 21; *see also* Clement 5:12-16, 7:56-8:35; Sauk 11:40-41 (reducing

IPR2023-01019, Pet. at 23

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I certify that on this 3rd day of September, 2024, a true and correct copy of the foregoing **Petitioners' Demonstratives** was served by electronic mail on Patent Owner's lead and backup counsel at the following email addresses:

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