Exhibit C-18: Invalidity Based on the Oculus DK1 System

U.S. Patent No. 9,226,090

Claims 8, 14, and 15 (the "Asserted Claims") of the '090 Patent are anticipated under 35 U.S.C. § 102 and/or obvious under 35 U.S.C. § 103 in view of the Oculus Rift DK1 system[1] ("Oculus DK1 System"), as embodied in the Oculus DK1 products themselves and other prior art references that describe them. To the extent Plaintiff argues that the Oculus DK1 System does not disclose any limitation, either expressly, implicitly, and/or by inherency, a person of ordinary skill in the art would have determined that the limitation would have been obvious in light of the Oculus DK1 System alone or in combination with applicant admitted prior art, the knowledge of one of ordinary skill in the art, or any one or more of the references identified in Defendants' invalidity contentions for at least the reasons stated in the cover pleading for Defendants' invalidity contentions and/or in the accompanying claim charts.

The contentions provided below address the Asserted Claims that Plaintiff identified in its infringement contentions. Defendants reserve the right to supplement or modify these contentions in accordance with and to address orders of the Court (e.g., any claim construction order(s)), Local Rules, other applicable rules, and/or in response to any supplementation, amendment, or modification of Plaintiff's infringement contentions.

The following disclosures are for prior art purposes only. The following chart may include positions in the alternative and does not constitute any concession by Defendants for purposes of infringement. Defendants' contentions herein are not, and should in no way be seen as, admissions or adoptions regarding any particular claim scope or construction or alleged infringement, either literally or under the doctrine of equivalents. Defendants do not agree with Plaintiff's application of the claims, or that the claims satisfy other statutory

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[1] The Oculus DK1 System referred to herein includes, but is not limited to, the various physical prototypes, commercial products, and systems created and publicly presented by Oculus prior to any date to which the '090 Patent can claim priority. The Oculus Rift DK1 System (also referred to as "Oculus Rift Development Kit" or "Oculus Rift Developer Kit" in press releases) was announced in August 2012 through a Kickstarter campaign, and began shipping to developers as of March 2013. *See* Oculus Rift Kickstarts Campaign to Make Virtual Reality a Reality (August 1, 2012), https://www.nbcnews.com/tech/tech-news/oculus-rift-kickstarts-campaign-make-virtual-reality-reality-flna918527; Oculus Rift: Step into the Game (October 6, 2012), https://www.youtube.com/watch?v=DhcOMOWRMnA; Update of Developer Kit Technology, Shipping Details (November 28, 2012), https://www.meta.com/blog/quest/update-on-developer-kit-technology-shipping-details/?utm_source=www.google.com&utm_medium=oculusredirect; Oculus Rift Development Kit Unboxing (March 21, 2013), https://www.youtube.com/watch?v=xxlI6xDNdKg; Development Kits are Shipping! (March 29, 2013), https://www.kickstarter.com/projects/1523379957/oculus-rift-step-into-the-game/posts/440293.

requirements, e.g., under 35 U.S.C. § 112. Furthermore, to the extent any Asserted Claim is subject to 35 U.S.C. § 112(6), Defendants' invalidity contentions are in no way an admission that the '090 Patent specification sufficiently discloses or describes corresponding structure for performing the claimed function. Defendants' contentions also are based, at least in part, on Plaintiff's Infringement Contentions to date and Plaintiff's overly broad interpretation and application of the Asserted Claims.

The citations to portions of any reference in this chart are exemplary only and are not exhaustive of the disclosures of the limitations in the art. Furthermore, citations to any figure, table, chart, component, or embodiment are meant to encompass the language describing the respective figure, table, chart, component, or embodiment and vice versa. Defendants will rely on the entirety of the references cited in this chart to show that the Asserted Claims are invalid, as will Defendants' experts. Defendants also reserve the right to rely on additional citations or sources of evidence that may be or may become applicable during discovery as this case progresses, e.g., through third-party discovery.

Claim	Oculus DK1 System's Exemplary Disclosures
CLAIM 8	
8[pre]. A non-transitory computer readable storage medium storing instructions that cause a computer system to execute a method, comprising:	To the extent the Preamble is limiting, the Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "[a] non-transitory computer readable storage medium storing instructions that cause a computer system to execute a method" as embodied in the product itself and as reflected in other prior art references that describe it. For example: The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "[a] non-transitory computer readable storage medium storing instructions that cause a computer system to execute a method": The Oculus DK1 System includes a computer[2] (indicated with a (1) in the image below), along with electronic devices including an Oculus Rift DK1 headset (indicated with a (2)), earphones[3]

[2] For example, a computer can be an exemplary Dell Inspiron 7720. *See* META-8KHZ_00047873. A computer can also be an exemplary HP ENVY DV4-5213cl Notebook computer. *See* META-8KHZ_00047987. An HP ENVY DV4-5213cl Notebook computer works in the same way as a Dell Inspiron 7720 computer, as described herein.

[3] Earphones may be wireless and can connect to, for example, a computer via, for example, Bluetooth. *See, e.g.*, LG Tone+ HBS-730: Where Have You Been All My Life (February 18, 2013), https://www.wired.com/2013/02/lg-tone-plus-hbs-730/ (describing wireless LG Tone+ HBS-730 earphones with Bluetooth); BackBeat GO 2 Earbuds Tutorial (November 5, 2013),

https://www.youtube.com/watch?v=EOwxkSW1UbM (describing wireless BackBeat GO 2 Earbuds with Bluetooth); Denon AH-W150 Exercise Freak Review: Wireless Headphones for Workouts (April 19, 2013), https://www.cnet.com/reviews/denon-exercise-freak-ah-w150-headphone-review/ ("The []Denon AH-W150 Exercise Freak[] in-ear Bluetooth headphones support wireless audio from Bluetooth-enabled devices."); *see also, e.g.*, META-8KHZ_00046189; META-8KHZ_00047873 at 31, 33 (supports "Bluetooth combo card"); META-8KHZ_00047806; META-8KHZ_00047987 at 9, 15.

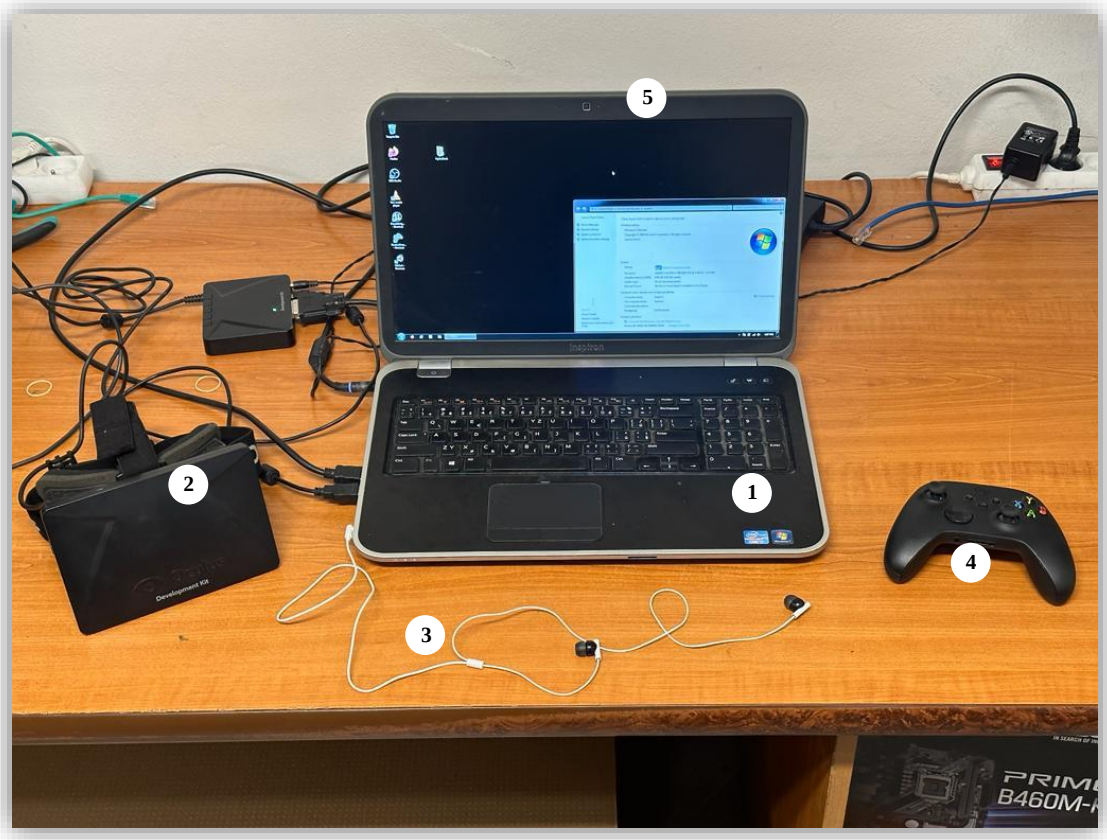
Claim	Oculus DK1 System's Exemplary Disclosures
	(like the earphones shown in (3) below), controller[4] and/or mouse[5] and/or keyboard[6] (like the controller shown in (4) below), and a microphone(s)[7] (like the microphone shown in (5) below that is embedded into the display of the Dell Inspiron 7720 computer):

[4] A controller may be wireless and can connect to a computer. *See, e.g.*, How To: Use Your Xbox 360 or PS3 Controller on a PC (April 11, 2013), https://www.youtube.com/watch?v=7nLnrkleR_c (explaining how to use Xbox 360 and/or PS3 controllers wirelessly with computer); Classic Game Room – XBOX 360 CONTROLLER for WINDOWS Review (January 21, 2013), https://www.youtube.com/watch?v=-GEZIpd66Po at 1:03 (showing wireless Xbox 360 controller connected to computer using a wireless adapter); META-8KHZ_00047859; *see also, e.g.*, META-8KHZ_00046189; META-8KHZ_00047873 at 31, 33 (supports "Bluetooth combo card"); META-8KHZ_00047806; META-8KHZ_00047987 at 9, 15.

[5] A mouse may be wireless and can connect to a computer. *See, e.g.*, SteelSeries Sensei Wireless Gaming Mouse Review (May 1, 2014), https://www.anandtech.com/show/7971/steelseries-sensei-wireless-gaming-mouse-review/2 (describing SteelSeries Sensei Wireless mouse that can be used with a computer); SteelSeries Sensei Wireless Laser Mouse Review (May 19, 2014), https://www.youtube.com/watch?v=MCVBi5Lub04 (showing SteelSeries Wireless mouse in use with computer that connects to computer via base station); Logitech M325 Wireless Mouse – Review (January 22, 2014), https://cafelilium.wordpress.com/2014/01/22/logitech-m325-wireless-mouse-review/ (describing Logitech M325 Wireless Mouse that connects to computer USB adapter plugged into computer); META-8KHZ_00047798; META-8KHZ_00047844; https://blog.logitech.com/2010/06/07/new-logitech-wireless-mouse-m510-delivers-all-day-comfort-and-advanced-control/ (describing M510 mouse); *see also, e.g.*, META-8KHZ_00046189; META-8KHZ_00047873 at 31, 33 (supports "Bluetooth combo card"); META-8KHZ_00047806; META-8KHZ_00047987 at 9, 15.

[6] A keyboard may be wireless and can connect to a computer. *See, e.g.*, Review: Logitech K830 Wireless HTPC Keyboard with TouchPad (May 15, 2014), https://www.smarthomebeginner.com/logitech-k830-wireless-backlit-htpc-keyboard/ (describing wireless keyboard that was tested on "Windows PC"); Apple Wireless Keyboard 2 Battery Version (August 7, 2011), https://www.youtube.com/watch?v=Zd44VTeggPI (showing wireless Apple keyboard); META-8KHZ_00047843; https://blog.logitech.com/2010/08/12/new-logitech-wireless-combo-mk520-puts-convenience-and-control-at-your-fingertips/ (describing K520 keyboard); *see also, e.g.*, META-8KHZ_00046189; META-8KHZ_00047873 at 31, 33 (supports "Bluetooth combo card"); META-8KHZ_00047806; META-8KHZ_00047987 at 9, 15.

[7] Microphone may be included in a computer. *See, e.g.*, META-8KHZ_00045115 at 3 ("Internal microphone support"); META-8KHZ_00047987 at 7 ("Internal microphones (2)). Microphone may also connect to, for example, a computer and may be wired or wireless. Wired microphone can connect to a computer via, for example, an auxiliary port or USB port. *See, e.g.*, META-8KHZ_00045115 at 3 ("one microphone-in port"); META-8KHZ_00047987 at 22 ("[C]onnect a microphone to the microphone jack

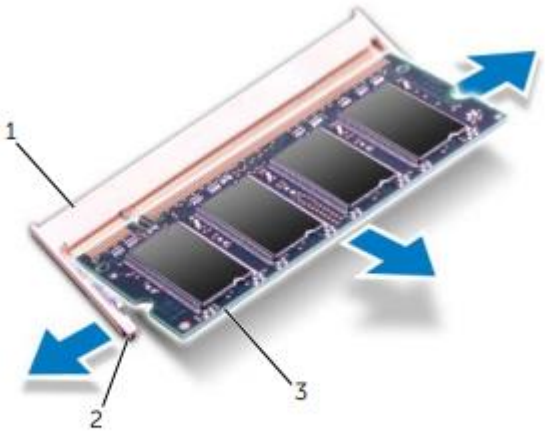
Claim	Oculus DK1 System's Exemplary Disclosures
	

on the computer."); Blue Yeti on PS3 (June 1, 2011), https://www.youtube.com/watch?v=oulJ4eJODUs. Wireless microphone can connect to a computer via, for example, Bluetooth. *See, e.g.*, Denon AH-W150 Exercise Freak Review: Wireless Headphones for Workouts (April 19, 2013), https://www.cnet.com/reviews/denon-exercise-freak-ah-w150-headphone-review/ ("The []Denon AH-W150 Exercise Freak[] in-ear Bluetooth headphones support wireless audio from Bluetooth-enabled devices . . . They have a built-in microphone."); *see also, e.g.*, META-8KHZ_00046189; META-8KHZ_00047873 at 31, 33 (supports "Bluetooth combo card"); META-8KHZ_00047806; META-8KHZ_00047987 at 9, 15.

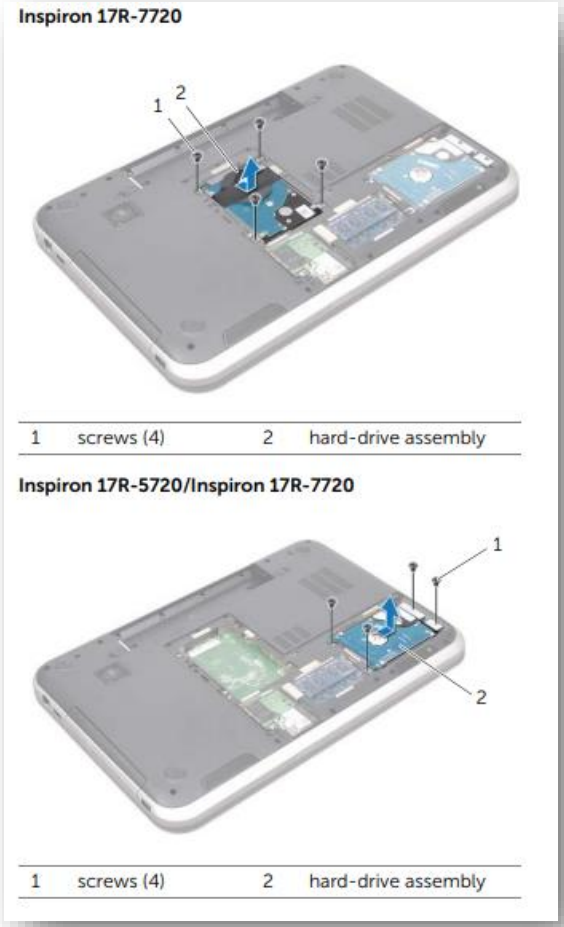
Claim	Oculus DK1 System's Exemplary Disclosures
	See photograph of an exemplary Oculus DK1 System.[8] Computer (1), in this example, is a Dell Inspiron 7720. The Dell Inspiron 7720 (1) comprises parts that make up traditional PCs, such as processor (CPU), and graphics card (GPU). The exemplary Dell Inspiron 7720 also includes memory (RAM): **Memory** Connectors: two internally-accessible DDR3 SODIMM sockets Capacities: 2 GB and 4 GB Minimum memory: 2 GB Maximum memory: 4 GB Memory type: 1333/1600 MHz DDR3 SODIMM Memory configurations supported: 2 GB, 4 GB, 6 GB, and 8 GB *See* Specification Sheet for Dell Inspiron 7720 (2013) (showing 1333/1600 MHz DDR3 SODIMM RAM memory).[9]

[8] META-8KHZ_00047800; *see also* META-8KHZ_00047801; META-8KHZ_00047802; META-8KHZ_00047799; META-8KHZ_00047805; META-8KHZ_00047804; META-8KHZ_00047803.

[9] META-8KHZ_00045115

Claim	Oculus DK1 System's Exemplary Disclosures
	 1 memory-module connector 2 securing clips (2) 3 memory module *See* Owner's Manual for Dell Inspiron 7720 (2012).[10] The Dell Inspiron 7720 also includes a hard drive:

[10] META-8KHZ_00047873

Claim	Oculus DK1 System's Exemplary Disclosures
	 Inspiron 17R-7720 1 screws (4) 2 hard-drive assembly Inspiron 17R-5720/Inspiron 17R-7720 1 screws (4) 2 hard-drive assembly *See* Owner's Manual for Dell Inspiron 7720 (2012).[11]

[11] META-8KHZ_00047873

Claim	Oculus DK1 System's Exemplary Disclosures
	 See photograph of an exemplary Oculus DK1 System.[12] The hard drive on the Dell Inspiron 7720 includes "instructions" that allows the computer to operate, for example, the Windows 7 operating system. Applications such as Couch Knights,[13]

[12] META-8KHZ_00047842

[13] Couch Knights was publicly demonstrated at the Games Developer Conference in March 2014. *See, e.g.*, GDC 2014: Oculus Rift DK2 'Couch Knights' Gameplay, https://www.youtube.com/watch?v=CoyjO-etC30; *see also* Oculus Rift DK2 Hands-On Impressions! Couch Knights, Valkyrie, and How It Compares to the DK1, https://www.youtube.com/watch?v=d_9nSA7thEc; https://www.unrealengine.com/marketplace/en-US/product/couch-knights (July 26, 2014); Couch Knights at Oculus Rift DK2 @

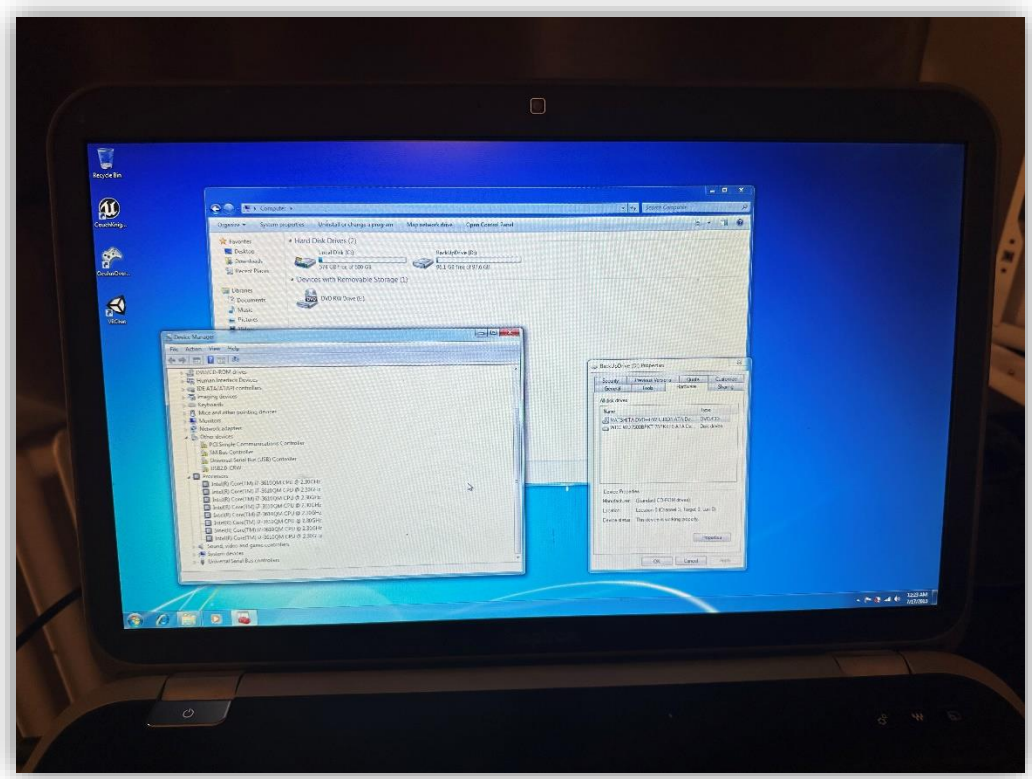
Claim	Oculus DK1 System's Exemplary Disclosures
	Oculus Overlay,[14] SecondLife,[15] VRChat,[16] and others are also "instructions that cause a computer system to execute a method," and would be stored on the hard drive of the computer, in this case a Dell Inspiron 7720.

GDC 2014, https://www.youtube.com/watch?v=J3Y_Qe1-Qvk. Couch Knights was also publicly demonstrated at PAX East 2014 in April 2014. *See, e.g.*, Pax East 2014 Oculus Rift HD Couch Knights Impressions, https://www.youtube.com/watch?v=Up56qLOGIqY; https://blog.hansoninc.com/en-guarde-couch-knights-oculus-rift-pax-east/.

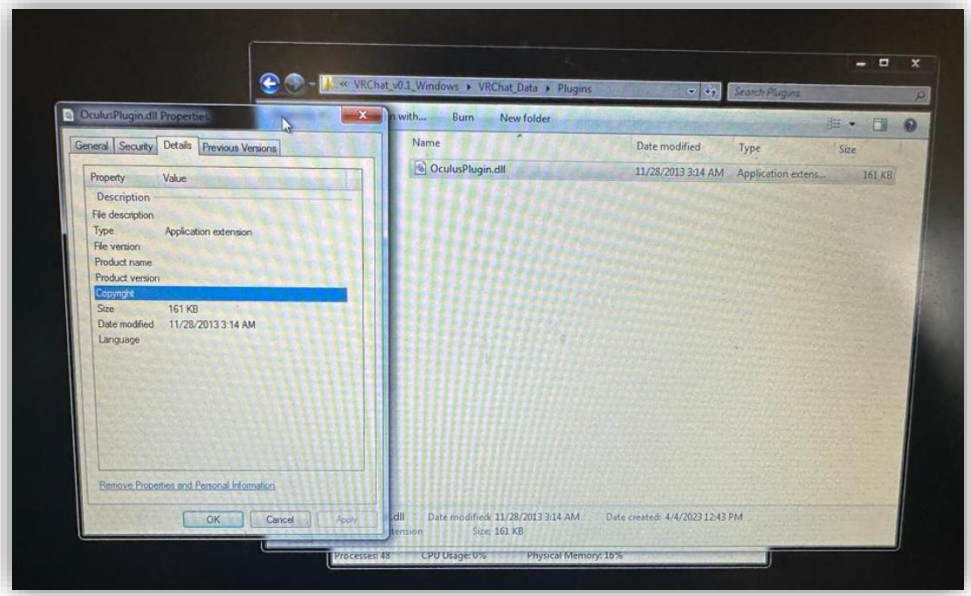
[14] Oculus Overlay was available prior to any date to which the '090 Patent can claim priority. *See, e.g.*, https://web.archive.org/web/20131226064044/http://holophone3d.com/oculus/ (December 26, 2013); DayZ (Arma 2) Oculus Rift DK1 (June 1, 2013), https://www.youtube.com/watch?v=5HBMHGYmfbo (showing DayZ application using "Oculus Overlay"); Prepar3D / Oculus Rift Using Oculus Overlay (January 13, 2014), https://www.youtube.com/watch?v=x1pkG4zTIhQ (showing Prepar3D application displayed with Oculus Overlay).

[15] SecondLife (through the SecondLife Oculus Rift Beta) for the Oculus DK1 was available at least as early as March 2014. *See, e.g.*, SLOculusRiftBeta (March 26, 2014), https://www.youtube.com/watch?v=YaROmSCpa2o; *see also, e.g.*, Second Life on a Oculus Rift (January 21, 2014), https://www.youtube.com/watch?v=MFh3buY8KFA; How to Use Oculus Rift with Second Life (May 22, 2014), https://www.youtube.com/watch?v=TLL5JVwG118; Release Notes/Second Life Project OculusRift (May 21, 2014), https://wiki.secondlife.com/wiki/Release_Notes/Second_Life_Project_OculusRift/3.7.8.289834.

[16] VRChat v0.1, for example, was released on January 16, 2014. *See* https://www.reddit.com/r/oculus/comments/1vcbwk/vrchat_v01_released/; https://en.wikipedia.org/wiki/VRChat.

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System.[17]

[17] META-8KHZ_00047841

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System (storing VRChat application).[18] The Windows 7 Operating System can execute applications (such as those discussed above) that are compatible with the operating system.[19] A POSA would understand that any application which is capable of operating with the Windows operating system is capable of being displayed on the Oculus DK1 headset (2), which is connected to the same computer on which Windows operates,

[18] META-8KHZ_00046193

[19] *See, e.g.*, VRChat v0.1 Released, https://www.reddit.com/r/oculus/comments/1vcbwk/vrchat_v01_released/ (showing Windows download for VRChat v0.1); https://www.unrealengine.com/marketplace/en-US/product/couch-knights (showing Windows as a supported platform); https://wiki.secondlife.com/wiki/Release_Notes/Second_Life_Project_OculusRift/3.7.8.289834 ("Oculus Rift is supported in Windows Vista (or newer)"); *see also* https://en.wikipedia.org/wiki/List_of_Microsoft_Windows_versions (showing that Windows Vista was released prior to Windows 7).

Claim	Oculus DK1 System's Exemplary Disclosures
	using either Oculus libraries or other software such as Oculus Overlay.[20] In the below example, a web browser (Firefox) is rendering on the Oculus Rift DK1 headset (the lenses were removed to capture the photo) using the Oculus Overlay software: *See* photograph of an exemplary Oculus DK1 System.[21] Other software, such as Couch Knights, SecondLife, and VRChat, can also be displayed on the Oculus Rift DK1 headset:

[20] *See* https://web.archive.org/web/20140614030857/http://holophone3d.com/oculus/ ("'OculusOverlay' provides is a high performance way to pipe any content from your desktop into your Oculus Rift. It works for any 3D and 2D content and now has tons of great features.").

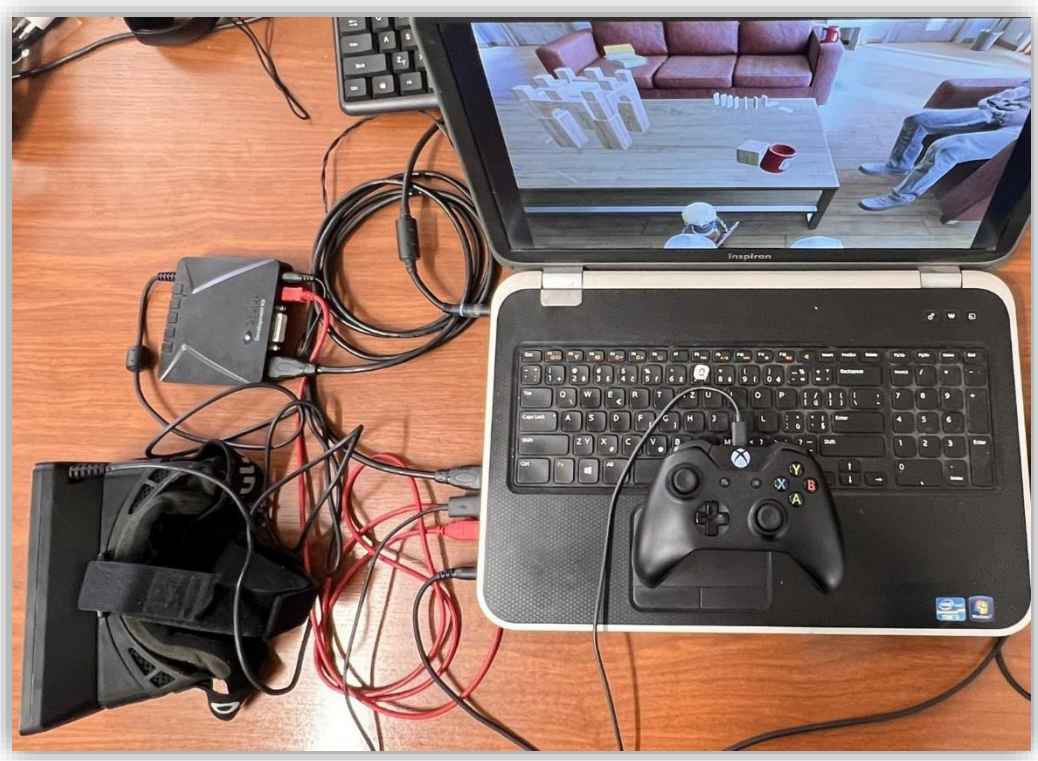
[21] META-8KHZ_00046194; *see also* META-8KHZ_00046203

Claim	Oculus DK1 System's Exemplary Disclosures
	 See photograph of an exemplary Oculus DK1 System (showing VRChat).[22]

[22] META-8KHZ_00047802; *see also* META-8KHZ_00047805

Claim	Oculus DK1 System's Exemplary Disclosures
	 See photograph of an exemplary DK1 System (showing VRChat displayed on the headset).[23]

[23] META-8KHZ_00046202; *see also* META-8KHZ_00046235

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System (showing Couch Knights).[24]

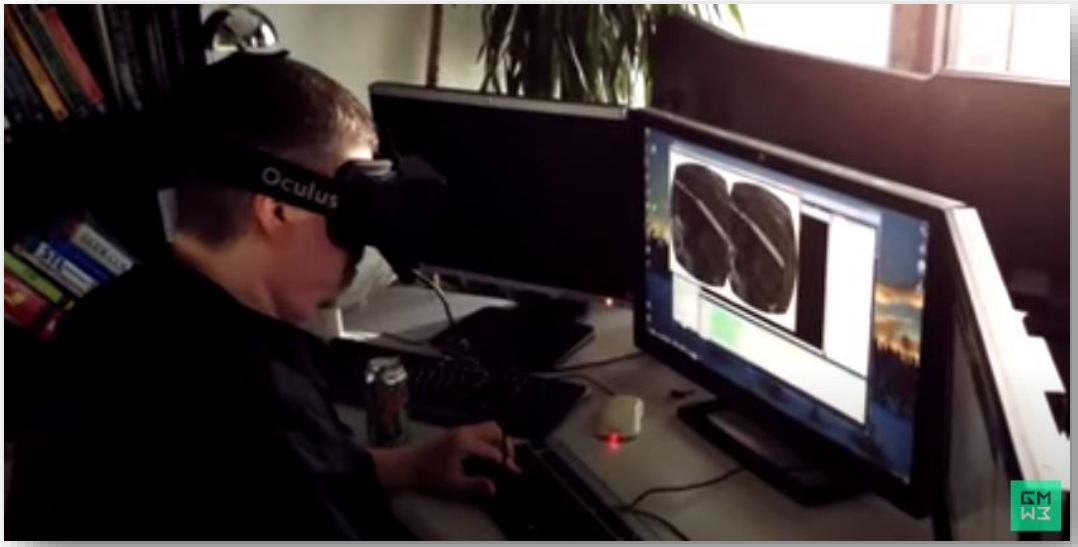
[24] META-8KHZ_00047801; *see also* META-8KHZ_00047804

Claim	Oculus DK1 System's Exemplary Disclosures
	 See photograph of an exemplary Oculus DK1 System (showing a knight character displayed on headset).[25]

[25] META-8KHZ_00046201; *see also* META-8KHZ_00046190

Claim	Oculus DK1 System's Exemplary Disclosures
	 See SLOculusRiftBeta Video (March 26, 2014) (showing SecondLife Oculus Rift Beta on the Oculus Rift DK1 headset).[26]

[26] SLOculusRiftBeta (March 26, 2014) at 7:20, https://www.youtube.com/watch?v=YaROmSCpa2o.

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* How to Use Oculus Rift with Second Life (May 22, 2014).[27]
8[a]. commence an electronic call between a first individual wearing an electronic earphone and a second individual that are remote from each other	The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "commence an electronic call between a first individual wearing an electronic earphone and a second individual that are remote from each other" as embodied in the product itself and as reflected in other prior art references that describe it. For example: The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "commenc[ing] an electronic call between a first individual" and a "second individual that are remote from each other":

[27] https://www.youtube.com/watch?v=TLL5JVwG118; *see also* https://community.secondlife.com/blogs/entry/1199-second-life%E2%80%99s-oculus-rift-integration-is-ready-for-beta-testers/; https://community.secondlife.com/blogs/entry/1275-using-the-oculus-rift-with-second-life/.

Claim	Oculus DK1 System's Exemplary Disclosures
	For example, under at least Plaintiff's theory of infringement, applications like VRChat allow a "first individual" to "commence an electronic call" with a remote "second individual." A "first individual" is shown below. In this example, the "first individual's" camera position is set to see through eyes of their avatar in applications like VRChat. *See* photograph of an exemplary Oculus DK1 System (showing VRChat).[28]

[28] META-8KHZ_00047802; *see also* META-8KHZ_00047805

Claim	Oculus DK1 System's Exemplary Disclosures
	In applications like VRChat, multiple users can share same virtual space and communicate with each other using voice chat. The "first individual," in this case, configures a server within the VRChat application (i.e., "commence an electronic call") which a "second individual" joins in order to communicate with the "first individual." *See* photograph of an exemplary Oculus DK1 System (starting a server).[29]

[29] META-8KHZ_00046185; *see also* META-8KHZ_00046236.

Claim	Oculus DK1 System's Exemplary Disclosures
	 See photograph of an exemplary Oculus DK1 System (connecting to a server).[30] If neither individual can start a server, they can use a third-party server. After both individuals are connected to same server, one of them needs to create a channel.

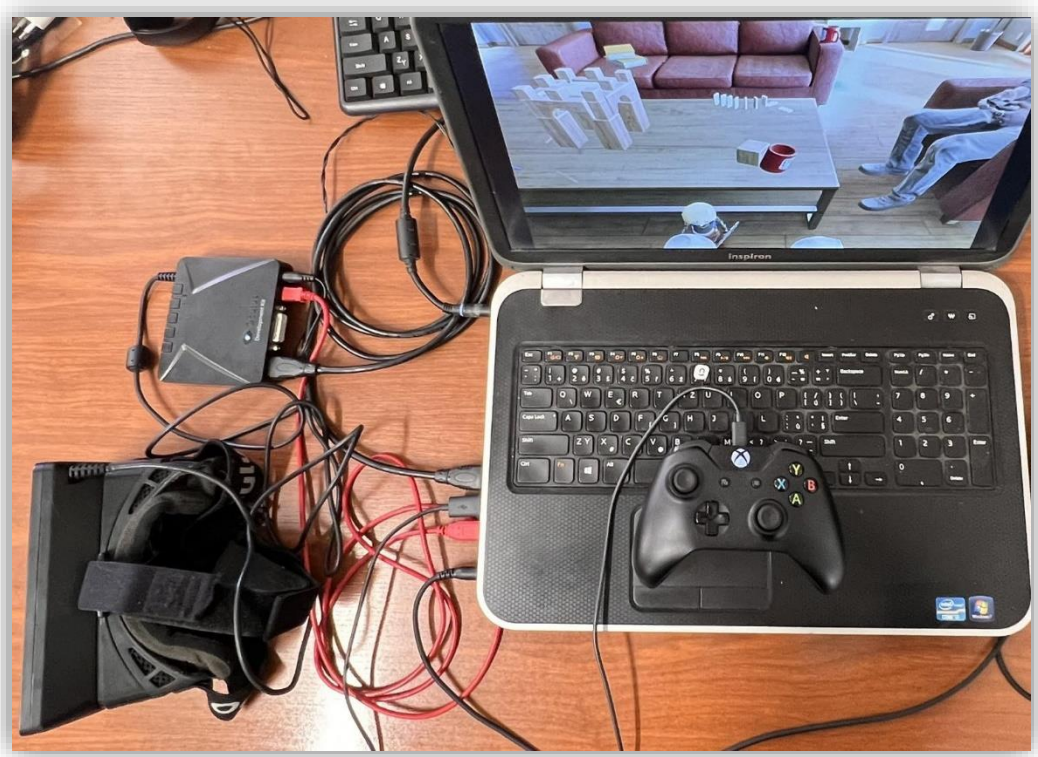
[30] META-8KHZ_00046186; *see also* META-8KHZ_00046234

Claim	Oculus DK1 System's Exemplary Disclosures
	  See photograph of an exemplary Oculus DK1 System (connecting to a channel).[31] After the channel is created, the first and second individuals can communicate via an "electronic call." For example, the virtual avatar of the "second individual" is shown below, while both individuals are "remote from each other."

[31] META-8KHZ_00046185; *see also* META-8KHZ_00046236.

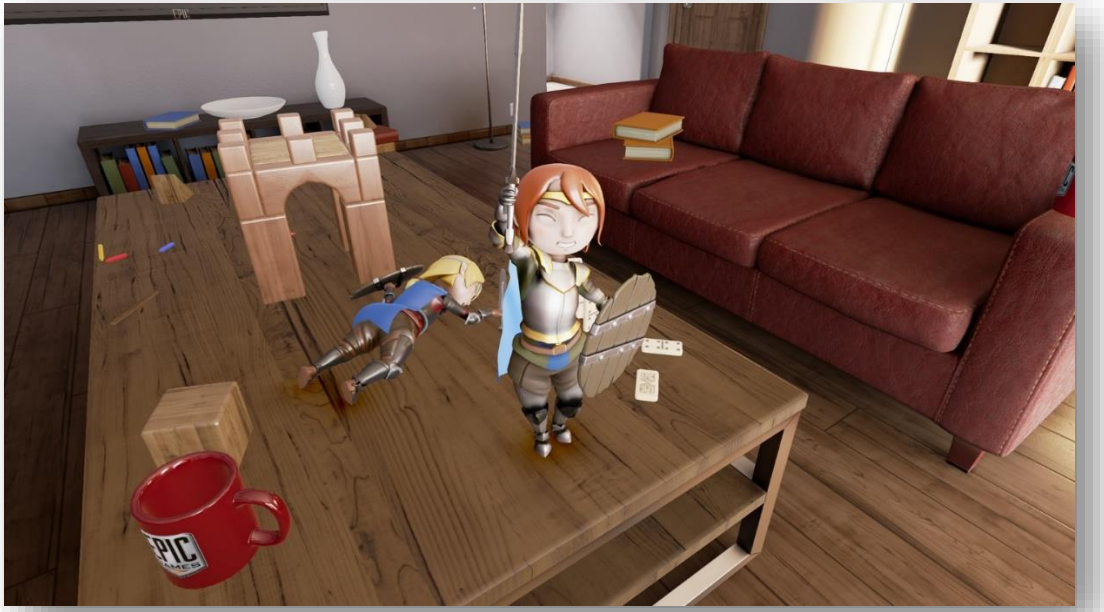
Claim	Oculus DK1 System's Exemplary Disclosures
	 See photograph of an exemplary Oculus DK1 System (showing a second individual).[32] As another example, under at least Plaintiff's theory of infringement, applications like Couch Knights allow a "first individual" to "commence an electronic call" with a remote "second individual." For example, a "first individual" is shown below. In this example, the "first individual's" camera position is set to see through eyes of their avatar in Couch Knights.

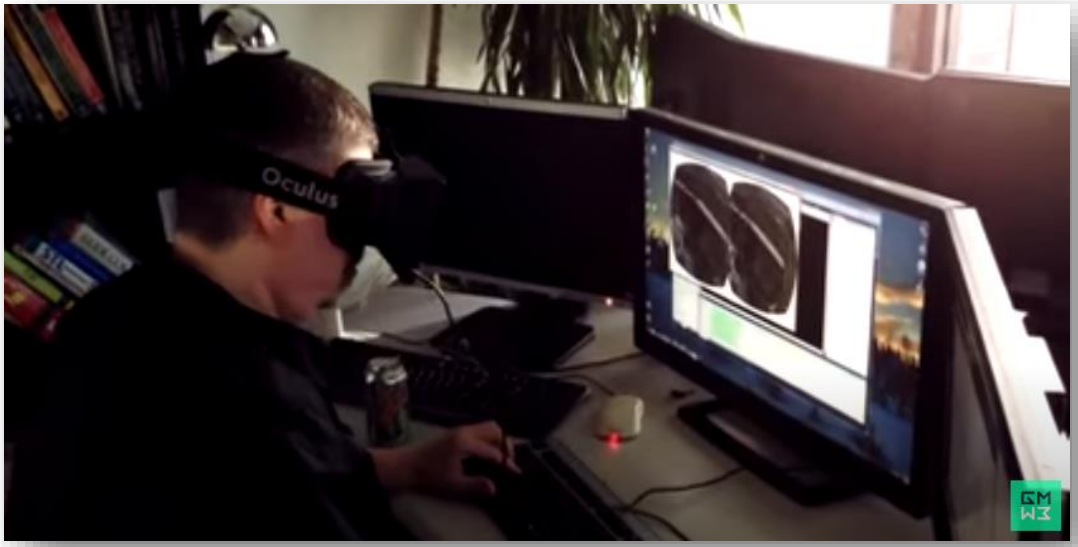
[32] META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System (showing a first individual).[33] In applications like Couch Knights, multiple users can participate in a "competitive multiplayer game" that "lets you compete in a shared virtual space."[34] The "first individual" in this case, can communicate with a "second individual" in a shared virtual space (i.e., "commence an electronic

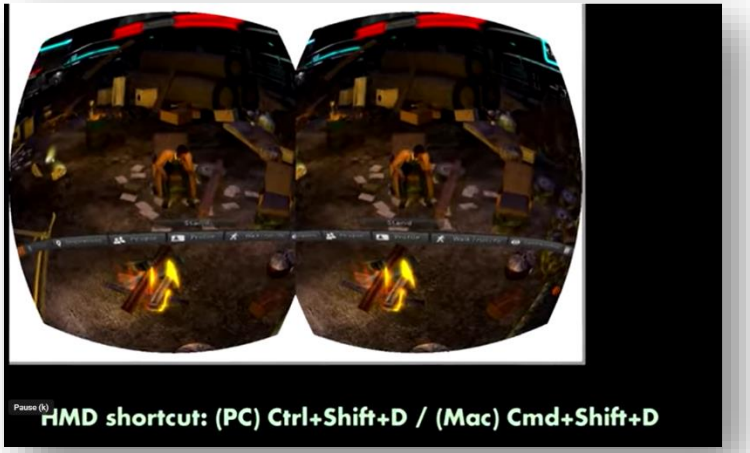
[33] META-8KHZ_00047801; *see also* META-8KHZ_00047804

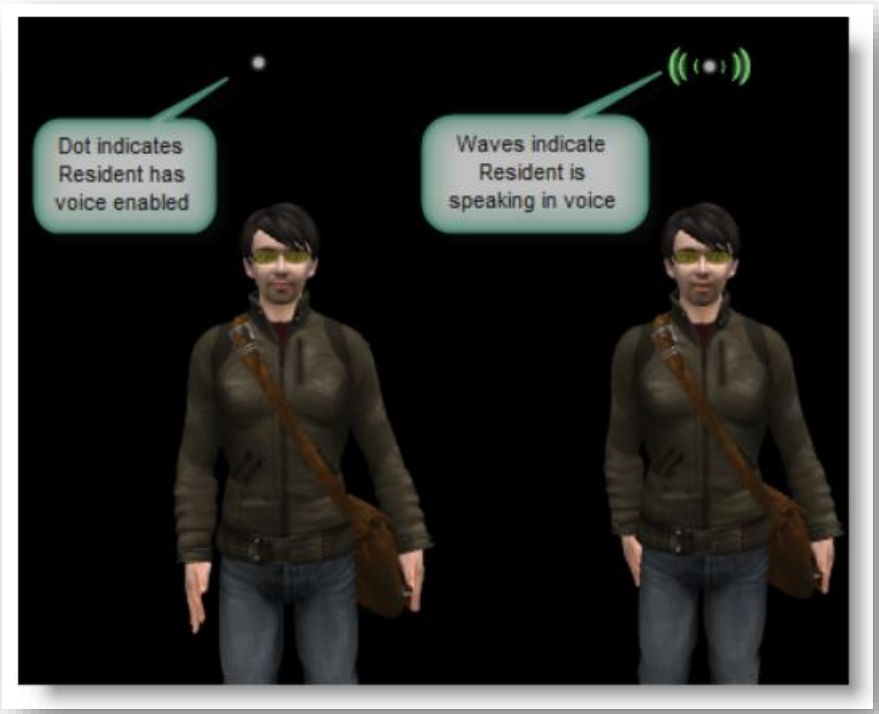
[34] https://www.unrealengine.com/marketplace/en-US/product/couch-knights.

Claim	Oculus DK1 System's Exemplary Disclosures
	call") using actions and sounds of their respective knight characters. In addition, both individuals are "remote from each other."  *See* picture of Couch Knights (showing the first and second individuals' respective knight characters). As another example, under at least Plaintiff's theory of infringement, applications like SecondLife allow a "first individual" to "commence an electronic call" with a remote "second individual." For example, a "first individual" is shown below.

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* How to Use Oculus Rift with Second Life (May 22, 2014).[35] The Oculus-enabled SecondLife viewer allows the "first individual" to use the their Oculus device anywhere in SecondLife.[36] While using the Oculus, the "first individual" can set their camera either to third-person "object mode" or to "first-person view." First-person view enables the "first individual" to "view the world from your avatar's perspective."

[35] https://www.youtube.com/watch?v=TLL5JVwG118.
[36] *See id.*

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See id.* *See id.*

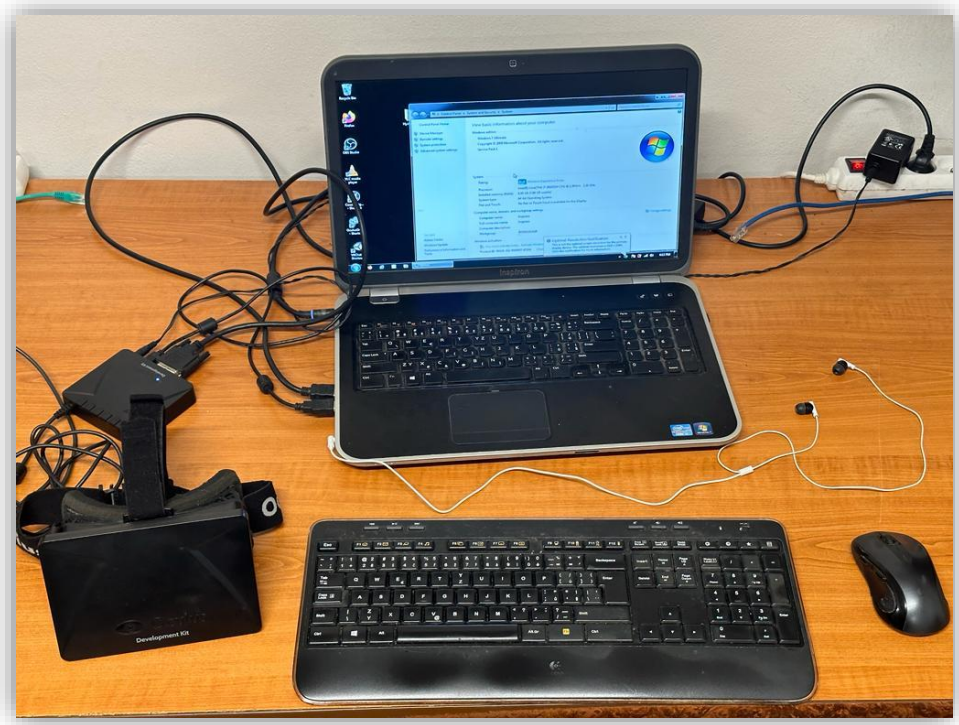
Claim	Oculus DK1 System's Exemplary Disclosures
	Applications like SecondLife include other individuals, and "[y]ou can talk to the people around you through text-based Local Chat. If you have a microphone, you can also speak out loud using inworld voice."[37] An example of a "second individual," in the form of a SecondLife "resident" (or user), is shown below: 

[37] *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010) at https://wiki.secondlife.com/wiki/Viewer_2_Quick_Start_Guide/Local_chat_and_voice.

Claim	Oculus DK1 System's Exemplary Disclosures
	See Viewer 2 Quick Start Guide/Local chat and voice (February 23 2010).[38] Applications like SecondLife allow users that are "remote" from each other to communicate in a shared virtual space (i.e., "commence an electronic call") using applications like SecondLife. For example, as shown below SecondLife has "resident" groups from all over the world, i.e. users that are "remote." **Subcategories** This category has the following 67 subcategories, out of 67 total. **2** • 2ndAgency group members **A** • Afrikaans speaking Residents • Arabic speaking Residents **B** • Bosnian speaking Residents • Brazilian Sign Language speaking Residents • Bulgarian speaking Residents **C** • Catalan speaking Residents • Central Khmer speaking Residents • Chinese speaking Residents • Community Gateway Owner • Czech speaking Residents **D** • Danish speaking Residents • DuoGrid Administrators • Hebrew speaking Residents • Hungarian speaking Residents **I** • I18n project members • Images of Second Life Residents • Impossible IRL group members • Italian speaking Residents **J** • Japanese speaking Residents • Jira Reporters **K** • Korean speaking Residents **L** • Languages spoken by Residents • Linden Bear Collectors • Lojban speaking Residents • LSL Mentors • LSL Teachers **M** • Romanian speaking Residents • Russian speaking Residents **S** • Scripter • Second Life Endorsed Group Network Applicants • Second Life Explorers • Second Life Mentor group members • Second Life Mentor Q&A group members • Second Life Volunteers • Second Lounge Administrators • SecondLife Hobos group members • Serbo-Croatian speaking Residents • Shelter Staff • Skills • Slovenian speaking Residents • Source Contributor • Spanish speaking Residents • Spanish Sign Language speaking Residents • Swedish speaking Residents **T** • Tagalog speaking Residents • Residents using Twitter *See* Second Life Residents (April 13, 2009).[39]

[38] https://wiki.secondlife.com/wiki/Viewer_2_Quick_Start_Guide/Local_chat_and_voice.

[39] https://wiki.secondlife.com/wiki/Category:Second_Life_Residents.

Claim	Oculus DK1 System's Exemplary Disclosures
	The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "a first individual wearing an electronic earphone":  *See* photograph of an exemplary Oculus DK1 System (showing earphones).[40] Any application can use the exemplary electronic earphones through the audio jack interface (shown below) on the Dell Inspiron 7720.

[40] META-8KHZ_00047799; META-8KHZ_00047800

Claim	Oculus DK1 System's Exemplary Disclosures
	Ports and connectors Audio: one microphone-in port; one stereo headphone/speaker/microphone combo port; one digital microphone *See* Specification Sheet for Dell Inspiron 7720 (2013).[41] In addition, applications allowed two users to directly connect to each other over a call prior to any date to which the '090 Patent can claim priority. For example, the Skype application, which can be run on a Windows computer[42], supported one-to-one, or peer-to-peer, calls.[43] A person of ordinary skill in the art would have understood that the Oculus DK1 System could be used with the Skype application to perform one-to-one, or peer-to-peer, calls between only two individuals and could be displayed on the Oculus DK1 headset using Oculus Overlay. A person of ordinary skill in the art would also have found it obvious to incorporate one-to-one, or peer-to-peer, calls between two individuals into other applications, such as VRChat, SecondLife, and/or Couch Knights.
8[b]. designate, for the first individual, a sound localization point that simulates a location in empty	The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "designate, for the first individual, a sound localization point that simulates a location in empty space from where an origin of a voice of the second individual occurs for the first individual through the electronic earphone such that the sound localization point in empty space is located

[41] META-8KHZ_00045115

[42] *See* https://web.archive.org/web/20140209181315/https://support.skype.com/en/faq/FA10328/what-are-the-system-requirements-for-skype (February 9, 2014) (supports, for example, Windows Vista, Windows 7, and Windows 8).

[43] *See* https://web.archive.org/web/20140315232126/http://www.skype.com/en/features/ (March 15, 2014) (describing "Skype to Skype calls," "One to one video calls," and calls with phones like "mobiles and landlines"); https://www.computerworld.com/article/2543670/how-dangerous-is-skype.html (March 6, 2007) ("Skype is a peer-to-peer (P2P) application, meaning that users connect to one another directly and not through a central server for communication.").

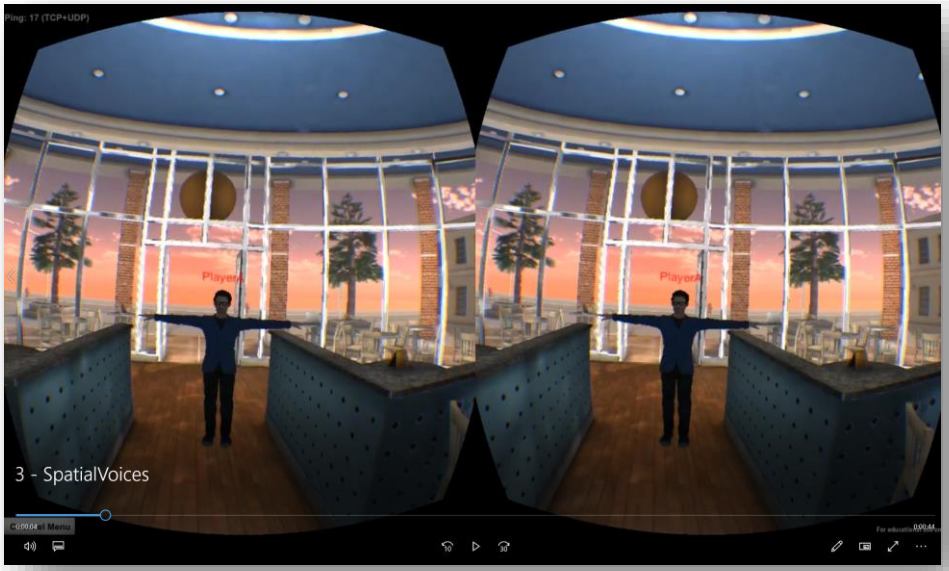
Claim	Oculus DK1 System's Exemplary Disclosures
space from where an origin of a voice of the second individual occurs for the first individual through the electronic earphone such that the sound localization point in empty space is located away from and proximate to the first individual	away from and proximate to the first individual" as embodied in the product itself and as reflected in other prior art references that describe it. For example: The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "designat[ing], for the first individual, a sound localization point that simulates a location in empty space from where an origin of a voice of the second individual occurs for the first individual" wherein the "sound localization point in empty space is located away from and proximate to the first individual": For example, in applications like VRChat, the avatar for the "second individual" includes "a sound localization point." As shown below, when the "second individual" is speaking their nametag in virtual world will turn red:

Claim	Oculus DK1 System's Exemplary Disclosures
	See photograph of an exemplary Oculus DK1 System (showing nametag in red).[44] Applications like VRChat "designate[]" a location for the voice of the "second individual" to originate from "for the first individual," where, under at least Plaintiff's theory of infringement, that location is "a location in empty space." For example, the "second individual" in the example above is remotely located from the "first individual," yet their voice is simulated so that it appears to originate from an empty location a few feet in front of the "first individual."

[44] META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU

Claim	Oculus DK1 System's Exemplary Disclosures
	  See photograph of an exemplary Oculus DK1 System (showing VRChat).[45] The "sound localization point in empty space is located away from and proximate to the first individual." For example, the second individual avatar is in front of the first individual's avatar (point of view) and the voice sound is originating in front of the user.

[45] META-8KHZ_00047802; *see also* META-8KHZ_00047805

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System (showing a second individual).[46] When the first individual turns to the left, the sound is now originating to the right for the user, where the original unchanged location of second individual avatar is located.

[46] META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU

Claim	Oculus DK1 System's Exemplary Disclosures
	 See photograph of an exemplary Oculus DK1 System (showing VRChat).[47] For example, the VRChat development diary from 2014 explains that the developer used "two libraries" in addition to Unity3D: "TNet (for networking) and USpeak (for voicechat)," which were used with "a sweet CoffeeShop environment on the Unity Asset Store."[48] USpeak includes

[47] *See id.*

[48] VRChat v0.1 Development, https://web.archive.org/web/20140121030858/http://grahamgaylor.com/2014/01/; *see also* https://web.archive.org/web/20140121030107/http://grahamgaylor.com/2013/06/ ("Now I'll explain the code implementation using Unity3D using C#."); https://web.archive.org/web/20140121030112/http://grahamgaylor.com/2013/09/ ("I decided to go with Unity3D as my game engine for two reasons. First off, I have the most experience with Unity, I've played around with the UDK, but I came crawling back to Unity. My second and more important reason is that there are Unity plugins for most of the hardware I'm using."); https://web.archive.org/web/20140121030858/http://grahamgaylor.com/2014/01/ ("I used Unity3D for both projects, but

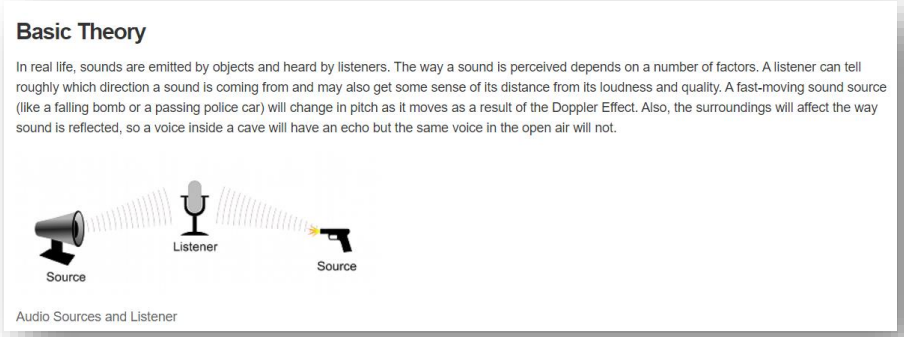
Claim	Oculus DK1 System's Exemplary Disclosures
	"[s]patial audio support" for voice chat that provided "directional audio for a truly immersive experience."[49] Furthermore, the Unity Developers Manual from 2014 explains that Unity supported 3D audio. For example, audio clips from sound clip files are "played back so as to simulate its position in the game world's 3D space" if the "audio clip is marked as a 3D Sound."[50] "3D sounds emulate the distance and location of sounds by attenuating volume and panning across speakers."[51]

used better networking and voice chat libraries in the second iteration."); https://web.archive.org/web/20140120214705/http://grahamgaylor.com/category/unity3d/; https://web.archive.org/web/20140121030102/http://grahamgaylor.com/2013/01/; https://web.archive.org/web/20140121093515/http://grahamgaylor.com/2013/04/ ("To start, the Oculus Developer Center is now open and ready for devs to download the Rift SDK. What this means is that developers will now be able to integrate the Rift into their games and/or start building games from scratch with an actual test unit to build it around. As of now (April 1), it seems the only SDK downloads are the Windows SDK and the Unity 4 Pro integration package."); https://web.archive.org/web/20140121030847/http://grahamgaylor.com/2013/05/.

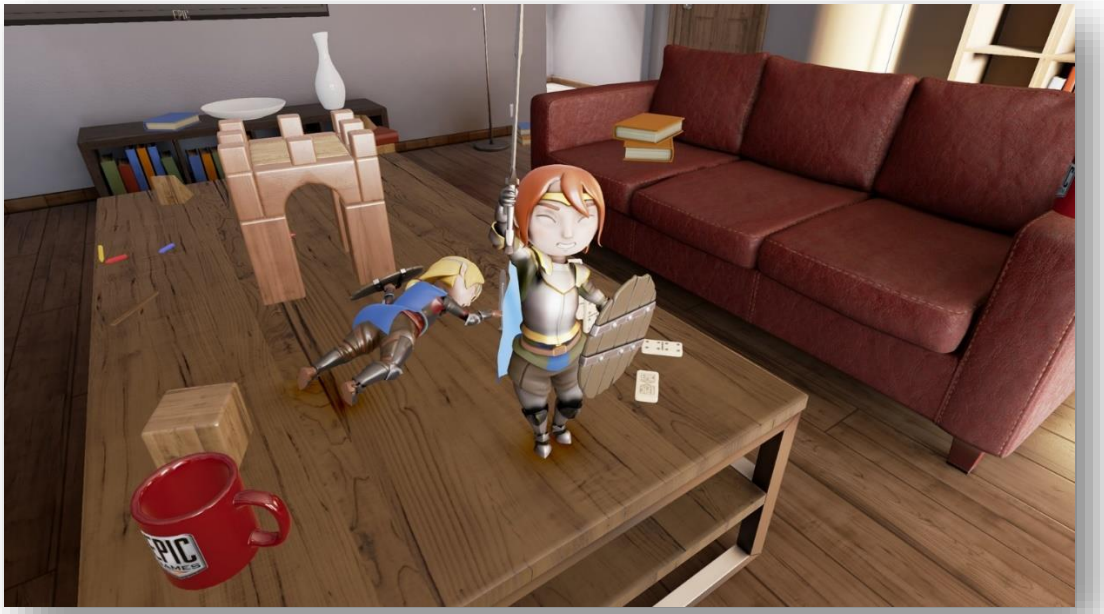
[49] *See* [RELEASED] USpeak Voice Chat – Voice Chat For All Your Multiplayer Games, https://forum.unity.com/threads/released-uspeak-voice-chat-voice-chat-for-all-your-multiplayer-games.154609/ (last edited November 17, 2013).

[50] *See* https://web.archive.org/web/20140601033451/http://docs.unity3d.com/Manual/class-AudioClip.html.

[51] *See id.*

Claim	Oculus DK1 System's Exemplary Disclosures
	 Audio Overview – Unity Documentation (June 3, 2014).[52] As another example, applications like Couch Knights "designate[]" a sound localization point from where the voice of a "second individual" originates (i.e., the sounds produced by their respective character). Under at least Plaintiff's theory of infringement, the sound localization point is used to "simulate[] a location in empty space from where an origin of a voice of the second individual occurs" for the "first individual."

[52] https://web.archive.org/web/20140603055903/http://docs.unity3d.com/Manual/AudioOverview.html.

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* picture of an exemplary Couch Knights application (showing knight characters that produce sound, such as footsteps and sword swings).[53] For the same reasons as above, the "sound localization point in empty space is located away from and proximate to the first individual." As an additional example, applications like SecondLife "designate[]" a sound localization point. For example, the documentation for the SecondLife application explains that "sound clips" can be "attached" to virtual objects.

[53] https://www.unrealengine.com/marketplace/en-US/product/couch-knights. *See also, e.g.*, Couch Knights on Oculus Rift DK1 (July 17, 2014), https://www.youtube.com/watch?v=HcreLAfIqUs; GDC 2014: Oculus Rift DK2 'Couch Knights' Gameplay (March 21, 2014), https://www.youtube.com/watch?v=CoyjO-etC30.

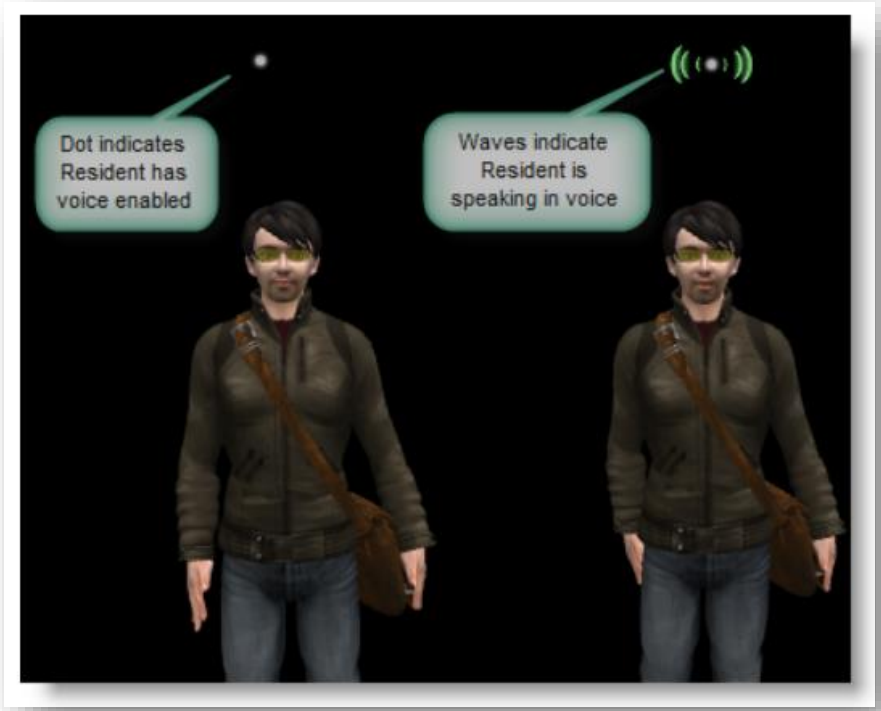
Claim	Oculus DK1 System's Exemplary Disclosures

	Scripting comments
	
	Sound clips
	
	• llTriggerSound()
	  • Unattached - sounds occur where they're triggered.
	  • Cannot be stopped with llStopSound().
	• llPlaySound()
	  • Attached - sounds follow the object they are in if it moves.
	  • Only one at a time per prim. Playing another will stop the current sound.
	• llLoopSound()
	  • Attached - sounds follow the object they are in if it moves.
	  • This continuously loops the sound.
	  • Only one at a time per prim. Playing another will stop the current sound.
	
	See SecondLife Wiki – Environment Sounds (Revision as of 20:11, July 15, 2012).[54]
	
	As explained above, applications like SecondLife includes other individuals, and "[y]ou can talk to the people around you through text-based Local Chat. If you have a microphone, you can also speak out loud using inworld voice."[55] An example of a "second individual," in the form of a SecondLife "resident" (or user), is shown below. This SecondLife avatar has a "voice chat feature that lets avatars speak."[56]

[54] https://wiki.secondlife.com/w/index.php?title=Environment_Sounds&direction=prev&oldid=1195319.

[55] *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010) at https://wiki.secondlife.com/wiki/Viewer_2_Quick_Start_Guide/Local_chat_and_voice.

[56] *See* SecondLife Wiki – Lip Sync (last edited on October 13, 2009) at https://wiki.secondlife.com/wiki/Lip_sync.

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010).[57] The "first individual" can "hear voice chat" either from the camera position or from the avatar position.

[57] https://wiki.secondlife.com/wiki/Viewer_2_Quick_Start_Guide/Local_chat_and_voice.

Claim	Oculus DK1 System's Exemplary Disclosures
	  See SecondLife Tutorial Video – Voice Chat Getting Started (November 14, 2008).[58] The audio for other residents in applications like SecondLife is spatialized such that, under at least Plaintiff's theory of infringement, "for the first individual, a sound localization point [] simulates a location in empty space from where an origin of a voice of the second individual occurs for the first individual." For example, the SecondLife documentation describes a "Voice Test" where "5 testers" "Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction." Then arrange themselves so that "4 testers [are] around one tester at north, south, east and west." This test is used to "verify [that] each tester sounds like their voice is coming from their position inworld" and that "everyone sound like they are in the right place spatially."

[58] https://wiki.secondlife.com/wiki/Video_Tutorials/More; *see also* http://vidtuts.s3.amazonaws.com/VOICE-CHAT-Getting-started.mp4.

Claim	Oculus DK1 System's Exemplary Disclosures

	Voice Test
	VERSION 0.1
	LENGTH 00:00
	TESTERS 5
	OVERVIEW Coming
	SETUP Up to 5 normal users, (can be done with 2)
	
	Spatial sound testing with gathered groups
	• Setup: Have each of 5 testers do the following: Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction.
	• Arrange 4 testers around one tester at north, south, east and west, like this:
	<tab> . Tester N . Tester W Tester C Tester E . Tester S . </tab>
	• Tester C: Face Tester N.
	• Cardinal Testers: Speak one at a time starting with Tester N and going clockwise around Tester C (N followed by E followed by S followed by W).
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Rotate your avatar to face Tester S.
	• Cardinal Testers, repeat the round robin above, starting with Tester S.
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Alt-Zoom on something out of range of the testers.
	* ...
	• Group in a circle
	  • Does everyone sound like they are in the right place spatially?
	  • If someone moves away, do they get quieter?
	• Group with members behind you
	  • Can you hear all members, including those behind you?
	
	See SecondLife Wiki – Voice Test (November 26, 2007).[59]

[59] https://wiki.secondlife.com/wiki/Voice_Test.

Claim	Oculus DK1 System's Exemplary Disclosures
	The SecondLife documentation also explains that "3D position" is used by the *Session.Set3DPosition.1* method for both the "speaker and listener" and that *Session.Set3DPosition.1* "describes the speaking position and the listening position for this avatar."

Session.Set3DPosition.1

When sending a 3D position for speaker and listener, the "listener" is either the avatar position or the camera position. That is, it describes the speaking position and the listening position for this avatar.

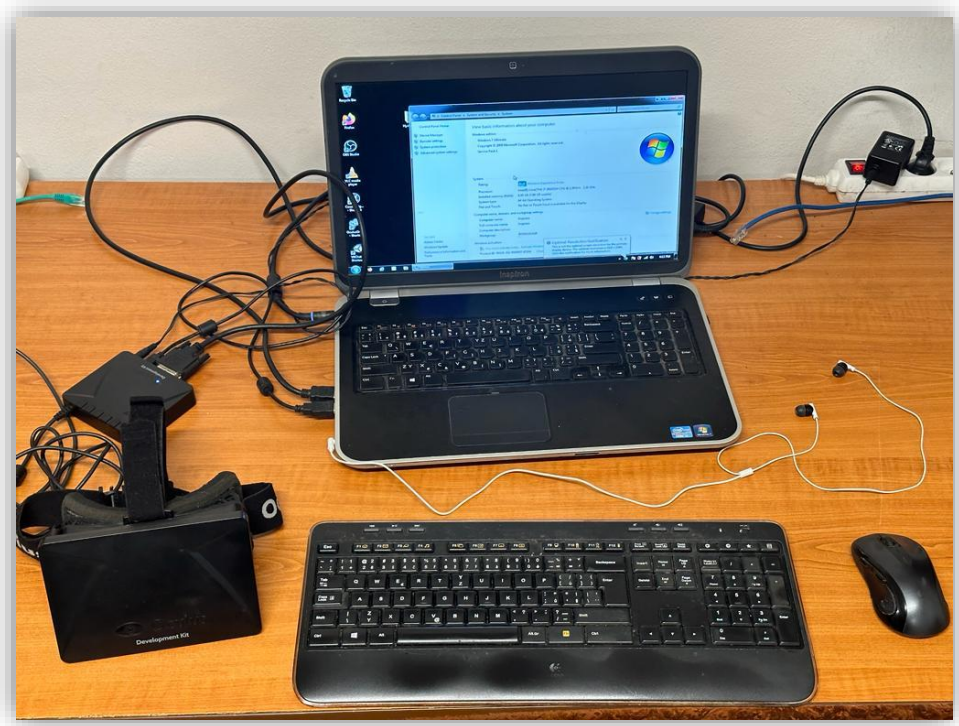

```
<Request requestId="114" action="Session.Set3DPosition.1">
    <SessionHandle>c1_m1000abcdefghijklmnopqrstuvwxy1</SessionHandle>
    <OrientationType>legacy</OrientationType>
    <SpeakerPosition>
        <Position>
            <X>261451</X>
            <Y>26.9568</Y>
            <Z>-283000</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.816965</X>
            <Y>0</Y>
            <Z>0.576688</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.576688</X>
            <Y>0</Y>
            <Z>-0.816965</Z>
        </LeftOrientation>
    </SpeakerPosition>
    <ListenerPosition>
        <Position>
            <X>261448</X>
            <Y>27.9639</Y>
            <Z>-283001</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.795791</X>
            <Y>0</Y>
            <Z>0.559283</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.574999</X>
            <Y>0</Y>
            <Z>-0.818154</Z>
        </LeftOrientation>
    </ListenerPosition>
</Request>
```


The viewer doesn't get a response

Claim	Oculus DK1 System's Exemplary Disclosures
	See SecondLife Wiki - Voice/Technical (November 18, 2009).[60] For the same reasons as above, the "sound localization point in empty space is located away from and proximate to the first individual." As explained above, the Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "through the electronic earphone": In particular, any application can use the exemplary electronic earphones through the audio jack interface (shown below) on the Dell Inspiron 7720. **Ports and connectors** Audio: one microphone-in port; one stereo headphone/speaker/microphone combo port; one digital microphone *See* Specification Sheet for Dell Inspiron 7720 (2013).[61]

[60] https://wiki.secondlife.com/wiki/Voice/Technical#Session.Set3DPosition.1.

[61] META-8KHZ_00045115

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System (showing earphones).[62]
8[c]. execute the electronic call such that the origin of the voice of the second individual appears to the first individual to originate from a fixed location that is the sound localization point in empty space while the first	The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "execute the electronic call such that the origin of the voice of the second individual appears to the first individual to originate from a fixed location that is the sound localization point in empty space while the first individual moves and changes a location and a head orientation with respect to the sound localization point" as embodied in the product itself and as reflected in other prior art references that describe it. *See* disclosures and cited evidence for limitations 8[a] and 8[b]. For example:

[62] META-8KHZ_00047799; META-8KHZ_00047800

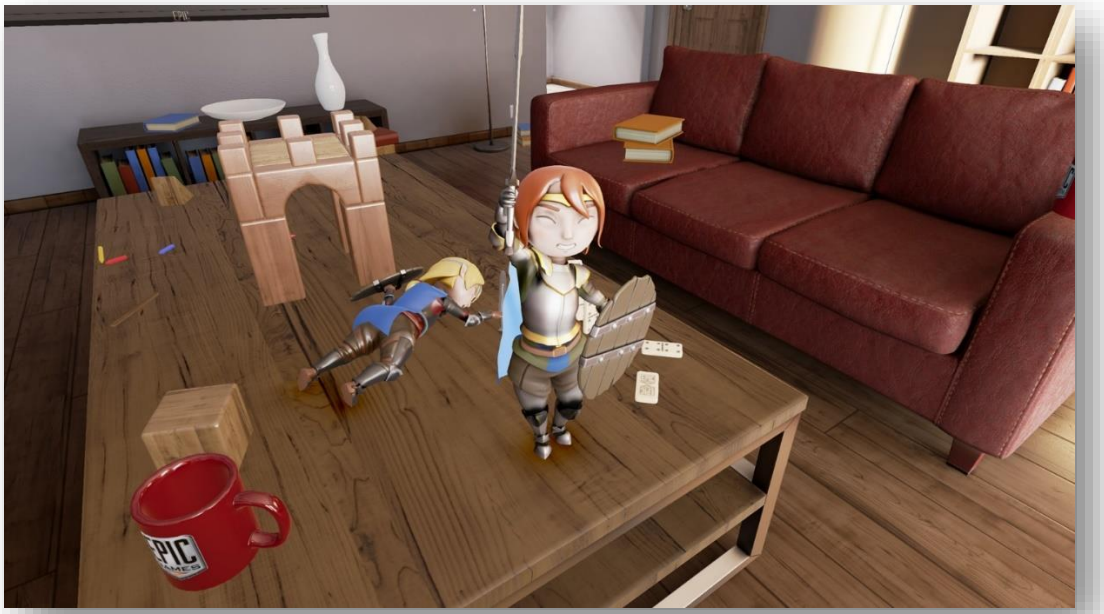
Claim	Oculus DK1 System's Exemplary Disclosures
individual moves and changes a location and a head orientation with respect to the sound localization point; and	The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "execut[ing] the electronic call." *See* disclosures and cited evidence for limitation 8[a]. The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "execut[ing] the electronic call such that the origin of the voice of the second individual appears to the first individual to originate from a fixed location that is the sound localization point in empty space." *See* disclosures and cited evidence for limitation 8[b]. For example: As explained in claim limitation 8[b], in applications like VRChat, the avatar for the "second individual" includes "a sound localization point." As shown below, when the "second individual" is speaking their nametag in virtual world will turn red. In this case, under at least Plaintiff's theory of infringement, the "origin of the voice of the second individual appears" at the fixed location of the second individual's avatar.

Claim	Oculus DK1 System's Exemplary Disclosures
	See photograph of an exemplary Oculus DK1 System (showing nametag in red).[63] As also explained in claim limitation 8[b], applications like VRChat "designate[]" a location for the voice of the "second individual" to originate from "for the first individual," where, under at least Plaintiff's theory of infringement, that location is "a location in empty space." For example, the "second individual" in the example above (represented by the virtual avatar) is remotely located from the "first individual," yet their voice is simulated so that it appears to originate from an empty location a few feet in front of the "first individual." When the first individual turns their head, the voice of the second individual will continue to appear to originate from the second individual's avatar. If the second individual does not move their avatar, under at least Plaintiff's theory of infringement, "the origin of the voice of the second individual appears to the first individual to originate from a fixed location."

[63] META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU

Claim	Oculus DK1 System's Exemplary Disclosures
	  See photograph of an exemplary Oculus DK1 System (showing VRChat).[64] As also explained in claim limitation 8[b], applications like Couch Knights "designate[]" a sound localization point from where the voice of a "second individual" originates (i.e., the sounds from their respective knight character). Under at least Plaintiff's theory of infringement, the sound localization point is used to "simulate[] a location in empty space from where an origin of a voice of the second individual occurs" for the "first individual." In this case, under at least Plaintiff's

[64] META-8KHZ_00047802; *see also* META-8KHZ_00047805

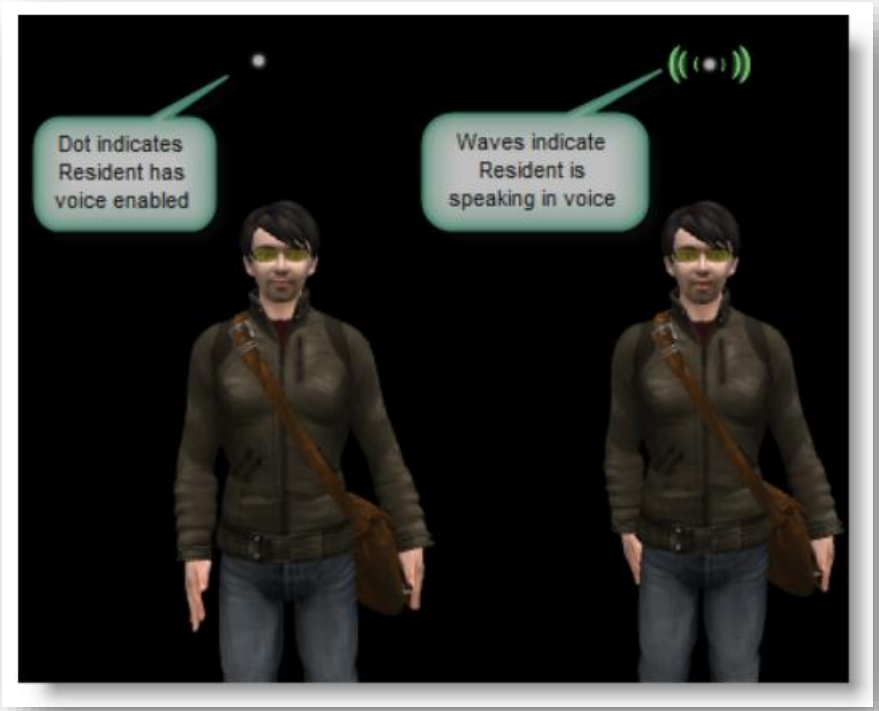
Claim	Oculus DK1 System's Exemplary Disclosures
	theory of infringement, the "origin of the voice of the second individual appears" at the fixed location of the second individual's knight character when it is standing still.  *See* picture of an exemplary Couch Knights application (showing knight characters that produce sound, such as footsteps and sword swings).[65]

[65] https://www.unrealengine.com/marketplace/en-US/product/couch-knights. *See also, e.g.*, Couch Knights on Oculus Rift DK1 (July 17, 2014), https://www.youtube.com/watch?v=HcreLAfIqUs (showing knight character moving from a first location to a second location "in empty space"); GDC 2014: Oculus Rift DK2 'Couch Knights' Gameplay (March 21, 2014), https://www.youtube.com/watch?v=CoyjO-etC30 (showing a user moving a knight character from a first location to a second location "in empty space").

Claim	Oculus DK1 System's Exemplary Disclosures

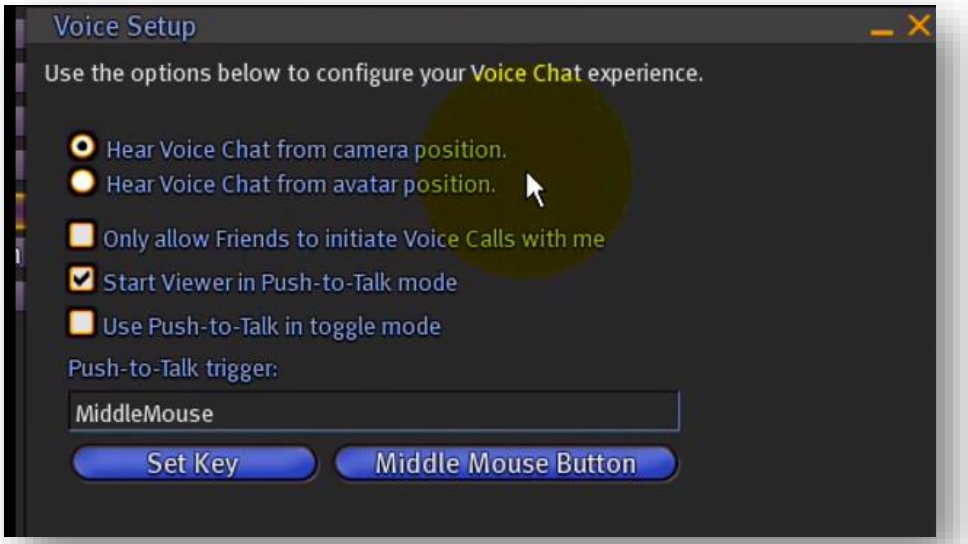
	For the same reasons as above, under at least Plaintiff's theory of infringement, the "sound localization point [is] in empty space."
	
	As also explained in claim limitation 8[b], applications like SecondLife "designate[]" a sound localization point. For example, the documentation for the SecondLife application explains that "sound clips" can be "attached" to virtual objects.
	
	Scripting comments
	
	Sound clips
	• llTriggerSound()
	  • Unattached - sounds occur where they're triggered.
	  • Cannot be stopped with llStopSound().
	• llPlaySound()
	  • Attached - sounds follow the object they are in if it moves.
	  • Only one at a time per prim. Playing another will stop the current sound.
	• llLoopSound()
	  • Attached - sounds follow the object they are in if it moves.
	  • This continuously loops the sound.
	  • Only one at a time per prim. Playing another will stop the current sound.
	
	See SecondLife Wiki – Environment Sounds (Revision as of 20:11, July 15, 2012).[66]
	
	As explained above, applications like SecondLife include other individuals, and "[y]ou can talk to the people around you through text-based Local Chat. If you have a microphone, you can also

[66] https://wiki.secondlife.com/w/index.php?title=Environment_Sounds&direction=prev&oldid=1195319.

Claim	Oculus DK1 System's Exemplary Disclosures
	speak out loud using inworld voice."[67] An example of a "second individual," in the form of a SecondLife "resident" (or user), is shown below. This SecondLife avatar has a "voice chat feature that lets avatars speak."[68]  *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010).

[67] *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010) at https://wiki.secondlife.com/wiki/Viewer_2_Quick_Start_Guide/Local_chat_and_voice.

[68] *See* SecondLife Wiki – Lip Sync (last edited on October 13, 2009) at https://wiki.secondlife.com/wiki/Lip_sync.

Claim	Oculus DK1 System's Exemplary Disclosures
	The "first individual" can "hear voice chat" either from the camera position or from the avatar position.  See SecondLife Tutorial Video – Voice Chat Getting Started (November 14, 2008).[69] The audio for other residents in applications like SecondLife is spatialized such that, under at least Plaintiff's theory of infringement, "for the first individual, a sound localization point [] simulates a location in empty space from where an origin of a voice of the second individual occurs for the first individual." For example, the SecondLife documentation describes a "Voice Test" where "5 testers" "Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction." Then arrange themselves so that "4 testers [are] around one tester at north,

[69] https://wiki.secondlife.com/wiki/Video_Tutorials/More; *see also* http://vidtuts.s3.amazonaws.com/VOICE-CHAT-Getting-started.mp4.

Claim	Oculus DK1 System's Exemplary Disclosures

	south, east and west." This test is used to "verify [that] each tester sounds like their voice is coming from their position inworld" and that "everyone sound like they are in the right place spatially."
	
	Voice Test
	VERSION 0.1
	LENGTH 00:00
	TESTERS 5
	OVERVIEW Coming
	SETUP Up to 5 normal users, (can be done with 2)
	
	Spatial sound testing with gathered groups
	• Setup: Have each of 5 testers do the following: Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction.
	• Arrange 4 testers around one tester at north, south, east and west, like this:
	<tab> . Tester N . Tester W Tester C Tester E . Tester S . </tab>
	• Tester C: Face Tester N.
	• Cardinal Testers: Speak one at a time starting with Tester N and going clockwise around Tester C (N followed by E followed by S followed by W).
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Rotate your avatar to face Tester S.
	• Cardinal Testers, repeat the round robin above, starting with Tester S.
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Alt-Zoom on something out of range of the testers.
	* ...
	• Group in a circle
	  • Does everyone sound like they are in the right place spatially?
	  • If someone moves away, do they get quieter?
	• Group with members behind you
	  • Can you hear all members, including those behind you?
	
	See SecondLife Wiki – Voice Test (November 26, 2007).[70]

[70] https://wiki.secondlife.com/wiki/Voice_Test.

Claim	Oculus DK1 System's Exemplary Disclosures
	The SecondLife documentation also explains that "3D position" is used by the *Session.Set3Dposition.1* method for both the "speaker and listener" and that *Session.Set3Dposition.1* "describes the speaking position and the listening position for this avatar."

Session.Set3DPosition.1

When sending a 3D position for speaker and listener, the "listener" is either the avatar position or the camera position. That is, it describes the speaking position and the listening position for this avatar.

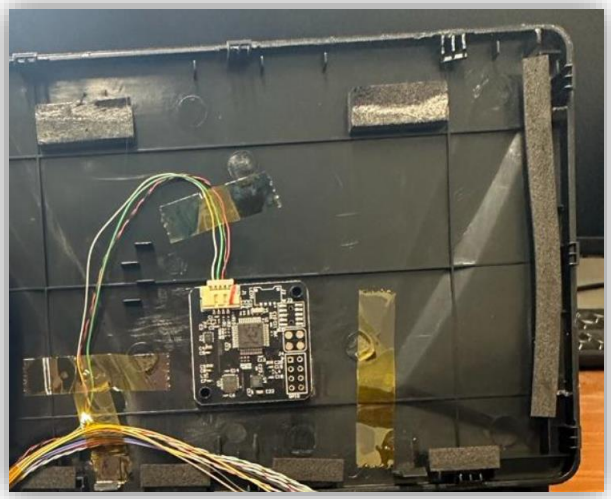

```
<Request requestId="114" action="Session.Set3DPosition.1">
    <SessionHandle>c1_m1000abcdefghijklmnopqrstuvwxy1</SessionHandle>
    <OrientationType>legacy</OrientationType>
    <SpeakerPosition>
        <Position>
            <X>261451</X>
            <Y>26.9568</Y>
            <Z>-283000</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.816965</X>
            <Y>0</Y>
            <Z>0.576688</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.576688</X>
            <Y>0</Y>
            <Z>-0.816965</Z>
        </LeftOrientation>
    </SpeakerPosition>
    <ListenerPosition>
        <Position>
            <X>261448</X>
            <Y>27.9639</Y>
            <Z>-283001</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.795791</X>
            <Y>0</Y>
            <Z>0.559283</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.574999</X>
            <Y>0</Y>
            <Z>-0.818154</Z>
        </LeftOrientation>
    </ListenerPosition>
</Request>
```


The viewer doesn't get a response

Claim	Oculus DK1 System's Exemplary Disclosures
	See SecondLife Wiki – Voice/Technical (November 18, 2009).[71] For the same reasons as above, under at least Plaintiff's theory of infringement, the "sound localization point [is] in empty space." In this case, under at least Plaintiff's theory of infringement, the "origin of the voice of the second individual appears" at the fixed location of the second individual's avatar. Additionally, the Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "while the first individual moves and changes a location and a head orientation with respect to the sound localization point": For example, the Oculus Rift DK1 headset includes an orientation sensor inside the headset casing (shown below) that includes IMU tracking in 9 dimension (9 DoF) – acceleration sensor (xyz), gyroscope (xyz) and magnetometer (xyz).[72]

[71] https://wiki.secondlife.com/wiki/Voice/Technical#Session.Set3DPosition.1.

[72] *See* Oculus Rift DK1 Teardown (April 9, 2013), https://www.ifixit.com/Teardown/Oculus+Rift+DK1+Teardown/13682 ("Head tracking accomplished with 1000 Hz absolute 9DOF orientation sensor (includes gyroscope, accelerometer, and magnetometer).").

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System.[73] **Orientation Tracking** The Oculus Rift hardware includes a gyroscope, accelerometer, and magnetometer. We combine the information from these sensors through a process known as *sensor fusion* to determine the orientation of the user's head in the real world, and to synchronize the user's virtual perspective in real-time. These sensors provide data to accurately track and portray yaw, pitch, and roll movements. The Oculus VR Best Practices Guide (April 30, 2014) at 18.[74]

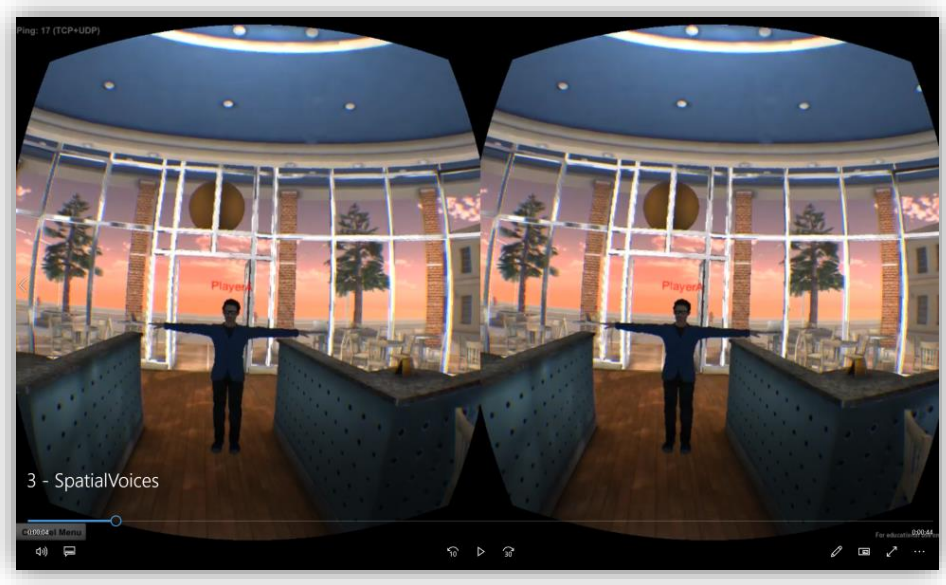
[73] META-8KHZ_00046195

[74] META-8KHZ_00048116.

Claim	Oculus DK1 System's Exemplary Disclosures
	In addition, the Oculus DK1 System can be used with a Razer Hydra device to allow the first individual to move and change a location in the real world such that the first individual's movement and change of location also occurs in the virtual world.[75] To the extent applications like VRChat, SecondLife, and/or Couch Knights do not natively support the Razer Hydra device, it would have been obvious to a person of ordinary skill in the art to modify the applications to support the Razer Hydra device like other games at the time.[76] In applications like VRChat, for example, both individuals can freely move the location of their avatars and point of view using input, such as via controller and/or mouse and/or keyboard. Head rotation of the first individual is tracked by IMU sensor inside the Oculus Rift DK1 headset. This data (location of both individuals in virtual world and head rotation) is being used to determine relative origin point of the sound to the first individual head to simulate the sound origin point. Therefore, under at least Plaintiff's theory of infringement, unless the second individual moves their avatar, the sound will originate in fixed location in virtual world, "while the first individual moves and changes a location and a head orientation with respect to the sound localization point," as demonstrated below:

[75] *See, e.g.*, Oculus Rift DK1 + Razer Hydra – Riftmax Theater, Minecrift, Sixense Tuscany (1080p) (February 2, 2014) at 17:48, https://www.youtube.com/watch?v=pKnZMdRbHKk&t=1097s (showing use of Razer Hydra with DK1 for movement tracking); Oculus Rift DK1 + Razer Hydra - Half-Life 2 - Part 10 (1080p), https://www.youtube.com/watch?v=hloKHP1SLKE (same); Minecraft | VIRTUAL REALITY MOD! (Razer Hydra & Oculus Rift!) | Mod Showcase (March 13, 2014), https://www.youtube.com/watch?v=4GRL0M4MKww (same).

[76] *See, e.g.*, Oculus Rift DK1 + Razer Hydra – Riftmax Theater, Minecrift, Sixense Tuscany (1080p) (February 2, 2014) at 17:48, https://www.youtube.com/watch?v=pKnZMdRbHKk&t=1097s; Oculus Rift DK1 + Razer Hydra - Half-Life 2 - Part 10 (1080p), https://www.youtube.com/watch?v=hloKHP1SLKE; Minecraft | VIRTUAL REALITY MOD! (Razer Hydra & Oculus Rift!) | Mod Showcase (March 13, 2014), https://www.youtube.com/watch?v=4GRL0M4MKww.

Claim	Oculus DK1 System's Exemplary Disclosures
	 The second individual avatar is in front of the first individual avatar (point of view) and the voice sound is originating in front of the user.[77]

[77] META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU

Claim	Oculus DK1 System's Exemplary Disclosures
	  The first individual turns their head to the left and the sound is now originating to the right for the user, where the original unchanged location of first individual avatar is. The development diary for VRChat also confirms it supports "head rotation" tracking on the Rift.[78] While the example above is using the VRChat application, applications like VRChat, Couch Knights, and/or SecondLife work in the same manner, as explained above and in claim limitation 8[b].[79] For example, in applications like SecondLife, the first individual can freely move the

[78] *See* VRC Dev Diary (1/18/2014), https://web.archive.org/web/20140121030858/http://grahamgaylor.com/2014/01/

[79] *See also* Oculus Rift: VR Headset demo – GDC 2013 (March 25, 2013), https://www.youtube.com/watch?v=jENVk1N1Stg; *see also* Couch Knights is a UE4 developed Oculus Rift title from Epic (March 19, 2014), https://www.vg247.com/couch-knight-is-a-ue4-developed-oculus-rift-title-from-epic ("Each player will hold a controller in the scene and in the real world and they can alter the view

Claim	Oculus DK1 System's Exemplary Disclosures
	location of their avatar and point of view using input, such as via controller and/or mouse and/or keyboard or by turning their head.[80] Head rotation of the first individual is tracked by IMU sensor inside the Oculus Rift DK1 headset. As another example, in applications like Couch Knights, the first individual can freely change a location and head orientation with respect to the SLPs corresponding to the knight characters.[81]
8[d]. maintain the origin of the voice of the second individual at the sound localization point but alter an interaural time difference of the voice that the first individual hears in response to the first individual moving the head orientation with respect to the sound localization point.	The Oculus DK1 System discloses and/or renders obvious "maintain[ing] the origin of the voice of the second individual at the sound localization point but alter an interaural time difference of the voice that the first individual hears in response to the first individual moving the head orientation with respect to the sound localization point" as embodied in the product itself and as reflected in other prior art references that describe it. *See* disclosures and cited evidence for limitations 8[b] and 8[c]. For example: The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "maintain[ing] the origin of the voice of the second individual at the sound localization point." *See* disclosures and cited evidence for limitation 8[c]. For example:

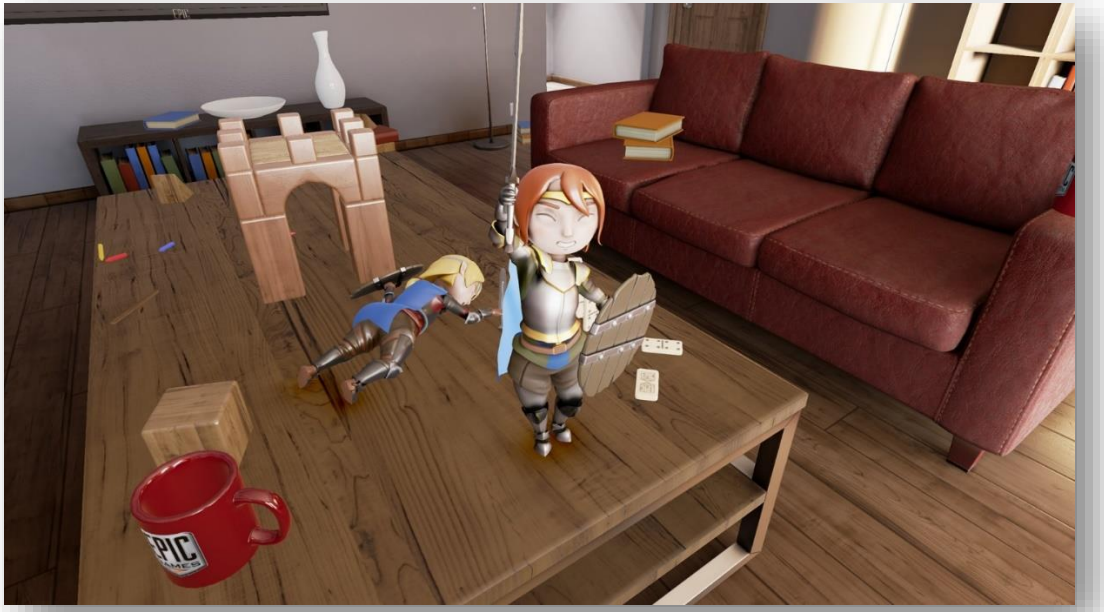
of the environment in real-time by "looking around the virtual space naturally. In addition, both players' motion and position 'are mapped through the headsets to their in-game avatars through inverse kinematics.'")

[80] *See, e.g.*, SLOculusRiftBeta (March 26, 2014) at 7:20, https://www.youtube.com/watch?v=YaROmSCpa2o (showing first individual moving their avatar and changing a head orientation); How to Use Oculus Rift with Second Life (May 22, 2014) at 1:26, https://www.youtube.com/watch?v=TLL5JVwG118 ("If you want to move in the same direction you are looking, tap the Q key to align to look."); https://wiki.secondlife.com/wiki/Viewerhelp:Preferences_-_Move_%26_View (January 11, 2012) (describing ways to move an avatar including "arrow key" and "click[ing]").

[81] *See, e.g.*, Couch Knights on Oculus Rift DK1 (July 17, 2014), https://www.youtube.com/watch?v=HcreLAfIqUs; GDC 2014: Oculus Rift DK2 'Couch Knights' Gameplay (March 21, 2014), https://www.youtube.com/watch?v=CoyjO-etC30; Couch Knights is a UE4 developed Oculus Rift title from Epic (March 19, 2014), https://www.vg247.com/couch-knight-is-a-ue4-developed-oculus-rift-title-from-epic ("Each player will hold a controller in the scene and in the real world and they can alter the view of the environment in real-time by "looking around the virtual space naturally. In addition, both players' motion and position 'are mapped through the headsets to their in-game avatars through inverse kinematics.'").

Claim	Oculus DK1 System's Exemplary Disclosures
	In applications like VRChat, the avatar for the "second individual" includes "a sound localization point." As shown below, when the "second individual" is speaking their nametag in virtual world will turn red. *See* photograph of an exemplary Oculus DK1 System (showing nametag in red).[82] When the first individual turns their head, the voice of the second individual will continue to appear to originate from the second individual's avatar. If the second individual does not move their avatar, the origin of the voice is "maintain[ed] . . . at the sound localization point." In applications like Couch Knights, the knight character for the "second individual" includes a "sound localization point."

[82] META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* picture of an exemplary Couch Knights application (showing knight characters that produce sound, such as footsteps and sword swings).[83] When the first individual turns their head, the sounds of the knight character of the second individual will continue to appear to originate from the second individual's knight character. If the second individual does not move their knight character, the origin of the sounds is "maintain[ed] . . . at the sound localization point."

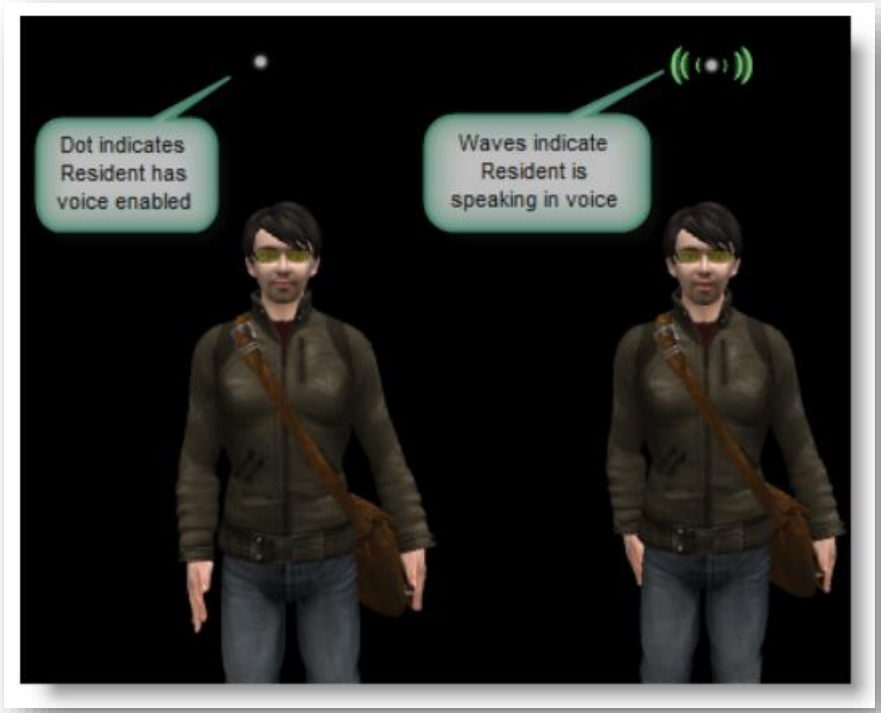
[83] https://www.unrealengine.com/marketplace/en-US/product/couch-knights. *See also, e.g.*, Couch Knights on Oculus Rift DK1 (July 17, 2014), https://www.youtube.com/watch?v=HcreLAfIqUs; GDC 2014: Oculus Rift DK2 'Couch Knights' Gameplay (March 21, 2014), https://www.youtube.com/watch?v=CoyjO-etC30.

Claim	Oculus DK1 System's Exemplary Disclosures

	In applications like SecondLife, the avatar for the "second individual" includes "a sound localization point." Virtual objects also include "a sound localization point." For example, the documentation for the SecondLife application explains that "sound clips" can be "attached" to virtual objects.
	
	Scripting comments
	
	Sound clips
	• llTriggerSound()
	  • Unattached - sounds occur where they're triggered.
	  • Cannot be stopped with llStopSound().
	• llPlaySound()
	  • Attached - sounds follow the object they are in if it moves.
	  • Only one at a time per prim. Playing another will stop the current sound.
	• llLoopSound()
	  • Attached - sounds follow the object they are in if it moves.
	  • This continuously loops the sound.
	  • Only one at a time per prim. Playing another will stop the current sound.
	
	See SecondLife Wiki - Environment Sounds (Revision as of 20:11, July 15, 2012).[84]
	
	As explained above, applications like SecondLife include other individuals, and "[y]ou can talk to the people around you through text-based Local Chat. If you have a microphone, you can also speak out loud using inworld voice."[85] An example of a "second individual," in the form of a

[84] https://wiki.secondlife.com/w/index.php?title=Environment_Sounds&direction=prev&oldid=1195319.

[85] *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010) at https://wiki.secondlife.com/wiki/Viewer_2_Quick_Start_Guide/Local_chat_and_voice.

Claim	Oculus DK1 System's Exemplary Disclosures
	SecondLife "resident" (or user), is shown below. This SecondLife avatar has a "voice chat feature that lets avatars speak."[86]  *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010). The "first individual" can "hear voice chat" either from the camera position or from the avatar position.

[86] *See* SecondLife Wiki – Lip Sync (last edited on October 13, 2009) at https://wiki.secondlife.com/wiki/Lip_sync.

Claim	Oculus DK1 System's Exemplary Disclosures
	   See SecondLife Tutorial Video – Voice Chat Getting Started (November 14, 2008).[87] The audio for other residents in applications like SecondLife is spatialized such that, under at least Plaintiff's theory of infringement, "for the first individual, a sound localization point [] simulates a location in empty space from where an origin of a voice of the second individual occurs for the first individual." For example, the SecondLife documentation describes a "Voice Test" where "5 testers" "Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction." Then arrange themselves so that "4 testers [are] around one tester at north, south, east and west." This test is used to "verify [that] each tester sounds like their voice is coming from their position inworld" and that "everyone sound like they are in the right place spatially."

[87] https://wiki.secondlife.com/wiki/Video_Tutorials/More; *see also* http://vidtuts.s3.amazonaws.com/VOICE-CHAT-Getting-started.mp4.

Claim	Oculus DK1 System's Exemplary Disclosures

	Voice Test
	VERSION 0.1
	LENGTH 00:00
	TESTERS 5
	OVERVIEW Coming
	SETUP Up to 5 normal users, (can be done with 2)
	
	Spatial sound testing with gathered groups
	• Setup: Have each of 5 testers do the following: Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction.
	• Arrange 4 testers around one tester at north, south, east and west, like this:
	<tab> . Tester N . Tester W Tester C Tester E . Tester S . </tab>
	• Tester C: Face Tester N.
	• Cardinal Testers: Speak one at a time starting with Tester N and going clockwise around Tester C (N followed by E followed by S followed by W).
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Rotate your avatar to face Tester S.
	• Cardinal Testers, repeat the round robin above, starting with Tester S.
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Alt-Zoom on something out of range of the testers.
	* ...
	• Group in a circle
	  • Does everyone sound like they are in the right place spatially?
	  • If someone moves away, do they get quieter?
	• Group with members behind you
	  • Can you hear all members, including those behind you?
	
	See SecondLife Wiki – Voice Test (November 26, 2007).[88]

[88] https://wiki.secondlife.com/wiki/Voice_Test.

Claim	Oculus DK1 System's Exemplary Disclosures
	The SecondLife documentation also explains that "3D position" is used by the *Session.Set3DPosition.1* method for both the "speaker and listener" and that *Session.Set3Dposition.1* "describes the speaking position and the listening position for this avatar."

Session.Set3DPosition.1

When sending a 3D position for speaker and listener, the "listener" is either the avatar position or the camera position. That is, it describes the speaking position and the listening position for this avatar.

```
<Request requestId="114" action="Session.Set3DPosition.1">
    <SessionHandle>c1_m1000abcdefghijklmnopqrstuvwxy1</SessionHandle>
    <OrientationType>legacy</OrientationType>
    <SpeakerPosition>
        <Position>
            <X>261451</X>
            <Y>26.9568</Y>
            <Z>-283000</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.816965</X>
            <Y>0</Y>
            <Z>0.576688</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.576688</X>
            <Y>0</Y>
            <Z>-0.816965</Z>
        </LeftOrientation>
    </SpeakerPosition>
    <ListenerPosition>
        <Position>
            <X>261448</X>
            <Y>27.9639</Y>
            <Z>-283001</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.795791</X>
            <Y>0</Y>
            <Z>0.559283</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.574999</X>
            <Y>0</Y>
            <Z>-0.818154</Z>
        </LeftOrientation>
    </ListenerPosition>
</Request>
```

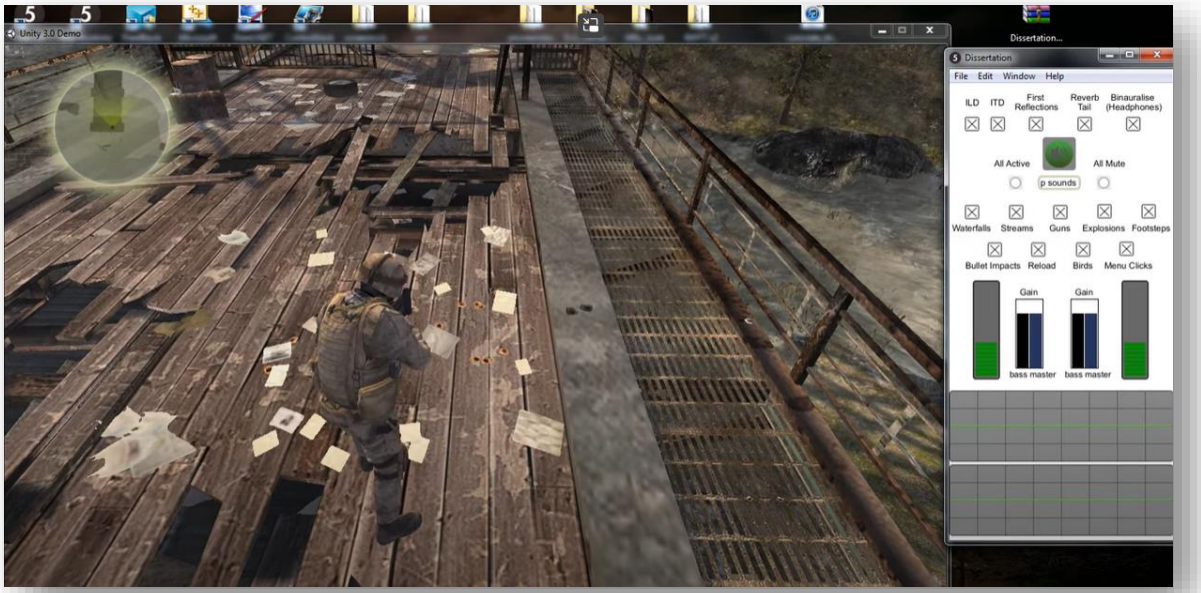
The viewer doesn't get a response

Claim	Oculus DK1 System's Exemplary Disclosures
	See SecondLife Wiki – Voice/Technical (November 18, 2009).[89] When the first individual turns their head, the voice of the second individual will continue to appear to originate from the second individual's avatar. If the second individual does not move their avatar, the origin of the voice is "maintain[ed] . . . at the sound localization point." Additionally, the Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "alter[ing] an interaural time difference of the voice that the first individual hears in response to the first individual moving the head orientation with respect to the sound localization point": For example, the VRChat application was "created by using the Unity 3D engine and is a platform for users to meet online and chat with each other in environments they have made themselves. The software has made it easy for developers to add more than one user to any video game or other application, provided they are of the Unity-developed environments. The software used by the developers takes its cues from an amalgamation of different things: head gaze direction, body gestures and ***3D positional audio*** to do its best to develop an immersive, fun social experience for all users involved." *See* VR Chat Releasing for Oculus Rift (December 2, 2014).[90] As another example, the VRChat development diary explains that, in 2014, the developer used "two libraries" in addition to Unity3D: "Tnet (for networking) and Uspeak (for voicechat)," which were used with "a sweet CoffeeShop environment on the Unity Asset Store."[91] Uspeak includes

[89] https://wiki.secondlife.com/wiki/Voice/Technical#Session.Set3DPosition.1.

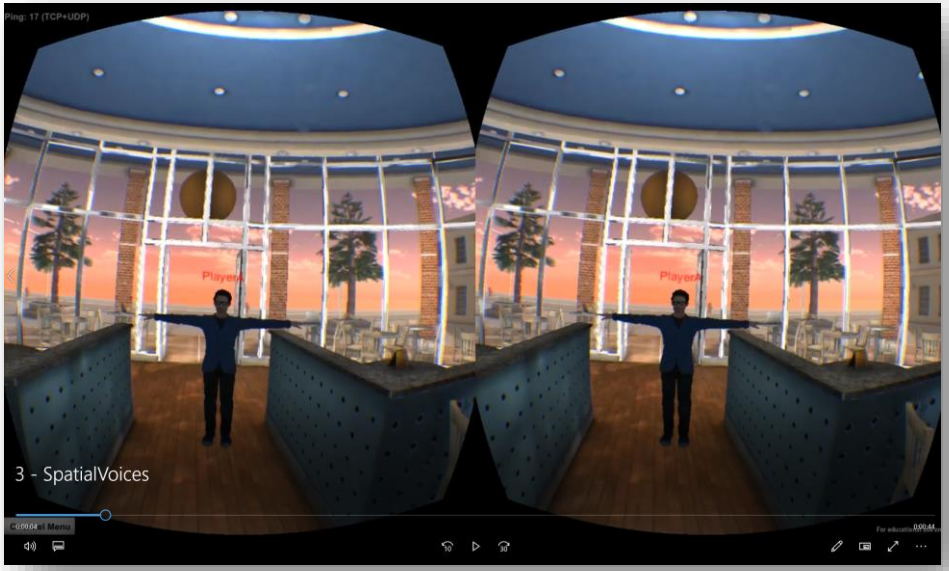
[90] https://virtualrealitytimes.com/2014/12/02/vr-chat-releasing-for-oculus-rift/; *see also* VRChat now in Oculus Rift app store (December 3, 2014) https://www.hypergridbusiness.com/2014/12/vrchat-now-in-oculus-rift-app-store/; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU; VRChat v0.1 Released https://www.reddit.com/r/oculus/comments/1vcbwk/vrchat_v01_released/.

[91] VRChat v0.1 Development, https://web.archive.org/web/20140121030858/http://grahamgaylor.com/2014/01/; *see also* https://web.archive.org/web/20140511130557/http://grahamgaylor.com/category/vrchat/

Claim	Oculus DK1 System's Exemplary Disclosures
	"[s]patial audio support" for voice chat that provided "directional audio for a truly immersive experience."[92] As early as 2011, Unity included ITDs, for example as shown in the "Procedural Audio and Binauralisation in Unity's Bootcamp Demo (v 1.0)" as shown below:  *See* Procedural Audio and Binauralisation in Unity's Bootcamp Demo (v 1.0) (Aug. 15, 2011).[93]

[92] *See* [RELEASED] USpeak Voice Chat – Voice Chat For All Your Multiplayer Games, https://forum.unity.com/threads/released-uspeak-voice-chat-voice-chat-for-all-your-multiplayer-games.154609/ (last edited November 17, 2013).

[93] https://www.youtube.com/watch?v=sQlKPaKNCPY

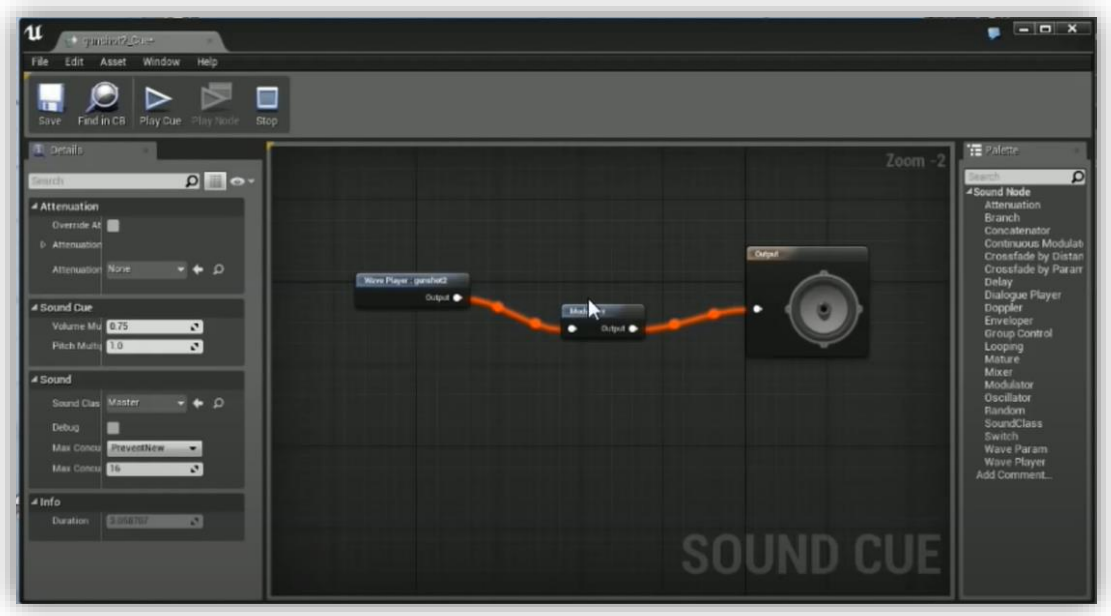
Claim	Oculus DK1 System's Exemplary Disclosures
	For example, the second individual avatar is in front of the first individual avatar (point of view) and the voice sound is originating in front of the user.  *See* photograph of an exemplary Oculus DK1 System (showing VRChat).[94] When the first individual turns to the left the sound is now originating to the right for the user, where the original unchanged location of second individual avatar is located.

[94] META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU

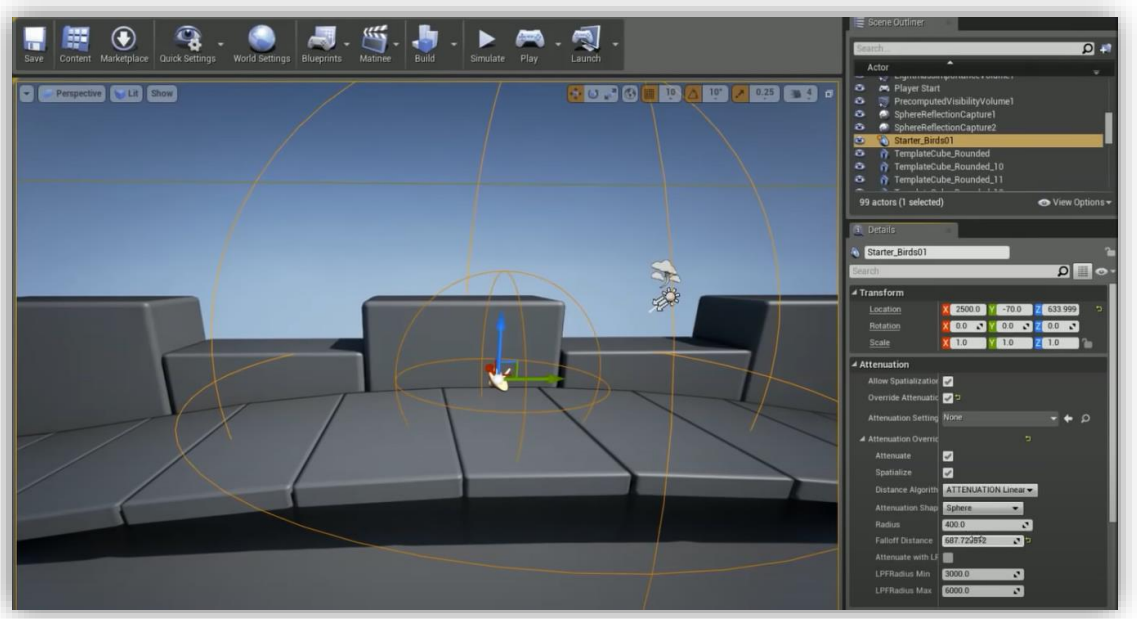
Claim	Oculus DK1 System's Exemplary Disclosures
	 See photograph of an exemplary Oculus DK1 System (showing VRChat).[95] Likewise, the Couch Knights application was developed using Unreal Engine 4.[96] Unreal Engine includes "Sound Node[s]" for game objects that allowed for spatialization of the object's audio.

[95] META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU

[96] *See* Couch Knights is a UE4 developed Oculus Rift title from Epic (March 19, 2014), https://www.vg247.com/couch-knight-is-a-ue4-developed-oculus-rift-title-from-epic.

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See, e.g.*, Unreal Engine 4 Tutorial – Sound Cues at 1:39.[97]

[97] https://www.youtube.com/watch?v=rZhrjHSN_II (showing attenuation option for "Sound Node" in Unreal Engine 4).

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See also, e.g.*, Unreal Engine 4 Tutorial – Ambient Audio (Basic!) at 1:06.[98] In applications like Couch Knights, the second individual's knight character is in front of the first individual's point of view and the sounds of the knight character originate from the knight character. When the first individual turns to the left, the sound now originates to the right of the first individual, where the original unchanged location of the second individual's knight character is located.[99]

[98] https://www.youtube.com/watch?v=qtgY7esjB6I (showing attenuation and "Allow Spatialization" options).

[99] *See, e.g.*, https://www.youtube.com/watch?v=-ntcmcBGTvE (showing a first and second individuals' knight characters making sound).

Claim	Oculus DK1 System's Exemplary Disclosures

	Additionally, the audio for other residents in applications like SecondLife is spatialized. For example, the SecondLife documentation describes a "Voice Test" where "5 testers" "Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction." Then arrange themselves so that "4 testers [are] around one tester at north, south, east and west." This test is used to "verify [that] each tester sounds like their voice is coming from their position inworld" and that "everyone sound like they are in the right place spatially."
	
	Voice Test
	VERSION 0.1
	LENGTH 00:00
	TESTERS 5
	OVERVIEW Coming
	SETUP Up to 5 normal users, (can be done with 2)
	
	Spatial sound testing with gathered groups
	• Setup: Have each of 5 testers do the following: Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction.
	• Arrange 4 testers around one tester at north, south, east and west, like this:
	<tab> . Tester N . Tester W Tester C Tester E . Tester S . </tab>
	• Tester C: Face Tester N.
	• Cardinal Testers: Speak one at a time starting with Tester N and going clockwise around Tester C (N followed by E followed by S followed by W).
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Rotate your avatar to face Tester S.
	• Cardinal Testers, repeat the round robin above, starting with Tester S.
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Alt-Zoom on something out of range of the testers.
	* . . .
	• Group in a circle
	  • Does everyone sound like they are in the right place spatially?
	  • If someone moves away, do they get quieter?
	• Group with members behind you
	  • Can you hear all members, including those behind you?

Claim	Oculus DK1 System's Exemplary Disclosures
	See SecondLife Wiki – Voice Test (26 November 2007).[100] The SecondLife documentation also explains that "3D position" is used by the *Session.Set3DPosition.1* method for both the "speaker and listener" and that *Session.Set3Dposition.1* "describes the speaking position and the listening position for this avatar."

[100] https://wiki.secondlife.com/wiki/Voice_Test.

Session.Set3DPosition.1

When sending a 3D position for speaker and listener, the "listener" is either the avatar position or the camera position. That is, it describes the speaking position and the listening position for this avatar.

```
<Request requestId="114" action="Session.Set3DPosition.1">
    <SessionHandle>c1_m1000abcdefghijklmnopqrstuvwxy1</SessionHandle>
    <OrientationType>legacy</OrientationType>
    <SpeakerPosition>
        <Position>
            <X>261451</X>
            <Y>26.9568</Y>
            <Z>-283000</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.816965</X>
            <Y>0</Y>
            <Z>0.576688</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.576688</X>
            <Y>0</Y>
            <Z>-0.816965</Z>
        </LeftOrientation>
    </SpeakerPosition>
    <ListenerPosition>
        <Position>
            <X>261448</X>
            <Y>27.9639</Y>
            <Z>-283001</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.795791</X>
            <Y>0</Y>
            <Z>0.559283</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.574999</X>
            <Y>0</Y>
            <Z>-0.818154</Z>
        </LeftOrientation>
    </ListenerPosition>
</Request>
```

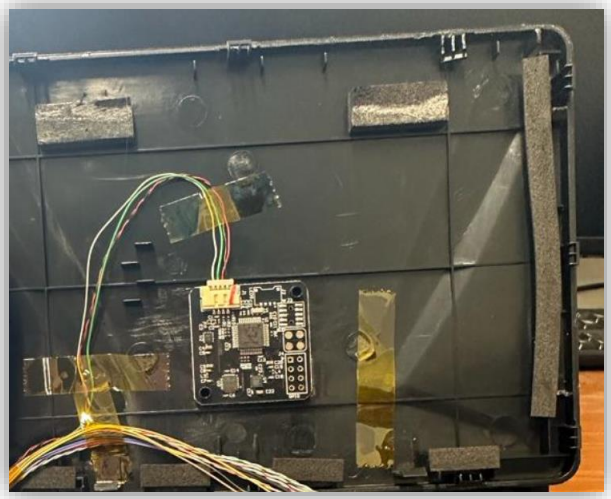
The viewer doesn't get a response

Claim	Oculus DK1 System's Exemplary Disclosures
	See SecondLife Wiki – Voice/Technical (November 18, 2009).[101] As explained above for claim limitation 8[c], the Oculus Rift DK1 headset tracks the first individual's head orientation, including when the first individual is using applications like VRChat, SecondLife, and/or Couch Knights:[102] For example, the Oculus Rift DK1 headset includes an orientation sensor inside the headset casing (shown below) that includes IMU tracking in 9 dimension (9 DoF) – acceleration sensor (xyz), gyroscope (xyz) and magnetometer (xyz).[103]

[101] https://wiki.secondlife.com/wiki/Voice/Technical#Session.Set3DPosition.1

[102] *See, e.g.*, META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU; SLOculusRiftBeta (March 26, 2014) at 7:20, https://www.youtube.com/watch?v=YaROmSCpa2o; Couch Knights on Oculus Rift DK1 (July 17, 2014), https://www.youtube.com/watch?v=HcreLAfIqUs; GDC 2014: Oculus Rift DK2 'Couch Knights' Gameplay (March 21, 2014), https://www.youtube.com/watch?v=CoyjO-etC30; Couch Knights is a UE4 developed Oculus Rift title from Epic (March 19, 2014), https://www.vg247.com/couch-knight-is-a-ue4-developed-oculus-rift-title-from-epic ("Each player will hold a controller in the scene and in the real world and they can alter the view of the environment in real-time by "looking around the virtual space naturally. In addition, both players' motion and position 'are mapped through the headsets to their in-game avatars through inverse kinematics.'").

[103] *See* Oculus Rift DK1 Teardown (April 9, 2013), https://www.ifixit.com/Teardown/Oculus+Rift+DK1+Teardown/13682 ("Head tracking accomplished with 1000 Hz absolute 9DOF orientation sensor (includes gyroscope, accelerometer, and magnetometer).").

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System.[104] **Orientation Tracking** The Oculus Rift hardware includes a gyroscope, accelerometer, and magnetometer. We combine the information from these sensors through a process known as *sensor fusion* to determine the orientation of the user's head in the real world, and to synchronize the user's virtual perspective in real-time. These sensors provide data to accurately track and portray yaw, pitch, and roll movements. The Oculus VR Best Practices Guide (April 30, 2014) at 18.[105]

[104] META-8KHZ_00046195

[105] META-8KHZ_00048116.

Claim	Oculus DK1 System's Exemplary Disclosures
	In addition, teleconferencing applications spatialized audio by adjusting an interaural time difference prior to any date to which the '090 Patent can claim priority.[106] vSpace "alter[ed] an interaural time difference of" voices of participants in VoIP calls.[107] > "'We reproduce the way sound arrives at the ears of a human listener," says Gardner. 'A sound to the left of a human creates a louder left ear signal than right ear, just as in amplitude panning, but the sound at the right ear is also delayed by a fraction of a millisecond. In addition, the sound is diffracted by the head and external ear, which causes the tonal response to be altered. So unlike conventional stereo where position affects only the amplitude, we alter the amplitude, delay, and the equalization of the sound, just as in real life hearing. The result is a much more realistic positioning of the sound with the perception that the sound is outside the head.'" 3D Audio Comes to Conferencing (February 22, 2010).[108] To the extent Plaintiff argues that the Oculus DK1 System does not disclose this limitation, either expressly, implicitly, and/or by inherency, a person of ordinary skill in the art would have determined that the limitation would have been obvious in light of the Oculus DK1 System alone or in combination with any applicant admitted prior art, the knowledge of one of ordinary skill in the art, or any one or more of the references identified in Meta's Invalidity Contentions under Section IV.J.8 for at least the reasons stated in Meta's Invalidity Contentions cover pleading. *See, e.g.*, **Bedingfield** at 5:35-41 ("In other embodiments, the participants may be placed in other configurations within the sound field such as in a rectangular configuration or along a linear axis, using various audio techniques such as volume, balance, parametric equalization, delay, echo and

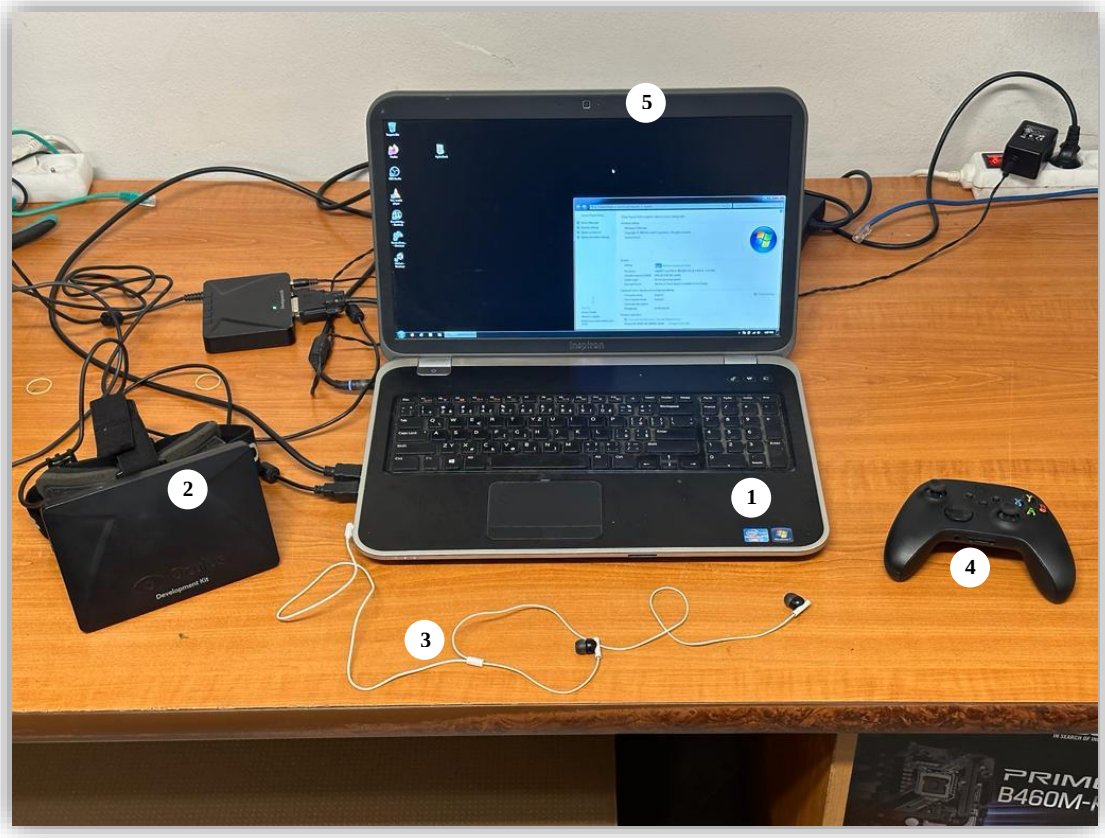
[106] *See* https://web.archive.org/web/20110828133313/http://www.vspace.net/faq; *see also* https://web.archive.org/web/20090409091723/http://www.vspace.net/; https://www.avnetwork.com/avnetwork/take1-insurance-rescues-hd-house

[107] https://web.archive.org/web/20110828133313/http://www.vspace.net/faq

[108] https://www.avnetwork.com/avnetwork/take1-insurance-rescues-hd-house

Claim	Oculus DK1 System's Exemplary Disclosures
	the like to produce the effects described above with reference to FIG. 1."), 2:4-16; **Li 305** at 1:65-2:3 ("Generally, human hearing localizes sound sources in a three-dimensional (3D) spatial field, mainly by three cues: an interaural time difference (ITD) cue, an interaural level difference (ILD) cue, and a spectral cue. The ITD is the difference of arrival times of transmitted sound between the two ears."),12:56-60 ("The other cues are interaural time difference (ITD) and spectral cue. The combination of the three cues are modeled by a pair offilters on the left ear and the right ear of a human being separately in order to describe the spatial effect which is recognizable by human hearing."); **Begault 2000** at 132 ("The panpot (panoramic potentiometer) has already been discussed as a means of moving virtual sound sources in space with a traditional mixing console. The amplitude is smoothly weighted from one channel 85notherr, or special functions can be used to create a moving virtual source on the basis of ILD cues. But because a 3-D sound system uses HRTFs, a frequency-dependent change in level must occur when a sound source (or the receiver) moves. Furthermore, changes in the ITD cues contained within the binaural HRTF are necessary."); **Sandgren** at [0009] ("The HRTFs incorporate 3D audio cues that a listener would use to determine the position of the sound source. Interaural time difference (ITD) and interaural intensity difference (IID) are two such cues. An ITD is the difference of the arrival times of a sound at a listener's ears, and an IID is the difference of the intensities of a Sound arriving at the ears."); **Hammershoi** at [0019] ("Preferably, the method includes deriving a measure of interaural time delay (ITD) based on the first and second positions. Since the two ear positions are determined, it is possible from a known simple relation to determine a measure of ITD for the listener, i.e. also a measure of a size of the head of the listener."), [0061] ("Applications such as decomposition of an auditory scenario is advantageous with the position tracking according to the invention, since an actual ITD of the listener can estimated based on the 3D positions PL(X,Y,Z), PR(X,Y,Z), whereas in prior art head tracking systems only a mid-point of the listener's head and its orientation is known, i.e. no ITD can be derived."); **Knappe** at 8:1-15 ("Channel mappers 96 and 98 can position the apparent location of their assigned conferencing endpoints within the presentation sound field by manipulating ITD and/or ILD for their assigned voice data channels. If a conferencing endpoint is broadcasting monaurally and the presentation system uses stereo, a preliminary step can be to split the single channel by forming identical left and right channels. Or, the single channel can be directly mapped to two channels with appropriate ITD/ILD effects introduced in each channel. Likewise, an ITD/ILD mapping matrix can be used to translate a monophonic or stereophonic voice data channel to, e.g., a traditional two-speaker, 3-speaker (left, right, center) or 5.1 (left-rear, left,

Claim	Oculus DK1 System's Exemplary Disclosures
	center, right, right-rear, subwoofer) format."); **Pedersen** at 6:8-14 (""For example, a first binaural filter may be configured to output signals intended for the right ear and left ear of the user of the hearing device system that are phase shifted with relation to each other in order to introduce a first interaural time difference whereby the perceived position of the corresponding first sound source is shifted outside the head and laterally with relation to the user of the hearing device system. In the event that the output signals intended for the right ear and left ear are phase shifted 180° with relation to each other, sense of direction is lost; however, many humans find speech signals phase shifted 180° with relation to each other easy to separate from other signal sources and easy to understand."), 16:7-16.
CLAIM 14	
14[pre]. The non-transitory computer readable storage medium storing instructions of claim 8 further to cause the computer system to execute the method comprising:	To the extent the Preamble is limiting, the Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "[a] non-transitory computer readable storage medium storing instructions that cause a computer system to execute a method" as embodied in the product itself and as reflected in other prior art references that describe it. *See* disclosures and cited evidence for limitation 8[pre].
14[a]. receive, from the first individual, commands that move the sound localization point from a first point in empty space that is away from and proximate to the first individual to a second point in empty space that is away from and proximate to the first individual.	The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "receive, from the first individual, commands that move the sound localization point from a first point in empty space that is away from and proximate to the first individual to a second point in empty space that is away from and proximate to the first individual" as embodied in the product itself and as reflected in other prior art references that describe it. *See* disclosures and cited evidence for limitations 8[pre] and 8[b]. For example: The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "receive, from the first individual, commands that move the sound localization point from a first point in empty space that is away from and proximate to the first individual to a second point in empty space that is away from and proximate to the first individual":

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System.[109] As explained above, an exemplary Oculus DK1 System shown above includes the Computer (1), which includes a keyboard and trackpad, and controller (4).

[109] META-8KHZ_00047800; *see also* META-8KHZ_00047801; META-8KHZ_00047802; META-8KHZ_00047799; META-8KHZ_00047805; META-8KHZ_00047804; META-8KHZ_00047803.

Claim	Oculus DK1 System's Exemplary Disclosures
	In applications like VRChat, the first individual can use the controller and/or mouse and/or keyboard to move or reposition their avatar, under at least Plaintiff's theory of infringement, from a first point in empty space to a second point in empty space within the virtual environment. For example, the second individual avatar is in front of the first individual avatar (point of view) and the voice sound is originating in front of the user. *See* photograph of an exemplary Oculus DK1 System (showing VRChat).[110] When the first individual uses the controller and/or mouse and/or keyboard to turn to the left, the sound is now originating to the right for the user, where the original unchanged location of second individual avatar is located in empty space.

[110] META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU

Claim	Oculus DK1 System's Exemplary Disclosures
	 See photograph of an exemplary Oculus DK1 System (showing VRChat).[111] As another example, in applications like Couch Knights, users control a virtual miniature figurine of a knight in a room. The knight can be controlled by using controller and/or keyboard. As the user commands the knight to move and the knight moves, under at least Plaintiff's theory of infringement, from a first point in empty space to a second point in empty space, the virtual figurine knight produces sounds, such as footsteps or smashing sounds. These sounds correspond to the knight's location as the user moves the knight in the virtual world.

[111] META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU

Claim	Oculus DK1 System's Exemplary Disclosures
	  See exemplary picture of Couch Knights.[112] As an additional example, applications like SecondLife "designate[]" a sound localization point. For example, the documentation for the SecondLife application explains that "sound clips" can be "attached" to virtual objects.

[112] https://www.unrealengine.com/marketplace/en-US/product/couch-knights.

Claim	Oculus DK1 System's Exemplary Disclosures

	Scripting comments
	
	Sound clips
	
	• llTriggerSound()
	  • Unattached - sounds occur where they're triggered.
	  • Cannot be stopped with llStopSound().
	• llPlaySound()
	  • Attached - sounds follow the object they are in if it moves.
	  • Only one at a time per prim. Playing another will stop the current sound.
	• llLoopSound()
	  • Attached - sounds follow the object they are in if it moves.
	  • This continuously loops the sound.
	  • Only one at a time per prim. Playing another will stop the current sound.
	
	See SecondLife Wiki – Environment Sounds (Revision as of 20:11, July 15, 2012).[113]
	
	When the first individual uses the controller and/or mouse and/or keyboard to interact with the virtual object, the virtual object and the sounds associated with that object can be moved, under at least Plaintiff's theory of infringement, from a first point in empty space to a second point in empty space.[114]

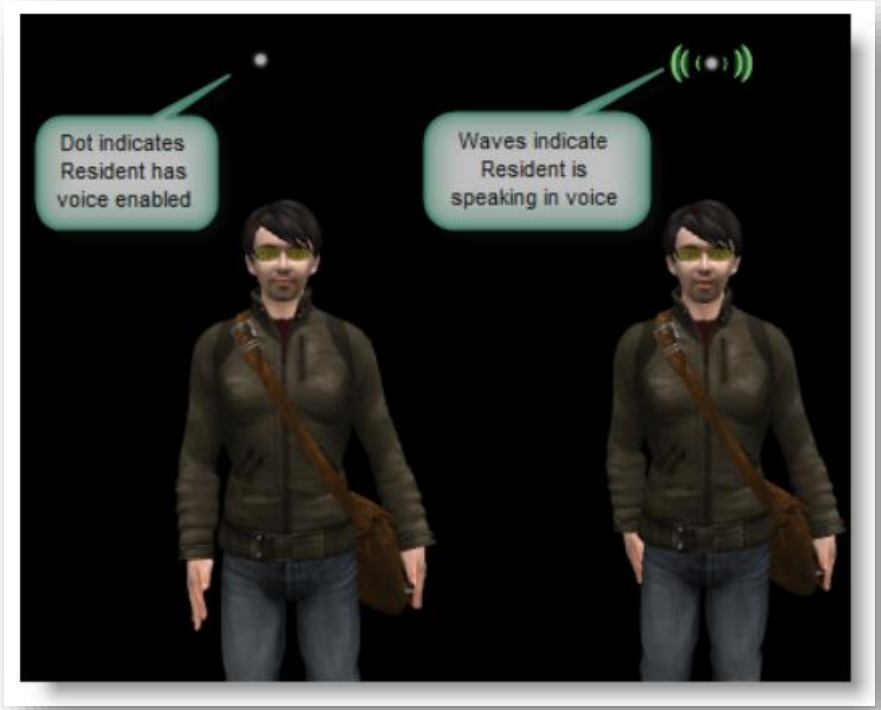
[113] https://wiki.secondlife.com/w/index.php?title=Environment_Sounds&direction=prev&oldid=1195319.

[114] *See* https://wiki.secondlife.com/wiki/Category:LSL_Grab (lasted edited July 24, 2011) ("A grab is when a user clicks and holds the mouse button down on an object, then drags the mouse. If an object is unlocked, not an attachment, and the avatar has move permission, the object can move along with the grabs.").

Claim	Oculus DK1 System's Exemplary Disclosures
	As explained above, applications like SecondLife include other individuals, and "[y]ou can talk to the people around you through text-based Local Chat. If you have a microphone, you can also speak out loud using inworld voice."[115] An example of a "second individual," in the form of a SecondLife "resident" (or user), is shown below. This SecondLife avatar has a "voice chat feature that lets avatars speak."[116]

[115] *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010) at https://wiki.secondlife.com/wiki/Viewer_2_Quick_Start_Guide/Local_chat_and_voice.

[116] *See* SecondLife Wiki – Lip Sync (last edited on October 13, 2009) at https://wiki.secondlife.com/wiki/Lip_sync.

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010). The "first individual" can "hear voice chat" either from the camera position or from the avatar position.

Claim	Oculus DK1 System's Exemplary Disclosures
	  See SecondLife Tutorial Video – Voice Chat Getting Started (November 14, 2008).[117] The audio for other residents in applications like SecondLife is spatialized such that, under at least Plaintiff's theory of infringement, "for the first individual, a sound localization point [] simulates a location in empty space from where an origin of a voice of the second individual occurs for the first individual." For example, the SecondLife documentation describes a "Voice Test" where "5 testers" "Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction." Then arrange themselves so that "4 testers [are] around one tester at north, south, east and west." This test is used to "verify [that] each tester sounds like their voice is coming from their position inworld" and that "everyone sound like they are in the right place spatially."

[117] https://wiki.secondlife.com/wiki/Video_Tutorials/More; *see also* http://vidtuts.s3.amazonaws.com/VOICE-CHAT-Getting-started.mp4.

Claim	Oculus DK1 System's Exemplary Disclosures

	Voice Test
	VERSION 0.1
	LENGTH 00:00
	TESTERS 5
	OVERVIEW Coming
	SETUP Up to 5 normal users, (can be done with 2)
	
	Spatial sound testing with gathered groups
	• Setup: Have each of 5 testers do the following: Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction.
	• Arrange 4 testers around one tester at north, south, east and west, like this:
	<tab> . Tester N . Tester W Tester C Tester E . Tester S . </tab>
	• Tester C: Face Tester N.
	• Cardinal Testers: Speak one at a time starting with Tester N and going clockwise around Tester C (N followed by E followed by S followed by W).
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Rotate your avatar to face Tester S.
	• Cardinal Testers, repeat the round robin above, starting with Tester S.
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Alt-Zoom on something out of range of the testers.
	* ...
	• Group in a circle
	  • Does everyone sound like they are in the right place spatially?
	  • If someone moves away, do they get quieter?
	• Group with members behind you
	  • Can you hear all members, including those behind you?
	
	See SecondLife Wiki – Voice Test (November 26, 2007).[118]

[118] https://wiki.secondlife.com/wiki/Voice_Test.

Claim	Oculus DK1 System's Exemplary Disclosures
	The SecondLife documentation also explains that "3D position" is used by the *Session.Set3Dposition.1* method for both the "speaker and listener" and that *Session.Set3Dposition.1* "describes the speaking position and the listening position for this avatar."

Session.Set3DPosition.1

When sending a 3D position for speaker and listener, the "listener" is either the avatar position or the camera position. That is, it describes the speaking position and the listening position for this avatar.


```
<Request requestId="114" action="Session.Set3DPosition.1">
    <SessionHandle>c1_m1000abcdefghijklmnopqrstuvwxy1</SessionHandle>
    <OrientationType>legacy</OrientationType>
    <SpeakerPosition>
        <Position>
            <X>261451</X>
            <Y>26.9568</Y>
            <Z>-283000</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.816965</X>
            <Y>0</Y>
            <Z>0.576688</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.576688</X>
            <Y>0</Y>
            <Z>-0.816965</Z>
        </LeftOrientation>
    </SpeakerPosition>
    <ListenerPosition>
        <Position>
            <X>261448</X>
            <Y>27.9639</Y>
            <Z>-283001</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.795791</X>
            <Y>0</Y>
            <Z>0.559283</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.574999</X>
            <Y>0</Y>
            <Z>-0.818154</Z>
        </LeftOrientation>
    </ListenerPosition>
</Request>
```


The viewer doesn't get a response

Claim	Oculus DK1 System's Exemplary Disclosures
	See SecondLife Wiki – Voice/Technical (November 18, 2009).[119] Therefore, when the first individual uses the controller and/or mouse and/or keyboard to turn, the sound is now originating from a second location, where the original unchanged location of second individual avatar is located. To the extent Plaintiff argues that the Oculus DK1 System does not disclose this limitation, either expressly, implicitly, and/or by inherency, a person of ordinary skill in the art would have determined that the limitation would have been obvious in light of the Oculus DK1 System alone or in combination with any applicant admitted prior art, the knowledge of one of ordinary skill in the art, or any one or more of the references identified in Meta's Invalidity Contentions under Section IV.J.3 for at least the reasons stated in Meta's Invalidity Contentions cover pleading. *See, e.g.*, **Chou** at 7:62-8:30 ("Referring again to FIG. 2, the standalone environment sensing device 200 can optionally include a set of user controls 232. The visually impaired person can utilize the user controls 232 to customize various aspects of the operation of the sensing device 200 including, but not limited to, the following. The visually impaired person can utilize the user controls to adjust various properties of the virtual sound sources such as the type of sound that emanates from each of the virtual sound sources, the volume of the sound that emanates from each of the virtual sound sources, and the frequency of the sound that emanates from each of the virtual sound sources, among other things. The visually impaired person can also utilize the user controls to choose different modes of operation such as a walk mode, a read mode, an analyze environment mode, and a manipulate object mode, among others. The visually impaired person can also utilize the user controls to adjust the field of view of the object sensor 202. It will be appreciated that the visually impaired person can make these adjustments both on-the-fly (i.e., when he is actively using the sensing device to determine the spatial geometry of his current physical environment) and offline (e.g., when he is not actively using the sensing device to determine the spatial geometry of his physical environment). The user controls 232 can be implemented in various ways including, but not limited to, the following. In an exemplary embodiment of the augmented auditory perception technique described herein the user controls 232 include one or more physical control elements (not shown) such as buttons, or sliders, or any combination thereof. The sensing device 200 can

[119] https://wiki.secondlife.com/wiki/Voice/Technical#Session.Set3DPosition.1.

Claim	Oculus DK1 System's Exemplary Disclosures
	optionally also include a location sensor 208 which is also coupled to the first computing device 210 and operates in conjunction therewith to determine the location coordinates (such as latitude and longitude, among others) of the sensing device 200. Various types of devices can be employed for the location sensor 208 such as a global positioning system (GPS) sensor, among others."), Fig. 2; **Jarvinen** at 17:37-48 ("Referring now to FIG. 5, a flow diagram an example embodiment is provided. In FIG. 5, a device such as, for example, communication device 90 may detect one or more hand gestures to manipulate one or more selected audio objects. The hand gestures may be gestures of a bare hand of a user that may not necessarily be currently holding an apparatus (e.g., apparatus 50). As described above, the communication device 90 may be embodied in a wrist band, bracelet (e.g., a wrist bracelet), game controller, ring, glove, pen, or any other device that is worn by a user or is otherwise attached to the user and which detects hand gestures of the user."), 12:39-42 ("The gesture module 78 may analyze this information to modify an audio object(s) (e.g., an audio signal (e.g., a spatial audio signal)) based in part on the movements of the hand(s), as described more fully below."), Fig. 5; **Cohen 1991 II** at 39 ("With a device like a DataGlove, a user can point and gesticulate using a 3D workspace envelope."), 39 ("Pointing at a source indicates it, as a prelude for selection by grasping"), 57 ("The standard pointing device in a window/icon/menu/pointing device (wimp) system is a mouse. A mouse, trackball (a mouse on its back), or joystick would suffice for positioning objects in 2-space. One can imagine direct control of position (with a mouse, trackball, or DataGlove, say), steering control (with a return-to-center joystick, perhaps), or programmed control (automatic circulation)," "for instance, used joysticks to manipulate crudely spatialized sources. As long as visual tokens for the spatial sound objects are accessible through the workstation, they can be manipulated through the operations described above. For example, a mouse-based system finds analogs to indicating, highlighting, and relocating in pointing, clicking, and dragging. A speaker might be singled out for special attention by clicking her token, which would throw a spotlight on her voice."), 90 ("In a gestural interface (like Handy Sound's), pointing and grasping are natural postures for indicating and securing."); **Li 305** at 14:5-18 ("FIG. 7 illustrates a method for simultaneously generating configurable three-dimensional (3D) sounds using a microphone array system. Three-dimensional (3D) sound comprises 3D surround sound, 3D binaural sound, and 3D stereo sound. 3D sound comprises, for example, music, speech, any audio signal, etc., and is used with or without 3D images, 3D movies, and 3D videos. 3D sound allows a user to experience sound in a 3D space. As used herein, the term "user" refers to a listener of a sound recording, or a person receiving an audio signal on audio

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	media. The 3D sound is represented as a 3D binaural sound when used with a headset or as a 3D surround sound when used with multiple loudspeakers, for example, in a home theater speaker system. The 3D stereo sound is considered as a special case of the 3D sound."); **Billinghurst 1998** at 5 ("A hand held Logitech wireless trackball with three buttons is used as the primary input device."), 167-68 (6DoF "wand type pointing devices" and "joysticks" allow users to "point at or manipulate virtual objects"); **Pedersen** at 9:6-21 ("The user may move the symbols into desired positions on the display using the user interface of the control device. For example, the display may be a touch sensitive display allowing the user to move the symbols by touching and dragging the symbols as is well-known in the art of smartphones. When the symbols have been moved into their desired positions on the display, the processor controls the corresponding binaural filters connected to respective input signals from sound sources represented by the symbols, for selection of directional transfer function corresponding to the positions on the display of the symbols representing the sound sources with relation to the symbol representing the user, whereby the user perceives the Sound sources to be positioned in the directions, or at the positions, indicated by the respective symbols positions on the display."), 16:55-61 ("In addition, the microphones of binaural hearing aid 10A, 10B may be used for reception of spoken commands by the user transmitted (not shown) to the Smartphone 110 for speech recognition in a processor 130 of the smartphone 110, for decoding of the spoken commands and for controlling the hearing device system 10 to perform actions defined by respective spoken commands."); **Boustead** at 13:5-44 ("FIG. 2 illustrates a Graphical User Interface (GUI) 200 of a conference scene which may be provided at the conference server 100 and/or at the terminals 120. If provided at a terminal 120, the GUI 200 may enable a participant to modify the conference scene as perceived at the terminal 120. In an embodiment, the GUI 200 enables a chairperson of an audio conference to place the conference participants within a conference scene. The GUI 200 may indicate the participants 201 of the audio conference. The participants 201 may correspond to the originators of the audio signals comprised within a set of downstream audio signals. As such, the GUI 200 may indicate up to (M-1) participants 201," Fig. 2; **Bedingfield** at 6:27-51 ("From the decision block 304, the listener may select the mode for modifying individual participants via route B at the block 308. At a selection block 322, the listener may select a setting, such as to place the focus at a block 324, to change a participant's volume at a block 326, or to change a participant's location at a block 328. If the listener selects to place the focus at the block 324, the listener then selects a participant for the focus (the focus object). The focus object's volume may then be amplified above the volume level of the other participants. For

Claim	Oculus DK1 System's Exemplary Disclosures
	example, when multiple participants are speaking during a conference, the listener may desire to place the focus on the participant the listener desires to hear above the other speaking participants. If the listener selects to change the volume at the block 326, the listener may select a participant and adjust the volume, or other aspects of the participants sound such as the aspects adjustable by the block 316. If the listener selects to change the location at the block 328, the listener selects a participant and then selects a new location for the participant within the sound field. The listener may also relocate his position within the sound field at the block 328. After the setting is selected at the selection block 322 and a setting is selected and implemented at the blocks 324, 326 or 328, the method 300 advances to the decision block 318 and then to either the decision block 304 or the block 320 as described above."); **Knappe** at 9:43-67 ("GUI 100 can allow a user to manually partition the sound field. One possible GUI 'look and feel', illustrated in FIGS. 7A and 7B, shows a method of manual partitioning. FIG. 7A shows a GUI screen 110 at the start of a conference call. The presentation sound field is represented in GUI screen 110 by annular half-circle 112. Endpoints B, C, and D are portrayed respectively in blocks 114, 116, and 118 (endpoint D's block 118 is shown smaller than the others because D represents a monophonic sound source). The blocks initially appear to the inside of the half-circle 112, signaling that no sound field mapping is currently being done on any of these sources. FIG. 7B shows GUI screen 110 after manipulation by a listener. The listener has created a presentation sound field sector for each endpoint, e.g., by dragging and dropping blocks 114, 116, and 118 onto half-circle 112. Endpoint B now occupies sector 122, i.e., approximately the leftmost 75 degrees of the sound field. Endpoint C now occupies, sector 124, i.e., the 75 degree sector from about 15 degrees left of center to about 60 degrees right of center. Endpoint D now occupies sector 126, i.e., approximately the rightmost 30 degrees of the sound field. Note that the listener has replaced the generic labels of each endpoint with icons containing the names of the conference participants at each location. The listener can also manipulate the widths of sectors 122, 124, and 126 by moving the sector dividers."), Figs. 7A and 7B; **Begault 2000** at 173 173 ("[A]udio in any virtual reality configuration can provide an important source of feedback. For instance, the VPL Data Glove works by analyzing a combination of detected finger positions and then using the software to match them to sets of predefined gestures (e.g., a peace sign, pointing with the index finger, squeezing hand as a fist).").
CLAIM 15	

Claim	Oculus DK1 System's Exemplary Disclosures
15[pre][a]. A computer system, comprising: a first wearable electronic device that a first person wears	To the extent the Preamble is limiting, the Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "[a] computer system, comprising: a first wearable electronic device that a person wears" as embodied in the product itself and as reflected in other prior art references that describe it. *See* disclosures and cited evidence for limitations 8[pre] and 8[a]. For example: The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "[a] computer system." *See* disclosures and cited evidence for limitation 8[pre]. For example: The Oculus DK1 System includes a computer[120] (indicated with a (1) in the image below), along with electronic devices including an Oculus Rift DK1 headset (indicated with a (2), which includes

[120] For example, a computer can be an exemplary Dell Inspiron 7720. *See* META-8KHZ_00047873. A computer can also be an exemplary HP ENVY DV4-5213cl Notebook computer. *See* META-8KHZ_00047987. An HP ENVY DV4-5213cl Notebook computer works in the same way as a Dell Inspiron 7720 computer, as described herein.

Claim	Oculus DK1 System's Exemplary Disclosures
	a headstrap), earphones[121] (like the earphones shown in (3) below), controller[122] and/or mouse[123] and/or keyboard[124] (like the controller shown in (4) below), and a microphone(s)[125] (like the

[121] Earphones may be wireless and can connect to, for example, a computer via, for example, Bluetooth. *See, e.g.*, LG Tone+ HBS-730: Where Have You Been All My Life (February 18, 2013), https://www.wired.com/2013/02/lg-tone-plus-hbs-730/ (describing wireless LG Tone+ HBS-730 earphones with Bluetooth); BackBeat GO 2 Earbuds Tutorial (November 5, 2013), https://www.youtube.com/watch?v=EOwxkSW1UbM (describing wireless BackBeat GO 2 Earbuds with Bluetooth); Denon AH-W150 Exercise Freak Review: Wireless Headphones for Workouts (April 19, 2013), https://www.cnet.com/reviews/denon-exercise-freak-ah-w150-headphone-review/ ("The []Denon AH-W150 Exercise Freak[] in-ear Bluetooth headphones support wireless audio from Bluetooth-enabled devices."); *see also, e.g.*, META-8KHZ_00046189; META-8KHZ_00047873 at 31, 33 (supports "Bluetooth combo card"); META-8KHZ_00047806; META-8KHZ_00047987 at 9, 15.

[122] A controller may be wireless and can connect to a computer. *See, e.g.*, How To: Use Your Xbox 360 or PS3 Controller on a PC (April 11, 2013), https://www.youtube.com/watch?v=7nLnrkleR_c (explaining how to use Xbox 360 and/or PS3 controllers wirelessly with computer); Classic Game Room – XBOX 360 CONTROLLER for WINDOWS Review (January 21, 2013), https://www.youtube.com/watch?v=-GEZIpd66Po at 1:03 (showing wireless Xbox 360 controller connected to computer using a wireless adapter); META-8KHZ_00047859; *see also, e.g.*, META-8KHZ_00046189; META-8KHZ_00047873 at 31, 33 (supports "Bluetooth combo card"); META-8KHZ_00047806; META-8KHZ_00047987 at 9, 15.

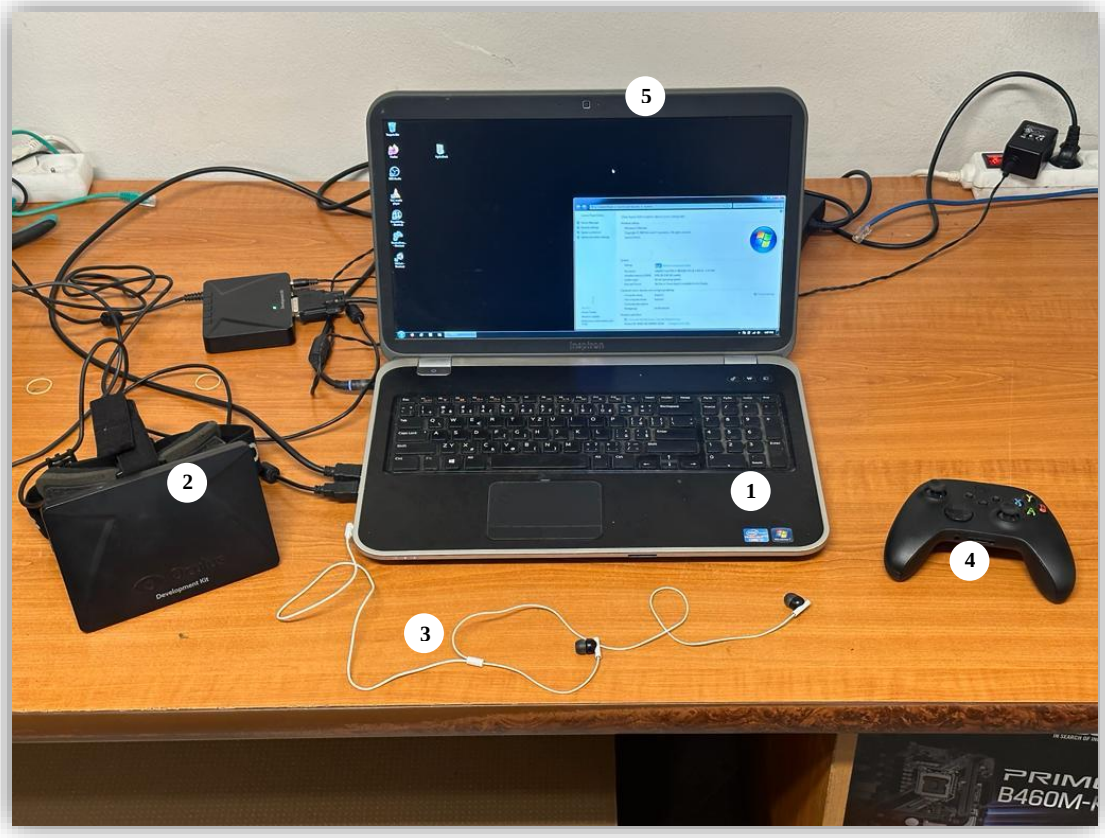
[123] A mouse may be wireless and can connect to a computer. *See, e.g.*, SteelSeries Sensei Wireless Gaming Mouse Review (May 1, 2014), https://www.anandtech.com/show/7971/steelseries-sensei-wireless-gaming-mouse-review/2 (describing SteelSeries Sensei Wireless mouse that can be used with a computer); SteelSeries Sensei Wireless Laser Mouse Review (May 19, 2014), https://www.youtube.com/watch?v=MCVBi5Lub04 (showing SteelSeries Wireless mouse in use with computer that connects to computer via base station); Logitech M325 Wireless Mouse – Review (January 22, 2014), https://cafelilium.wordpress.com/2014/01/22/logitech-m325-wireless-mouse-review/ (describing Logitech M325 Wireless Mouse that connects to computer USB adapter plugged into computer); META-8KHZ_00047798; META-8KHZ_00047844; https://blog.logitech.com/2010/06/07/new-logitech-wireless-mouse-m510-delivers-all-day-comfort-and-advanced-control/ (describing M510 mouse); *see also, e.g.*, META-8KHZ_00046189; META-8KHZ_00047873 at 31, 33 (supports "Bluetooth combo card"); META-8KHZ_00047806; META-8KHZ_00047987 at 9, 15.

[124] A keyboard may be wireless and can connect to a computer. *See, e.g.*, Review: Logitech K830 Wireless HTPC Keyboard with TouchPad (May 15, 2014), https://www.smarthomebeginner.com/logitech-k830-wireless-backlit-htpc-keyboard/ (describing wireless keyboard that was tested on "Windows PC"); Apple Wireless Keyboard 2 Battery Version (August 7, 2011), https://www.youtube.com/watch?v=Zd44VTeggPI (showing wireless Apple keyboard); META-8KHZ_00047843;

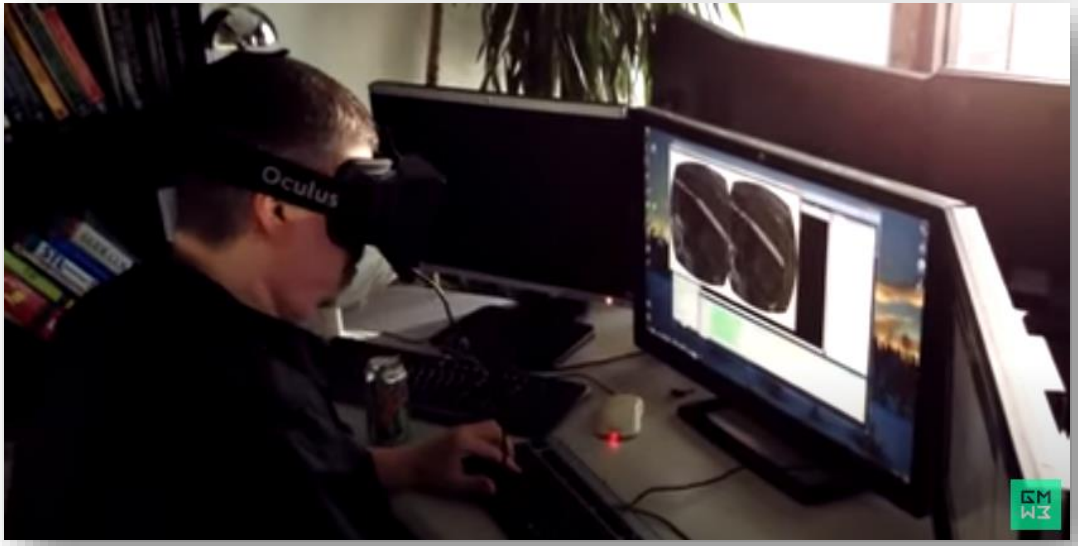
Claim	Oculus DK1 System's Exemplary Disclosures
	microphone shown in (5) below that is embedded into the display of the Dell Inspiron 7720 computer):

https://blog.logitech.com/2010/08/12/new-logitech-wireless-combo-mk520-puts-convenience-and-control-at-your-fingertips/ (describing K520 keyboard); *see also, e.g.*, META-8KHZ_00046189; META-8KHZ_00047873 at 31, 33 (supports "Bluetooth combo card"); META-8KHZ_00047806; META-8KHZ_00047987 at 9, 15.

[125] Microphone may be included in a computer. *See, e.g.*, META-8KHZ_00045115 at 3 ("Internal microphone support"); META-8KHZ_00047987 at 7 ("Internal microphones (2)). Microphone may also connect to, for example, a computer and may be wired or wireless. Wired microphone can connect to a computer via, for example, an auxiliary port or USB port. *See, e.g.*, META-8KHZ_00045115 at 3 ("one microphone-in port"); META-8KHZ_00047987 at 22 ("[C]onnect a microphone to the microphone jack on the computer."); Blue Yeti on PS3 (June 1, 2011), https://www.youtube.com/watch?v=oulJ4eJODUs. Wireless microphone can connect to a computer via, for example, Bluetooth. *See, e.g.*, Denon AH-W150 Exercise Freak Review: Wireless Headphones for Workouts (April 19, 2013), https://www.cnet.com/reviews/denon-exercise-freak-ah-w150-headphone-review/ ("The []Denon AH-W150 Exercise Freak[] in-ear Bluetooth headphones support wireless audio from Bluetooth-enabled devices . . . They have a built-in microphone."); *see also, e.g.*, META-8KHZ_00046189; META-8KHZ_00047873 at 31, 33 (supports "Bluetooth combo card"); META-8KHZ_00047806; META-8KHZ_00047987 at 9, 15.

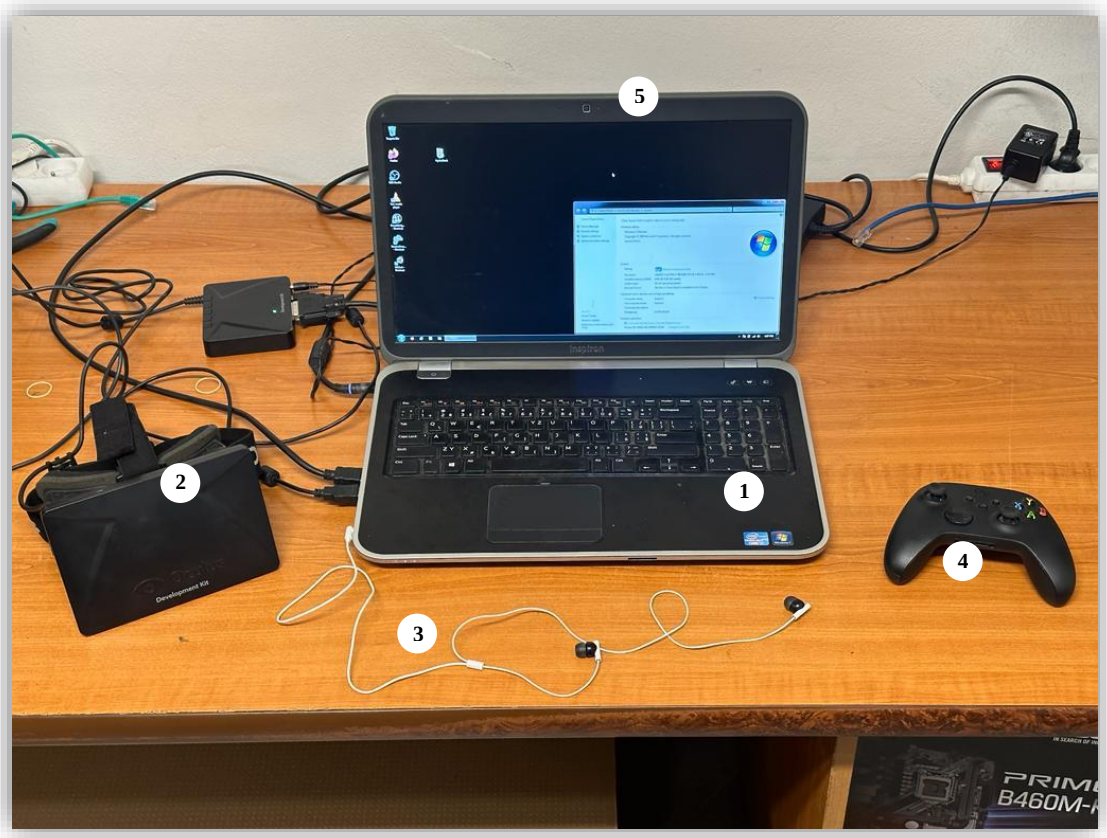
Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System.[126] As shown below, the Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "[a] computer system" comprising a "first wearable electronic device that a first person wears":

[126] META-8KHZ_00047800; *see also* META-8KHZ_00047801; META-8KHZ_00047802; META-8KHZ_00047799; META-8KHZ_00047805; META-8KHZ_00047804; META-8KHZ_00047803.

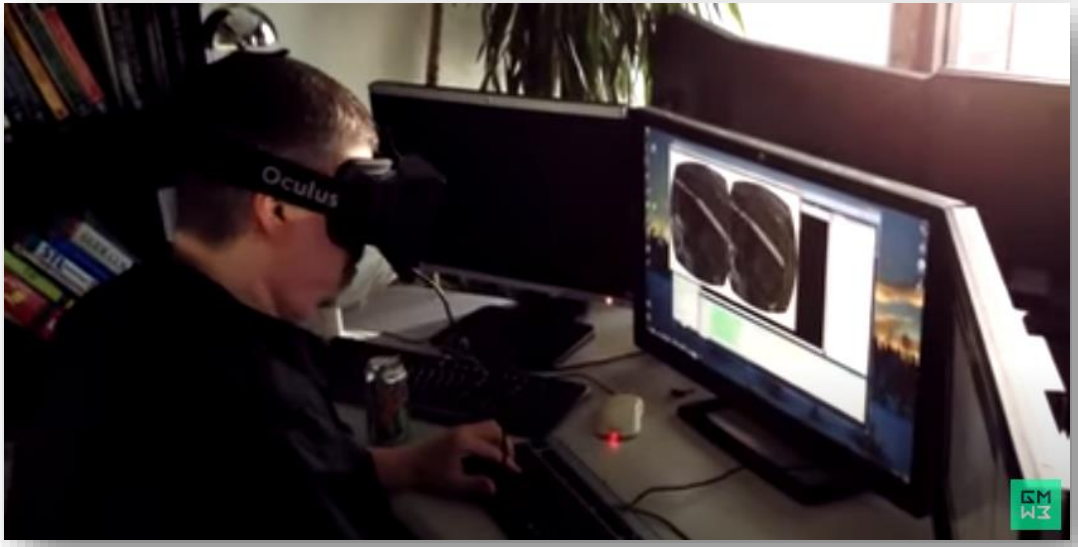
Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* How to Use Oculus Rift with Second Life (May 22, 2014).[127] The first person wears the wearable Oculus DK1 headset on their head using a strap. To the extent Plaintiff argues that the Oculus DK1 System does not disclose this limitation, either expressly, implicitly, and/or by inherency, a person of ordinary skill in the art would have determined that the limitation would have been obvious in light of the Oculus DK1 System alone or in combination with any applicant admitted prior art, the knowledge of one of ordinary skill in the art, or any one or more of the references identified in Defendants' Invalidity Contentions under

[127] https://www.youtube.com/watch?v=TLL5JVwG118; *see also* https://community.secondlife.com/blogs/entry/1199-second-life%E2%80%99s-oculus-rift-integration-is-ready-for-beta-testers/; https://community.secondlife.com/blogs/entry/1275-using-the-oculus-rift-with-second-life/.

Claim	Oculus DK1 System's Exemplary Disclosures
	Section IV.J.2 for at least the reasons stated in Defendants' Invalidity Contentions cover pleading. *See, e.g.*, **Haddick 248** at [001179] ("FIG. 156 is an illustration of a head mounted display device 15600 with see-through capabilities. The head mounted display device 15600 includes see-through displays 15602, one or more cameras 15604 and electronics 15608, wherein the electronics 15608 can include one or more of the following: a processor, a battery, a global positioning sensor (GPS), a direction sensor, data storage, a wireless communication system and a user interface."); **Bradski 253** at [0214] ("As shown in FIG. 4A, a user 60 of a head-mounted augmented reality system ("AR system") is depicted wearing a frame 64 structure coupled to a display system 62 positioned in front of the eyes of the user. A speaker 66 is coupled to the frame 64 in the depicted configuration and positioned adjacent the ear canal of the user 60 (in one embodiment, another speaker, not shown, is positioned adjacent the other ear canal of the user to provide for stereo/shapeable sound control). The display 62 is operatively coupled 68, such as by a wired lead or wireless connectivity, to a local processing and data module 70 which may be mounted in a variety of configurations, such as fixedly attached to the frame 64, fixedly attached to a helmet or hat 80 as shown in the embodiment of FIG. 4B, embedded in headphones, removably attached to the torso 82 of the user 60 in a configuration (e.g., placed in a backpack (not shown)) as shown in the embodiment of FIG. 4C, or removably attached to the hip 84 of the user 60 in a belt-coupling style configuration as shown in the embodiment of FIG. 4D.").
15[b]. a second wearable electronic device that a second person wears and that captures a binaural voice of the second person during an electronic phone call with the first wearable electronic device that the first person wears;	The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "a second wearable electronic device that a second person wears and that captures a binaural voice of the second person during an electronic phone call with the first wearable electronic device that the first person wears" as embodied in the product itself and as reflected in other prior art references that describe it. *See* disclosures and cited evidence for limitations 8[pre], 8[a], and 15[pre][a]. For example: The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "a second wearable electronic device that a second person wears." *See* disclosures and cited evidence for limitations 8[a] and 15[pre][a]. For example: A first person and a second person can each use an Oculus Rift DK1 System while each person wears their own wearable Oculus DK1 headset.

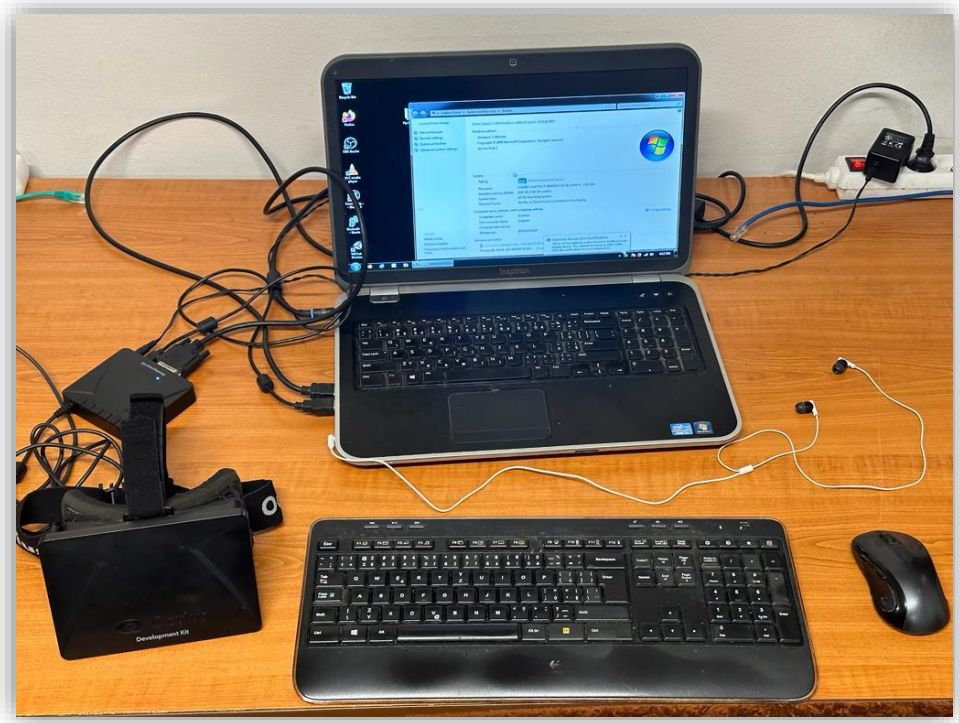
Claim	Oculus DK1 System's Exemplary Disclosures
	The Oculus Rift DK1 system includes the Oculus DK1 headset (indicated with a (2) in the image below), which includes a head strap, and earphones (like those shown in (3) below).  *See* photograph of an exemplary Oculus DK1 System.[128]

[128] META-8KHZ_00047800; *see also* META-8KHZ_00047801; META-8KHZ_00047802; META-8KHZ_00047799; META-8KHZ_00047805; META-8KHZ_00047804; META-8KHZ_00047803.

Claim	Oculus DK1 System's Exemplary Disclosures
	As shown below, a second person "wears" the Oculus DK1 headset ("a second wearable electronic device") using a strap:  *See* How to Use Oculus Rift with Second Life (May 22, 2014).[129] The Oculus DK1 System also includes wearable electronic earphones[130] that a first and second persons wear.

[129] https://www.youtube.com/watch?v=TLL5JVwG118; *see also* https://community.secondlife.com/blogs/entry/1199-second-life%E2%80%99s-oculus-rift-integration-is-ready-for-beta-testers/; https://community.secondlife.com/blogs/entry/1275-using-the-oculus-rift-with-second-life/.

[130] Earphones may be wireless and can connect to a computer via, for example, Bluetooth. *See, e.g.*, LG Tone+ HBS-730: Where Have You Been All My Life (February 18, 2013), https://www.wired.com/2013/02/lg-tone-plus-hbs-730/ (describing wireless LG Tone+ HBS-730 earphones with Bluetooth); BackBeat GO 2 Earbuds Tutorial (November 5, 2013),

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System (showing earphones).[131]

https://www.youtube.com/watch?v=EOwxkSW1UbM (describing wireless BackBeat GO 2 Earbuds with Bluetooth); Denon AH-W150 Exercise Freak Review: Wireless Headphones for Workouts (April 19, 2013), https://www.cnet.com/reviews/denon-exercise-freak-ah-w150-headphone-review/ ("The []Denon AH-W150 Exercise Freak[] in-ear Bluetooth headphones support wireless audio from Bluetooth-enabled devices . . . They have a built-in microphone."); *see also, e.g.*, Owner's Manual for Dell Inspiron 7720 (2012) at 31, 33 (supports "Bluetooth combo card").

[131] META-8KHZ_00047799; META-8KHZ_00047800

Claim	Oculus DK1 System's Exemplary Disclosures
	As another example, a first and second person wearing headsets is shown below.[132] As another example, the second person can "wear[]" wearable binaural earphones in their ears that are able to "capture" that person's binaural voice.[133]

[132] See Oculus Rift DK2 Hands-On Impressions! Couch Knights, Valkyrie, and How It Compares to the DK1 at 1:15, https://www.youtube.com/watch?v=d_9nSA7thEc (showing two people wearing headsets while playing Couch Knights together).

[133] Wearable earphones capable of "captur[ing] a binaural voice" were available prior to any date to which the '090 Patent can claim priority. For example, the Roland CS-10EM earphones "provide[d] combined in-ear monitoring and binaural recording." A second person can "[s]imply wear the microphone-equipped earphones and capture what [they] hear." *See, e.g.*,

Claim	Oculus DK1 System's Exemplary Disclosures
	Under at least Plaintiff's theory of infringement, the Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "an electronic phone call with the first wearable electronic device that the first person wears." *See* disclosures and cited evidence for limitation 8[a]. For example: In at least applications like VRChat, Couch Knights, and/or SecondLife, multiple persons can share same virtual space and communicate with each other using voice chat or other communication methods (i.e. "an electronic phone call"). Each person can wear an Oculus Rift DK1 headset and/or electronic earphones during the electronic phone call, as explained above. In addition, teleconferencing application applications with spatialized audio, such as vSpace, allowed users to connect to teleconferences using a phone:[134] In vSpace, "[p]articipants using vSpace will hear [the phone user] localized."[135] For example, a person of ordinary skill in the art would have understood that a first person wearing the Oculus DK1 headset and earphones while using the vSpace application to participate in a call on the exemplary Inspiron 7720 would hear the "localized" voice of a second person connected to the same call using a phone and wearing earphones connected to that phone. In addition, applications allowed two users to directly connect to each other over a call prior to any date to which the '090 Patent can claim priority. For example, the Skype application, which can be

https://web.archive.org/web/20140410092739/http:/www.roland.com/products/en/CS-10EM; https://www.amazon.com/Roland-CS-10EM-In-Ear-Monitors/dp/B003QGPCTE (listing "Date First Available" as "April 21, 2010"); Soundman OKM II Binaural Stereo Microphone Headset (May 2001), https://www.soundonsound.com/reviews/soundman-okm-ii; My Soundman OKM II Classic Binaural Microphone and Dummy Head Has Arrived (July 16, 2013), https://www.asmrhq.com/my-soundman-okm-ii-classic-binaural-microphone-and-dummy-head-has-arrived-my-review/.

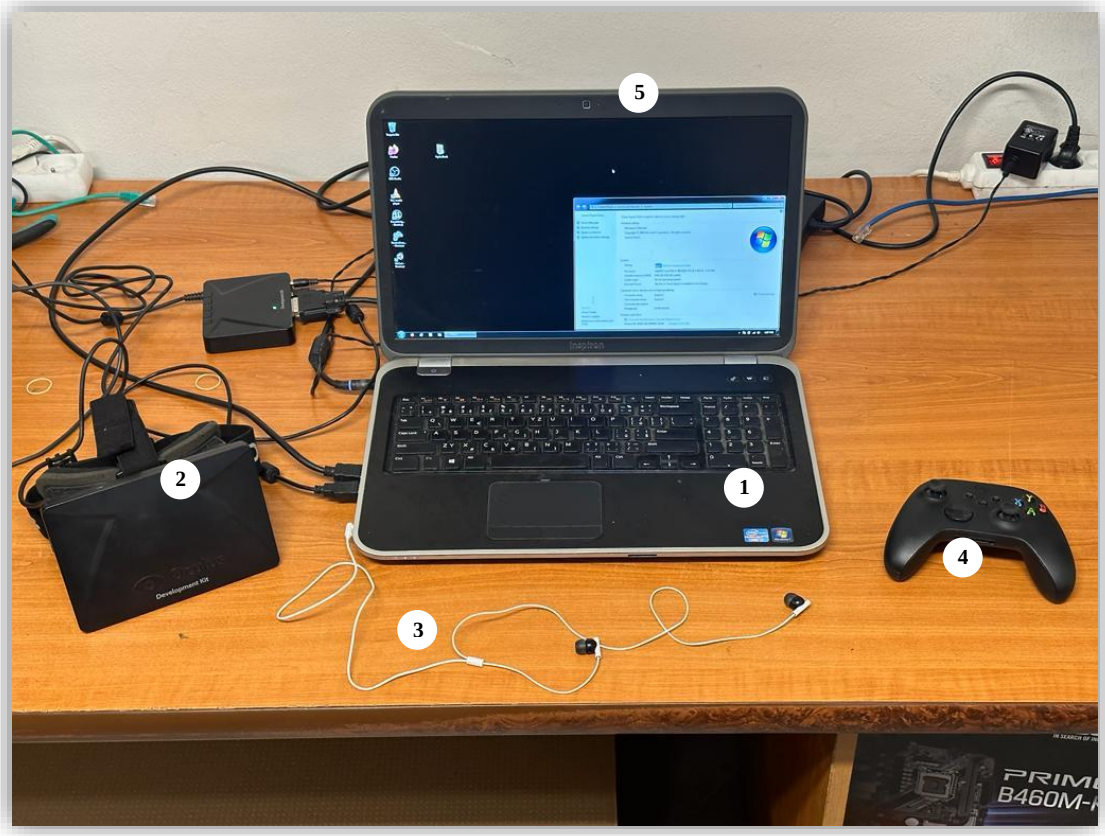
[134] https://web.archive.org/web/20110828133313/http://www.vspace.net/faq

[135] https://web.archive.org/web/20110828133313/http://www.vspace.net/faq

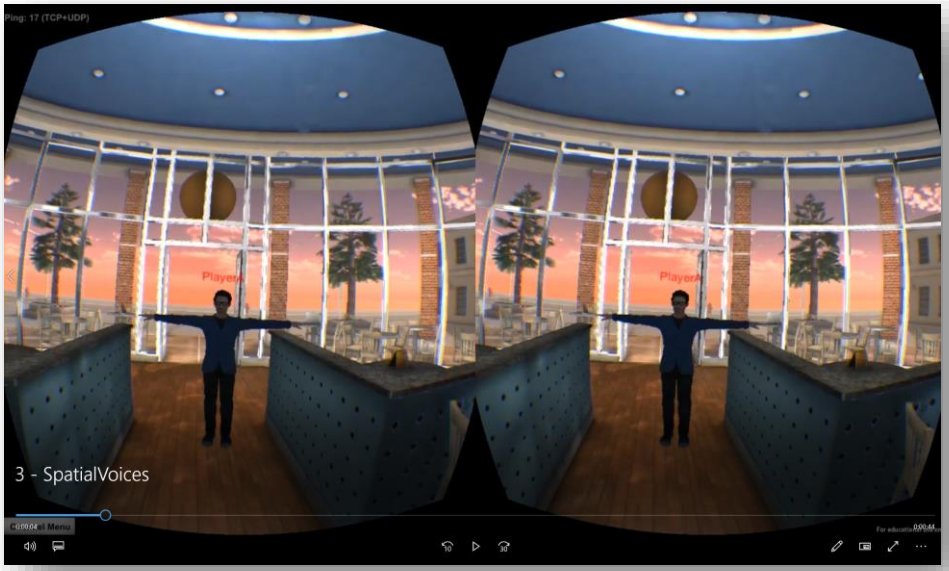
Claim	Oculus DK1 System's Exemplary Disclosures
	run on a Windows computer[136], supported one-to-one, or peer-to-peer, calls.[137] A person of ordinary skill in the art would have understood that the Oculus DK1 System could be used with the Skype application to perform one-to-one, or peer-to-peer, calls between only two individuals and could be displayed on the Oculus DK1 headset using Oculus Overlay. A person of ordinary skill in the art would also have found it obvious to combine the spatialized audio of the vSpace application with the peer-to-peer calls of the Skype application. A person of ordinary skill in the art would also have found it obvious to incorporate one-to-one, or peer-to-peer, calls between two individuals into other applications, such as applications like VRChat, SecondLife, and/or Couch Knights. The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "captur[ing] a binaural voice of the second person during an electronic phone call with the first wearable electronic device that the first person wears": For example, in applications like VRChat, the second person's avatar is in front of the first person's avatar (point of view) and the voice sound is originating in front of the first person. The second person's Oculus DK1 System "captures a binaural voice of the second person" when it captures the second person's voice on, for example, microphone (5) (shown in the image below).

[136] *See* https://web.archive.org/web/20140209181315/https://support.skype.com/en/faq/FA10328/what-are-the-system-requirements-for-skype (February 9, 2014) (supports, for example, Windows Vista, Windows 7, and Windows 8).

[137] *See* https://web.archive.org/web/20140315232126/http://www.skype.com/en/features/ (March 15, 2014) (describing "Skype to Skype calls," "One to one video calls," and calls with phones like "mobiles and landlines"); https://www.computerworld.com/article/2543670/how-dangerous-is-skype.html (March 6, 2007) ("Skype is a peer-to-peer (P2P) application, meaning that users connect to one another directly and not through a central server for communication.").

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System.[138]

[138] META-8KHZ_00047800; *see also* META-8KHZ_00047801; META-8KHZ_00047802; META-8KHZ_00047799; META-8KHZ_00047805; META-8KHZ_00047804; META-8KHZ_00047803.

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System (showing VRChat).[139] The second person's Oculus DK1 System also works with a wearable electronic device that connects to the Oculus DK1 System's computer (like the computer shown as (1) above) and that contains microphones that "capture a binaural voice." For example, the wearable Roland CS-10EM earphones "provide combined in-ear monitoring and binaural recording."[140] The exemplary

[139] META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU

[140] *See* https://web.archive.org/web/20140410092739/http:/www.roland.com/products/en/CS-10EM; *see also, e.g.*, Soundman OKM II Binaural Stereo Microphone Headset (May 2001), https://www.soundonsound.com/reviews/soundman-okm-ii (describing wearable Soundman OKM II binaural recording microphone headset with "3.5mm TRS jack plug"); My Soundman OKM II Classic Binaural Microphone and Dummy Head Has Arrived (July 16, 2013), https://www.asmrhq.com/my-soundman-okm-ii-classic-binaural-

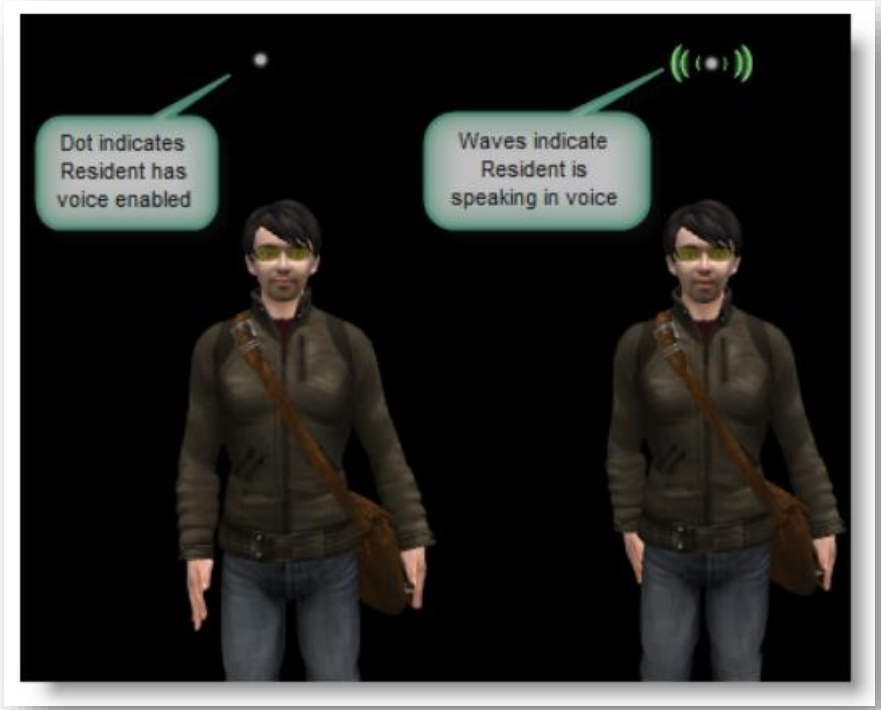
Claim	Oculus DK1 System's Exemplary Disclosures
	Roland CS-10EM earphones can also be worn by the second person and used with other devices, such as a phone, via "3.5mm Jack" or "USB" connection.[141] As explained above, applications like SecondLife include other persons, and "[y]ou can talk to the people around you through text-based Local Chat. If you have a microphone, you can also speak out loud using inworld voice."[142] An example of a "second person," in the form of a SecondLife "resident" (or user), is shown below. This SecondLife avatar has a "voice chat feature that lets avatars speak."[143]

microphone-and-dummy-head-has-arrived-my-review/ (explaining that the Soundman OKM II headset can be "[p]laced in each ear" to "record what is happening around you").

[141] *See* https://www.amazon.com/Roland-CS-10EM-In-Ear-Monitors/dp/B003QGPCTE (listing "Date First Available" as "April 21, 2010").

[142] *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010) at https://wiki.secondlife.com/wiki/Viewer_2_Quick_Start_Guide/Local_chat_and_voice.

[143] *See* SecondLife Wiki – Lip Sync (last edited on October 13, 2009) at https://wiki.secondlife.com/wiki/Lip_sync.

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010). The "first person" can "hear voice chat" either from the camera position or from the avatar position.

Claim	Oculus DK1 System's Exemplary Disclosures
	  See SecondLife Tutorial Video – Voice Chat Getting Started (November 14, 2008).[144] The second person's Oculus DK1 System, for example, thus "captures a binaural voice of the second person." The audio for other residents in applications like SecondLife is spatialized. For example, the SecondLife documentation describes a "Voice Test" where "5 testers" "Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction." Then arrange themselves so that "4 testers [are] around one tester at north, south, east and west." This test is used to "verify [that] each tester sounds like their voice is coming from their position inworld" and that "everyone sound like they are in the right place spatially."

[144] https://wiki.secondlife.com/wiki/Video_Tutorials/More; *see also* http://vidtuts.s3.amazonaws.com/VOICE-CHAT-Getting-started.mp4.

Claim	Oculus DK1 System's Exemplary Disclosures

	Voice Test
	VERSION 0.1
	LENGTH 00:00
	TESTERS 5
	OVERVIEW Coming
	SETUP Up to 5 normal users, (can be done with 2)
	
	Spatial sound testing with gathered groups
	• Setup: Have each of 5 testers do the following: Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction.
	• Arrange 4 testers around one tester at north, south, east and west, like this:
	<tab> . Tester N . Tester W Tester C Tester E . Tester S . </tab>
	• Tester C: Face Tester N.
	• Cardinal Testers: Speak one at a time starting with Tester N and going clockwise around Tester C (N followed by E followed by S followed by W).
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Rotate your avatar to face Tester S.
	• Cardinal Testers, repeat the round robin above, starting with Tester S.
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Alt-Zoom on something out of range of the testers.
	* ...
	• Group in a circle
	  • Does everyone sound like they are in the right place spatially?
	  • If someone moves away, do they get quieter?
	• Group with members behind you
	  • Can you hear all members, including those behind you?
	
	See SecondLife Wiki – Voice Test (November 26, 2007).[145]
	
	The SecondLife documentation also explains that "3D position" is used by the *Session.Set3DPosition.1* method for both the "speaker and listener" and that *Session.Set3Dposition.1* "describes the speaking position and the listening position for this avatar."

[145] https://wiki.secondlife.com/wiki/Voice_Test.

Session.Set3DPosition.1

When sending a 3D position for speaker and listener, the "listener" is either the avatar position or the camera position. That is, it describes the speaking position and the listening position for this avatar.

```
<Request requestId="114" action="Session.Set3DPosition.1">
    <SessionHandle>c1_m1000abcdefghijklmnopqrstuvwxy1</SessionHandle>
    <OrientationType>legacy</OrientationType>
    <SpeakerPosition>
        <Position>
            <X>261451</X>
            <Y>26.9568</Y>
            <Z>-283000</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.816965</X>
            <Y>0</Y>
            <Z>0.576688</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.576688</X>
            <Y>0</Y>
            <Z>-0.816965</Z>
        </LeftOrientation>
    </SpeakerPosition>
    <ListenerPosition>
        <Position>
            <X>261448</X>
            <Y>27.9639</Y>
            <Z>-283001</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.795791</X>
            <Y>0</Y>
            <Z>0.559283</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.574999</X>
            <Y>0</Y>
            <Z>-0.818154</Z>
        </LeftOrientation>
    </ListenerPosition>
</Request>
```

The viewer doesn't get a response

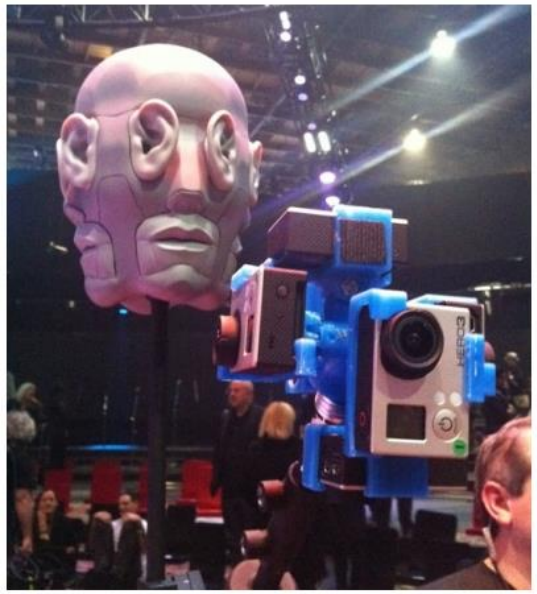
Claim	Oculus DK1 System's Exemplary Disclosures
	See SecondLife Wiki – Voice/Technical (November 18, 2009).[146] Like in applications like VRChat, the second person's Oculus DK1 System "captures a binaural voice of the second person" when it captures the second person's voice on, for example, microphone (5). The second person's Oculus DK1 System also works with a wearable electronic device that connects to the Oculus DK1 System's computer (like the computer shown as (1) above) and that contains microphones that "capture a binaural voice." For example, the wearable Roland CS-10EM earphones "provide combined in-ear monitoring and binaural recording."[147] The exemplary Roland CS-10EM earphones can also be worn by the second person and used with other devices, such as a phone, via "3.5mm Jack" or "USB" connection.[148] In addition, it was well known that the Oculus DK1 could play back "a binaural voice." By late 2012, the "3D Beck performance 'Hello Again'" was recorded using "a terrifying human head mannequin covered with extra ears. No face. Just eight ear-shaped microphones and a '360 Heros' rig with six GoPro cameras. Together, they simultaneously record 3D audio and video."[149]

[146] https://wiki.secondlife.com/wiki/Voice/Technical#Session.Set3DPosition.1.

[147] *See* https://web.archive.org/web/20140410092739/http:/www.roland.com/products/en/CS-10EM; *see also, e.g.*, Soundman OKM II Binaural Stereo Microphone Headset (May 2001), https://www.soundonsound.com/reviews/soundman-okm-ii (describing wearable Soundman OKM II binaural recording microphone headset with "3.5mm TRS jack plug"); My Soundman OKM II Classic Binaural Microphone and Dummy Head Has Arrived (July 16, 2013), https://www.asmrhq.com/my-soundman-okm-ii-classic-binaural-microphone-and-dummy-head-has-arrived-my-review/ (explaining that the Soundman OKM II headset can be "[p]laced in each ear" to "record what is happening around you").

[148] *See* https://www.amazon.com/Roland-CS-10EM-In-Ear-Monitors/dp/B003QGPCTE (listing "Date First Available" as "April 21, 2010").

[149] https://techcrunch.com/2014/04/13/oculus-music/.

Claim	Oculus DK1 System's Exemplary Disclosures
	 The 3D, binaural recording was played back on the Oculus DK1 System: "Music aficionados may have heard of binaural recordings, where a dummy head with microphones in each of its two silicone ears pick up sound the same way you'd hear it in person. A sound on the right will hit the dummy's right ear a split second before its left. When listened to on headphones, binaural recordings make you feel like you're standing still in a room with the musicians. But Milk took it a step further by inventing possibly the world's first 360 binaural head microphone. When combined with Oculus' head tracking sensor, this creepy face's recordings maintain the binaural illusion no matter which direction you turn." "But seen and heard through Oculus, I actually felt like I got a better deal than the live audience. They were stuck in their seats. I could instantly teleport from the center of the

Claim	Oculus DK1 System's Exemplary Disclosures
	stage right beside Beck to the front of the crowd to the outer perimeter with close-ups of the backing bands. Not only did Oculus make me feel present, I felt omnipresent. And that's where virtual reality's opportunity to evolve performance art lies — in its ability to let us be both anywhere and anyone." *See* How Oculus And 8 Fake Ears Could Morph Concerts Into Video Games (April 13, 2014).[150] In addition, wearable electronic devices capable of "captur[ing] a binaural voice" were disclosed as early as 2010. For example, the Gamper AAR System (identified in Defendants' Invalidity Contentions and described in Exhibit C-16) included the MARA Headset earphones and was capable of "captur[ing] a binaural voice. A person of ordinary skill in the art would have understood that the Gamper AAR System and/or MARA Headset can be used with the Oculus DK1 System in the same way as earphones (3), described above. As another example, the Roland CS-10EM earphones described above can be used for "binaural recording," and was available as early as 2010.[151] To the extent Plaintiff argues that the Oculus DK1 System does not disclose this limitation, either expressly, implicitly, and/or by inherency, a person of ordinary skill in the art would have determined that the limitation would have been obvious in light of the Oculus DK1 System alone or in combination with any applicant admitted prior art, the knowledge of one of ordinary skill in the art, or any one or more of the references identified in Meta's Invalidity Contentions under Sections IV.J.2, 10 and 11 for at least the reasons stated in Meta's Invalidity Contentions cover pleading. *See, e.g.*, **Billinghurst 1998** at 4 ("With this display configuration a wearable conferencing space

[150] *Id.*

[151] *See* https://web.archive.org/web/20140410092739/http:/www.roland.com/products/en/CS-10EM; https://www.amazon.com/Roland-CS-10EM-In-Ear-Monitors/dp/B003QGPCTE (listing "Date First Available" as "April 21, 2010"); *see also, e.g.*, Soundman OKM II Binaural Stereo Microphone Headset (May 2001), https://www.soundonsound.com/reviews/soundman-okm-ii; My Soundman OKM II Classic Binaural Microphone and Dummy Head Has Arrived (July 16, 2013), https://www.asmrhq.com/my-soundman-okm-ii-classic-binaural-microphone-and-dummy-head-has-arrived-my-review/.

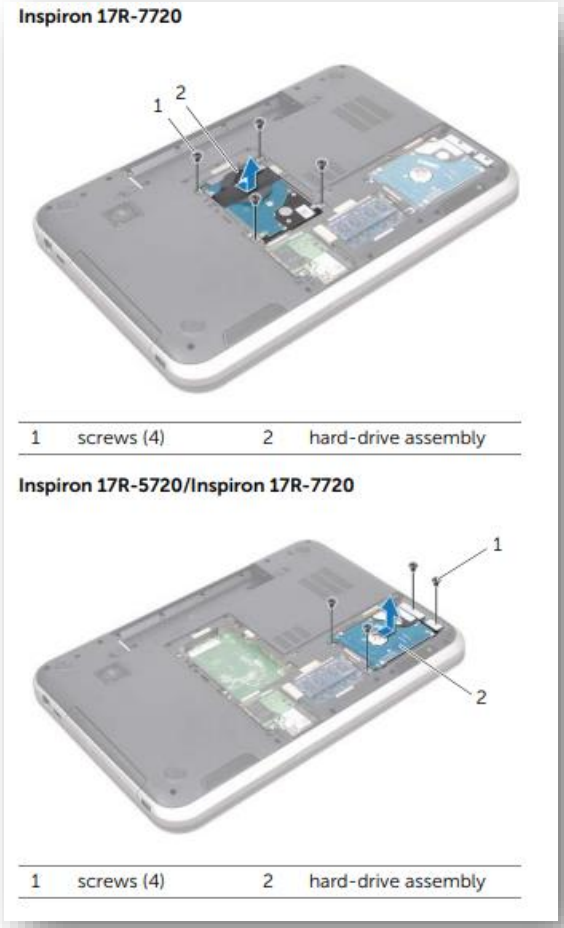
Claim	Oculus DK1 System's Exemplary Disclosures
	could be created that allows remote collaborators appear as virtual avatars distributed about the user (figure 2.0). The avatars could be live video streams and as they speak their audio streams spatialized in real time so that they appear to emit from the corresponding avatar."), 5 ("The wearable interface also supports 3D spatialized Internet telephony. When users connect to the conferencing space their audio is broadcast to all the other users in the space."); **Haddick 248** at [00636] ("An image of the wearer 1512AA may then be displayed on the display area 1518AA of the eyepiece and transmitted to others on the videoconference, such as along with the images 1514AA of other participants on the videoconference call."), [00662] ("The indicator may be an icon, a picture, a color, symbol, a blinking object, and the like, and indicate an alert, an email arriving, an incoming phone call, a calendar event, an internal or external processing facility that requires attention from the user, and the like."), [00731] ("In embodiments, the eyepiece may provide for an interface to accept wireless streaming media (e.g. video, audio, text messaging, phone call and calendar alerts) from an external facility, such as a smart phone, a tablet, a personal computer, an entertainment device, a portable music and video device, a home theater system, a home entertainment system, another eyepiece, and the like."), [001179] ("FIG. 156 is an illustration of a head mounted display device 15600 with see-through capabilities. The head mounted display device 15600 includes see-through displays 15602, one or more cameras 15604 and electronics 15608, wherein the electronics 15608 can include one or more of the following: a processor, a battery, a global positioning sensor (GPS), a direction sensor, data storage, a wireless communication system and a user interface."), [00637], [00730], [00822], [00995], Figs. 7, 15AA; **Jarvinen** at 26:30-37 ("For purposes of illustration and not of limitation, consider an example in which a user is participating in a teleconference or listening to music. In this example, presume that Peter (e.g., a fictitious person) is participating in a spatial audio teleconference (or is listening to music) using a smartphone (e.g., apparatus 50) with a headset/headphones while Anna (e.g., another fictitious person) suddenly enters the room."); **Pedersen** at 13:14-24 ("The upper part of FIG. 1 schematically illustrates a meeting in which one of the participants 100 uses a new hearing device system (not visible) comprising a binaural hearing aid (not visible) and his or her smartphone 110 controlling the binaural hearing aid and illustrated in the lower part of FIG. 1. The other meeting participants 102, 104, 106 wear spouse microphones (not visible) that transmit speech from the respective meeting participants to the binaural hearing aid of participant 100. Further, a participant in a remote location also participates in the meeting using a teleconference system (not shown)."); **Boustead** at 7:14-20 ("The conference server 110 may e.g. be an

Claim	Oculus DK1 System's Exemplary Disclosures
	application server of an audio conference service provider within a telecommunication network. The terminals 120 may e.g. be computing devices, such as laptop computers, desktop computers, tablet computers, and/or smartphones; as well as telephones, such as mobile telephones, cordless telephones, desktop handsets, etc."); **Bedingfield** at 3:25-32 ("An improved telephone or network-based communication system may more closely simulate an in-person conference setting. For example, a communication system may provide multi-channel sound to a listener by modifying a single channel signal provided by another participant's system. To further enhance the listener's experience, the communication system may assign each participant a virtual position within a virtual sound field."); **Nystrom** at 5:27-34 ("User device 204 may include any of the following devices to which earphones may be attached (e.g., via a headphone jack): a personal computer; a tablet computer; a cellular or mobile telephone; a smart phone; a laptop computer; a personal communications system (PCS) terminal that may combine a cellular telephone with data processing, facsimile, and/or data communications capabilities; a personal digital assistant (PDA) that includes a telephone . . ."), 5:38-39 ("Via user device 204, a user may place a telephone call, text message another user, send an email, etc."); **Ballas 439** at 1:42-58 ("Possible applications of spatial audio processing techniques include: . . . teleconferencing and telepresence applications; virtual and augmented reality environments"); **Craner** at 4:18-21 ("Voices are projected over the voice-projecting device in a manner that can be heard by a listener, whether the voice-projecting device includes a telephone, audio system, personal speaker system, or some other system."), 4:58-64 ("The voice capture device 14 (or a plurality of voice capture devices) is configured to capture voices from one or more talkers, and transmit the voices as voice information over the network to the voice-projecting device 23. The voice capture device and the associated voice projecting device 23 may be as simple as a telephone or stereo phone or, alternatively, may be as complex as a teleconferencing system with video, audio, and data communications."), 17:12-17 ("In voice/video teleconferencing applications, spatialization provided by at least two-dimensional spatialization equipment processing at both the voice capture device 300 and the voice-projecting device 400 allows for the relative locations of the different talkers to be accurately reflected (both in voice and in video) to the listener."); **Gardner** at 3:16-18 ("More generally, the present invention relates to audio teleconferencing systems that recreate a sound-field effect of participants in a shared acoustical space."), 11:59-63 ("The server 900 can receive calls from telephones if it is equipped with one or more line interface devices (LIDs), which connect the server to the public switched telephone network (PSTN) 922. FIG.9B shows how a telephone client 920 can connect to the

Claim	Oculus DK1 System's Exemplary Disclosures
	server 900."), 13:55-58 ("As shown in FIG. 9C, the spatializing server 900 can receive calls from telephones if it is equipped with one or more LIDS 925 which connect the server 900 to the PSTN 922."); **Andrea** at 2:37-40 ("A further object of the invention is to provide for a stereo headset or stereo earbuds with an integrated array of microphones utilizing an adaptive beam forming algorithm."), 10:35-50 ("The invention according to an embodiment may be an integrated headset system 200, a highly directional stereo array microphone with reception beam angle pointed forward from the ear phone to the corner of a user's mouth, as shown in FIG. 8. As shown in FIG. 8, headset system 200 is a circumaural headset. In some embodiments, a supra-aural headset using headphones 302 (shown in FIGS. 12 a-b), earbuds 303 (shown in FIG. 13), and/or one or more earphones may be utilized. The pick-up angles or the angles in which the microphones 250 pick up sound from a sound source 210 is shown in FIG. 9(d), for example, in front of the array, while cancellation of all sounds occurs from side and back directions. Different views of this pick-up 'area' 220 are shown in FIGS. 9(a)-9(c). Cancellation is approximately 30 dB of noise, including speech noise."), 14:44-61 ("As noted above, in one embodiment, the audio transmitting/receiving device may be, for example, a pair of earbuds. In this embodiment, each earbud may include one or more audio receiving means (e.g., microphone(s)). Positioning audio receiving means on each earbud creates a dual-channel audio reception device that may be used to create desirable audio effects. For example, this embodiment may be advantageously used to produce a surround sound effect. Such a surround sound effect is made possible by virtue of the audio receiving devices being positioned on each side a user's head during operation. While a user is wearing the earbuds, the audio receiving means on each earbud may pick up the same sound emanating from a single sound source (i.e., the respective audio receiving means may create a binaural recording). Because of the spatial discrepancy between each of the audio receiving means, a distinct audio signal may be produced in each of the channels corresponding to the same sound."), Figs. 2, 8, 9(a)-(d), 12(a)-(b), 13, 28; **Bedingfield** at 4:7-12 ("Therefore, the multi-channel audio communication system may render single channel sound detected by a speaker's microphone into a synthetic audio placement allowing a listener to sense the location (within the sound field) of the speaker through the modified audio signal presented to the listener."), 4:25-30 ("Each participant 104,106, 108 may have a communication device 110, 112, 114, respectively. The communication devices 110, 112, 114 may be telephones, wireless phones, mobile phones, two-way voice devices, walkie-talkies, voice-over-IP (VoIP) devices, microphones, or other communication devices that permit multi-directional communication over a communication system 116"); **Flaks 968** at 4:21-26 ("In some

Claim	Oculus DK1 System's Exemplary Disclosures
	embodiments, the user "wears" one or more microphones 31, which may be used by the system 10 to determine acoustic properties of the room to provide a more realistic 3D audio signal. In this example, the microphones 31 are located on the headphones 27, but the user could "wear" the microphones 31 in another location. In some embodiments, the user "wears" one or more inertial sensors 38, which may be used by the system 10 to determine location and rotation of the listener 8. In this example, the inertial sensor 38 is located on the user's head but the user could "wear" the inertial sensor 38 in another location. For example, the inertial sensor 38 could be integrated into the headphones 27. In some embodiments, the user 8 may carry a camera, which may be used to provide the system 10 with depth and/or RGB information similar to that generated by the depth camera system 20."); **Pedersen** at 18:32-43 ("In FIGS. 2, 3, and 4, the dashed lines indicate the housings of the first and second hearing aids 10A, 10B accommodating the components of the binaural hearing aid 10A, 10B. Each of the housings accommodates the one or more microphones 12A, 12B for reception of sound at the respective ear of the user for which the respective hearing aid 10A, 10B is intended for performing hearing loss compensation, and the respective receiver 42A, 42B for conversion of the respective output signal 40A, 40B of the signal processor 18 into acoustic signals for transmission towards eardrum of the respective one of the right and left ears of the user."), Figs. 2, 3, and 4; **Hammershoi** at [0033] ("The system may further include first and second microphones arranged for position at ear canal reference points for the binaural audio data. The first and second microphones are preferably arranged for position at entrances to the respective ears of the listener. The first and second microphones are preferably included in respective first and second earphone parts arranged for position in respective ears of the listener."); **Curry** at 3:51-57 ("FIG. 1 shows a schematic of a spatial sound conference system using a dummy head in a conference room that transmits spatial sound to a participant at a remote location across ISDN facilities. Inside conference room station 100 is a dummy head 101 having at least two spatially disposed microphones 103, 105 placed at the right and left ear locations."); **Knappe** at 3:47-52 ("Microphones 20L and 20R simultaneously capture the sound field produced at two spatially separated locations when B1, B2, or B3 talk, translate the captured sound field to electrical signals, and transmit those signals over left and right capture channels 22L and 22R. Capture channels 22L and 22R carry the signals to encoder 24."), Fig. 1; **Li 305** at 4:6-16 ("The microphone is positioned in an ear canal of each of the ears of the simulator apparatus. The 3D sound processing application is executable by at least one processor configured to measure head related transfer functions, to simultaneously generate configurable three-dimensional (3D) sounds in communication with a

Claim	Oculus DK1 System's Exemplary Disclosures
	microphone array system, to simultaneously generate configurable 3D sounds using pre-recorded sound tracks and pre-recorded stereo sound tracks, to generate a configurable 3D binaural sound from a stereo sound or a multi-channel sound, and to generate a configurable 3D surround sound."); **Bradski 253** at [0214] ("As shown in FIG. 4A, a user 60 of a head-mounted augmented reality system ("AR system") is depicted wearing a frame 64 structure coupled to a display system 62 positioned in front of the eyes of the user. A speaker 66 is coupled to the frame 64 in the depicted configuration and positioned adjacent the ear canal of the user 60 (in one embodiment, another speaker, not shown, is positioned adjacent the other ear canal of the user to provide for stereo/shapeable sound control). The display 62 is operatively coupled 68, such as by a wired lead or wireless connectivity, to a local processing and data module 70 which may be mounted in a variety of configurations, such as fixedly attached to the frame 64, fixedly attached to a helmet or hat 80 as shown in the embodiment of FIG. 4B, embedded in headphones, removably attached to the torso 82 of the user 60 in a configuration (e.g., placed in a backpack (not shown)) as shown in the embodiment of FIG. 4C, or removably attached to the hip 84 of the user 60 in a belt-coupling style configuration as shown in the embodiment of FIG. 4D.").
15[c]. a memory that stores instructions; and	The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "a memory that stores instructions" as embodied in the product itself and as reflected in other prior art references that describe it. *See* disclosures and cited evidence for limitation 8[pre]. For example: A POSA would have been aware that, prior to any date to which the '090 Patent can claim priority, computers commonly include a "memory" and the "memory" would execute computer instructions. For example, the exemplary Dell Inspiron 7720 includes a hard drive:

Claim	Oculus DK1 System's Exemplary Disclosures
	 Inspiron 17R-7720 1 screws (4) 2 hard-drive assembly Inspiron 17R-5720/Inspiron 17R-7720 1 screws (4) 2 hard-drive assembly *See* Owner's Manual for Dell Inspiron 7720 (2012).[152]

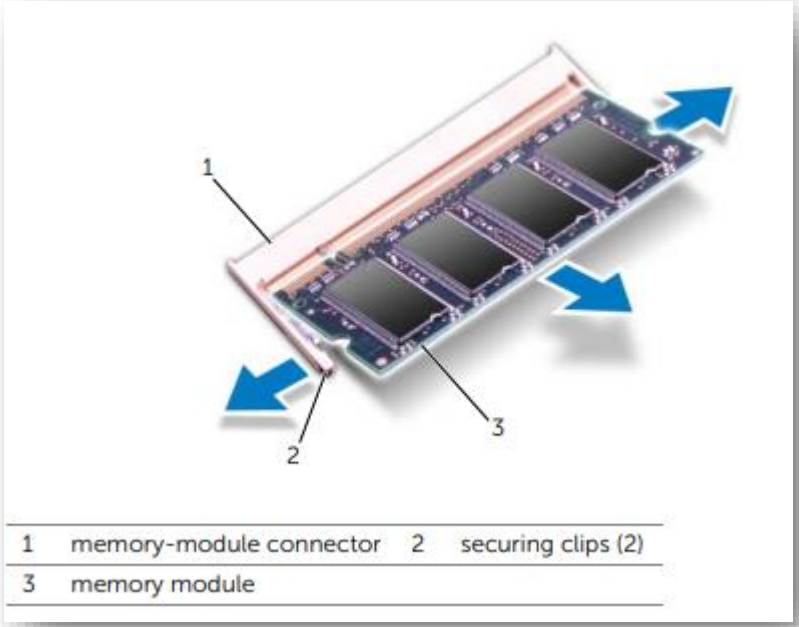
[152] META-8KHZ_00047873

Claim	Oculus DK1 System's Exemplary Disclosures
	 See photograph of an exemplary Oculus DK1 System.[153] The exemplary Dell Inspiron 7720 also includes RAM memory:

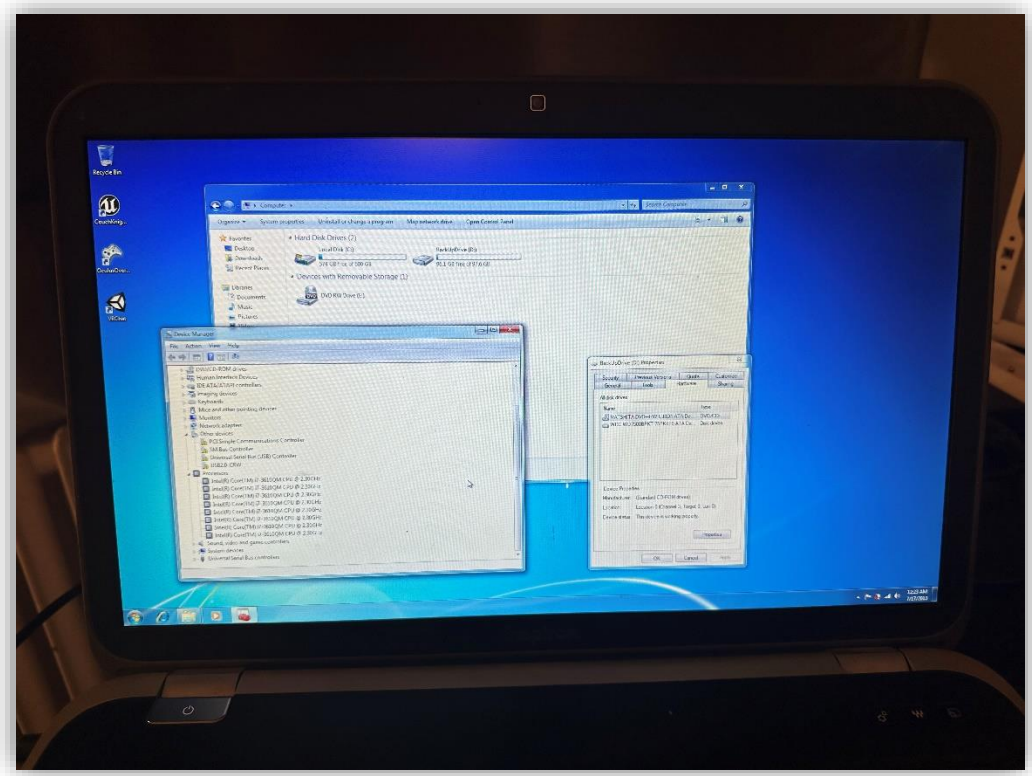
[153] META-8KHZ_00047842

Claim	Oculus DK1 System's Exemplary Disclosures
	Memory Connectors: two internally-accessible DDR3 SODIMM sockets Capacities: 2 GB and 4 GB Minimum memory: 2 GB Maximum memory: 4 GB Memory type: 1333/1600 MHz DDR3 SODIMM Memory configurations supported: 2 GB, 4 GB, 6 GB, and 8 GB *See* Specification Sheet for Dell Inspiron 7720 (2013) (showing 1333/1600 MHz DDR3 SODIMM RAM memory).[154]

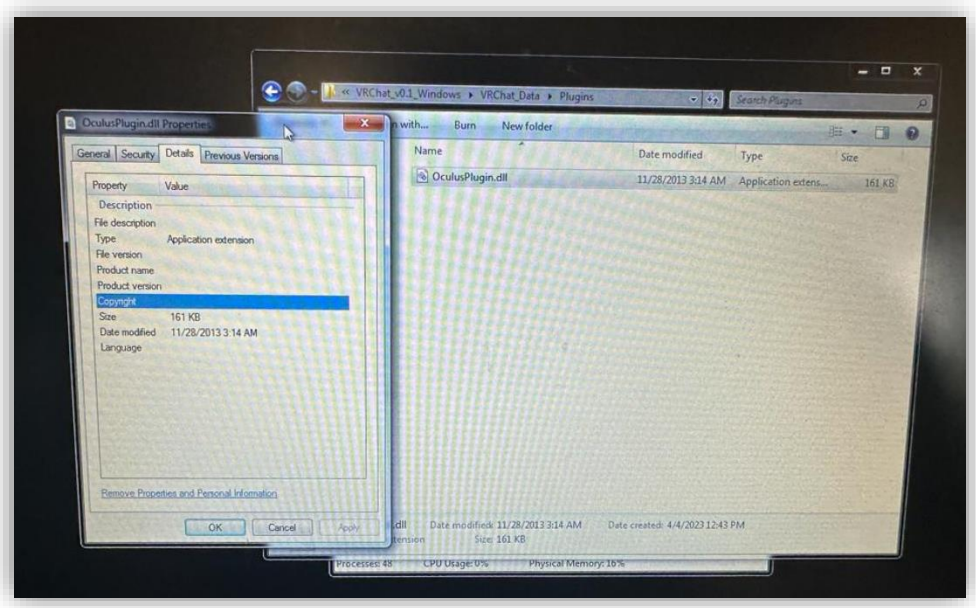
[154] META-8KHZ_00045115

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* Owner's Manual for Dell Inspiron 7720 (2012).[155] The hard drive on the Dell Inspiron 7720 stores "instructions" that allows the computer to operate, for example, the Windows 7 operating system. Applications such as Couch Knights, Oculus Overlay, SecondLife, VRChat, and others are also "instructions," and would be stored on the hard drive of the computer.

[155] META-8KHZ_00047873

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System.[156]

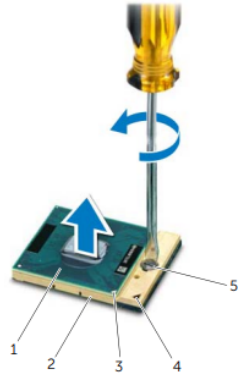
[156] META-8KHZ_00047841

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* photograph of an exemplary Oculus DK1 System (storing VRChat application).[157]
15[d]. a processor that executes the instructions to adjust the binaural voice of the second person during the electronic phone call in order to position a sound localization point of the binaural voice to a location that is away from and proximate to the first person, wherein the sound	The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "a processor that executes the instructions to adjust the binaural voice of the second person during the electronic phone call in order to position a sound localization point of the binaural voice to a location that is away from and proximate to the first person, wherein the sound localization point represents an origin of the binaural voice of the second person to the first person" as embodied in the product itself and as reflected in other prior art references that describe it. *See* disclosures and evidence cited for limitations 8[a], 8[b], 8[d], 14[a], and 15[b]. For example: The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "a processor that executes" instructions:

[157] META-8KHZ_00046193

Claim	Oculus DK1 System's Exemplary Disclosures
localization point represents an origin of the binaural voice of the second person to the first person.	A POSA would have been aware that, prior to any date to which the '090 Patent can claim priority, computers commonly include a "processor" and the "processor" would execute computer instructions. As one example, the exemplary Dell Inspiron 7720 includes a processor: **System information** Computer Model: Inspiron 17R-5720, Inspiron 17R-7720 Processor: Intel Pentium dual core, Intel Core i3, Intel Core i5, Intel Core i7 System chipset: Intel HM77 chipset *See* Specification Sheet for Dell Inspiron 7720 (2013) (showing Intel processors).[158]

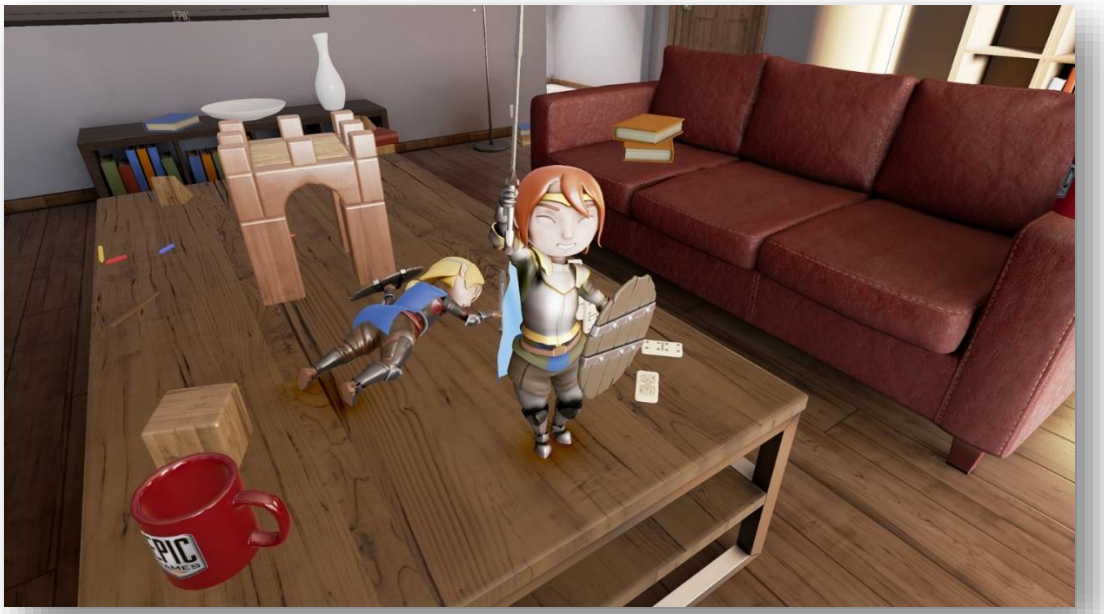
[158] META-8KHZ_00045115

Claim	Oculus DK1 System's Exemplary Disclosures
	Procedure 1 To loosen the ZIF socket, use a small, flat-blade screwdriver and rotate the ZIF-socket cam screw counterclockwise until it comes to the cam stop. △ **CAUTION: To ensure maximum cooling for the processor, do not touch the heat transfer areas on the processor thermal cooling assembly. The oils in your skin can reduce the heat transfer capability of the thermal pads.** △ **CAUTION: When removing the processor module, pull the module straight up. Be careful not to bend the pins on the processor module.** 2 Lift the processor module from the ZIF socket.  1 processor; 2 ZIF socket 3 processor pin-1 corner; 4 ZIF-socket pin-1 corner 5 ZIF-socket cam screw *See* Owner's Manual for Dell Inspiron 7720 (2012).[159] The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "adjust[ing] the binaural voice of the second person during the electronic phone call in order to position a sound localization point of the binaural voice to a location that is away from and

[159] META-8KHZ_00047873

Claim	Oculus DK1 System's Exemplary Disclosures
	proximate to the first person." *See* disclosures and cited evidence for limitations 8[a], 8[b], 8[d], 14[a], and 15[b]. For example: In applications like VRChat, the avatar for the "second person" includes "a sound localization point." As shown below, when the "second person" is speaking ("binaural voice") their nametag in virtual world will turn red. Thus, the "binaural voice" is "adjust[ed]" to be located at the SLP. *See* photograph of an exemplary Oculus DK1 System (showing nametag in red).[160] When the first person turns their head, the voice of the second person is "adjust[ed]" to continue to appear to originate from the second person's avatar. If the second person moves their avatar, the

[160] META-8KHZ_00046187; *see also* META-8KHZ_00046233; META-8KHZ_00046188; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU

Claim	Oculus DK1 System's Exemplary Disclosures
	second person's "binaural voice" will be adjusted to position the SLP of their avatar at the location the avatar moves to, which is "away from and proximate to the first person." In applications like Couch Knights, the knight character for the "second person" includes a "sound localization point."  *See* picture of an exemplary Couch Knights application (showing knight characters that produce sound, such as footsteps and sword swings).[161]

[161] https://www.unrealengine.com/marketplace/en-US/product/couch-knights. *See also, e.g.*, Couch Knights on Oculus Rift DK1 (July 17, 2014), https://www.youtube.com/watch?v=HcreLAfIqUs; GDC 2014: Oculus Rift DK2 'Couch Knights' Gameplay (March 21, 2014), https://www.youtube.com/watch?v=CoyjO-etC30.

Claim	Oculus DK1 System's Exemplary Disclosures

	When the first person turns their head, the "binaural" sounds of the knight character of the second person will continue to appear to originate from the second person's knight character. If the second person moves their knight character, the second person's "binaural voice" will be adjusted to position the SLP of their knight character at the location the avatar moves to, which is "away from and proximate to the first person."[162]
	
	In applications like SecondLife, the avatar for the "second person" includes "a sound localization point." Virtual objects also include "a sound localization point." For example, the documentation for the SecondLife application explains that "sound clips" can be "attached" to virtual objects.
	
	Scripting comments
	
	Sound clips
	• llTriggerSound()
	  • Unattached - sounds occur where they're triggered.
	  • Cannot be stopped with llStopSound().
	• llPlaySound()
	  • Attached - sounds follow the object they are in if it moves.
	  • Only one at a time per prim. Playing another will stop the current sound.
	• llLoopSound()
	  • Attached - sounds follow the object they are in if it moves.
	  • This continuously loops the sound.
	  • Only one at a time per prim. Playing another will stop the current sound.

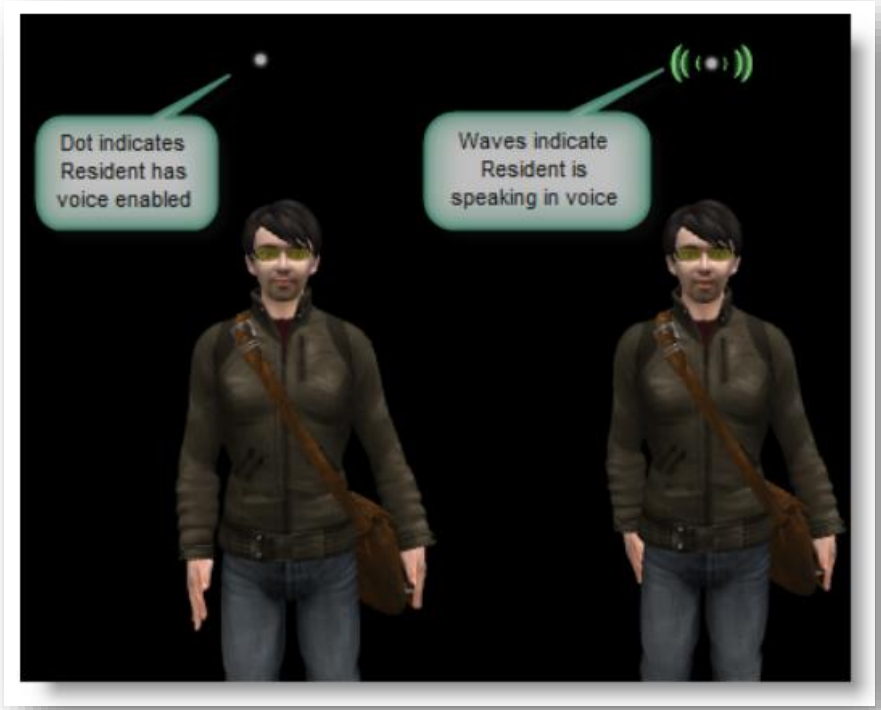
[162] *See, e.g.*, https://www.youtube.com/watch?v=-ntcmcBGTvE (showing a first and second individuals' knight characters making sound).

Claim	Oculus DK1 System's Exemplary Disclosures
	See SecondLife Wiki – Environment Sounds (Revision as of 20:11, July 15, 2012).[163] As explained above, applications like SecondLife include other persons, and "[y]ou can talk to the people around you through text-based Local Chat. If you have a microphone, you can also speak out loud using inworld voice."[164] An example of a "second person," in the form of a SecondLife "resident" (or user), is shown below. This SecondLife avatar has a "voice chat feature that lets avatars speak."[165]

[163] https://wiki.secondlife.com/w/index.php?title=Environment_Sounds&direction=prev&oldid=1195319.

[164] *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010) at https://wiki.secondlife.com/wiki/Viewer_2_Quick_Start_Guide/Local_chat_and_voice.

[165] *See* SecondLife Wiki – Lip Sync (last edited on October 13, 2009) at https://wiki.secondlife.com/wiki/Lip_sync.

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See* Viewer 2 Quick Start Guide/Local chat and voice (February 23, 2010). The "first person" can "hear voice chat" either from the camera position or from the avatar position.

Claim	Oculus DK1 System's Exemplary Disclosures
	  See SecondLife Tutorial Video – Voice Chat Getting Started (November 14, 2008).[166] The audio for other residents in applications like SecondLife is spatialized. For example, the SecondLife documentation describes a "Voice Test" where "5 testers" "Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction." Then arrange themselves so that "4 testers [are] around one tester at north, south, east and west." This test is used to "verify [that] each tester sounds like their voice is coming from their position inworld" and that "everyone sound like they are in the right place spatially."

[166] https://wiki.secondlife.com/wiki/Video_Tutorials/More; *see also* http://vidtuts.s3.amazonaws.com/VOICE-CHAT-Getting-started.mp4.

Claim	Oculus DK1 System's Exemplary Disclosures

	Voice Test
	VERSION 0.1
	LENGTH 00:00
	TESTERS 5
	OVERVIEW Coming
	SETUP Up to 5 normal users, (can be done with 2)
	
	Spatial sound testing with gathered groups
	• Setup: Have each of 5 testers do the following: Edit > Preferences > Voice Chat > [x] Enable voice chat, Hear voice at: Avatar position, camera direction.
	• Arrange 4 testers around one tester at north, south, east and west, like this:
	<tab> . Tester N . Tester W Tester C Tester E . Tester S . </tab>
	• Tester C: Face Tester N.
	• Cardinal Testers: Speak one at a time starting with Tester N and going clockwise around Tester C (N followed by E followed by S followed by W).
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Rotate your avatar to face Tester S.
	• Cardinal Testers, repeat the round robin above, starting with Tester S.
	• Tester C: Without moving, verify each tester sounds like their voice is coming from their position inworld.
	• Tester C: Alt-Zoom on something out of range of the testers.
	* ...
	• Group in a circle
	  • Does everyone sound like they are in the right place spatially?
	  • If someone moves away, do they get quieter?
	• Group with members behind you
	  • Can you hear all members, including those behind you?
	
	See SecondLife Wiki – Voice Test (November 26, 2007).[167]
	
	The SecondLife documentation also explains that "3D position" is used by the *Session.Set3Dposition.1* method for both the "speaker and listener" and that *Session.Set3Dposition.1* "describes the speaking position and the listening position for this avatar."

[167] https://wiki.secondlife.com/wiki/Voice_Test.

Session.Set3DPosition.1

When sending a 3D position for speaker and listener, the "listener" is either the avatar position or the camera position. That is, it describes the speaking position and the listening position for this avatar.

```
<Request requestId="114" action="Session.Set3DPosition.1">
    <SessionHandle>c1_m1000abcdefghijklmnopqrstuvwxy1</SessionHandle>
    <OrientationType>legacy</OrientationType>
    <SpeakerPosition>
        <Position>
            <X>261451</X>
            <Y>26.9568</Y>
            <Z>-283000</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.816965</X>
            <Y>0</Y>
            <Z>0.576688</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.576688</X>
            <Y>0</Y>
            <Z>-0.816965</Z>
        </LeftOrientation>
    </SpeakerPosition>
    <ListenerPosition>
        <Position>
            <X>261448</X>
            <Y>27.9639</Y>
            <Z>-283001</Z>
        </Position>
        <Velocity>
            <X>0</X>
            <Y>0</Y>
            <Z>0</Z>
        </Velocity>
        <AtOrientation>
            <X>0.795791</X>
            <Y>0</Y>
            <Z>0.559283</Z>
        </AtOrientation>
        <UpOrientation>
            <X>0</X>
            <Y>1</Y>
            <Z>0</Z>
        </UpOrientation>
        <LeftOrientation>
            <X>0.574999</X>
            <Y>0</Y>
            <Z>-0.818154</Z>
        </LeftOrientation>
    </ListenerPosition>
</Request>
```

The viewer doesn't get a response

Claim	Oculus DK1 System's Exemplary Disclosures
	See SecondLife Wiki – Voice/Technical (November 18, 2009).[168] When the first person turns their head, the voice of the second person is "adjust[ed]" to continue to appear to originate from the second person's avatar. If the second person moves their avatar, the second person's "binaural voice" will be adjusted to position the SLP of their avataother in environments they have made themselves. The software has made it easy for developers to add more than one user to any video game or other application, provided they are of the Unity-developed environments. The software used by the developers takes its cues from an amalgamation of different things: head gaze direction, body gestures and ***3D positional audio*** to do its best to develop an immersive, fun social experience for all users involved." *See* VR Chat Releasing for Oculus Rift (December 2, 2014).[169] For example, the VRChat development diary explains that, in 2014, the developer used "two libraries" in addition to Unity3D: "Tnet (for networking) and Uspeak (for voicechat)," which were used with "a sweet CoffeeShop environment on the Unity Asset Store."[170] Uspeak includes "[s]patial audio support" for voice chat that provided "directional audio for a truly immersive experience."[171] As early as 2011, Unity included ITDs, for example as shown in the "Procedural Audio and Binauralisation in Unity's Bootcamp Demo (v 1.0)" as shown below:

[168] https://wiki.secondlife.com/wiki/Voice/Technical#Session.Set3DPosition.1.

[169] https://virtualrealitytimes.com/2014/12/02/vr-chat-releasing-for-oculus-rift/; *see also* VRChat now in Oculus Rift app store (December 3, 2014) https://www.hypergridbusiness.com/2014/12/vrchat-now-in-oculus-rift-app-store/; Oculus Rift DK1 - VRChat 0.1 (1080p) (January 16, 2014) https://www.youtube.com/watch?v=z9PgdBYLbLU; VRChat v0.1 Released https://www.reddit.com/r/oculus/comments/1vcbwk/vrchat_v01_released/.

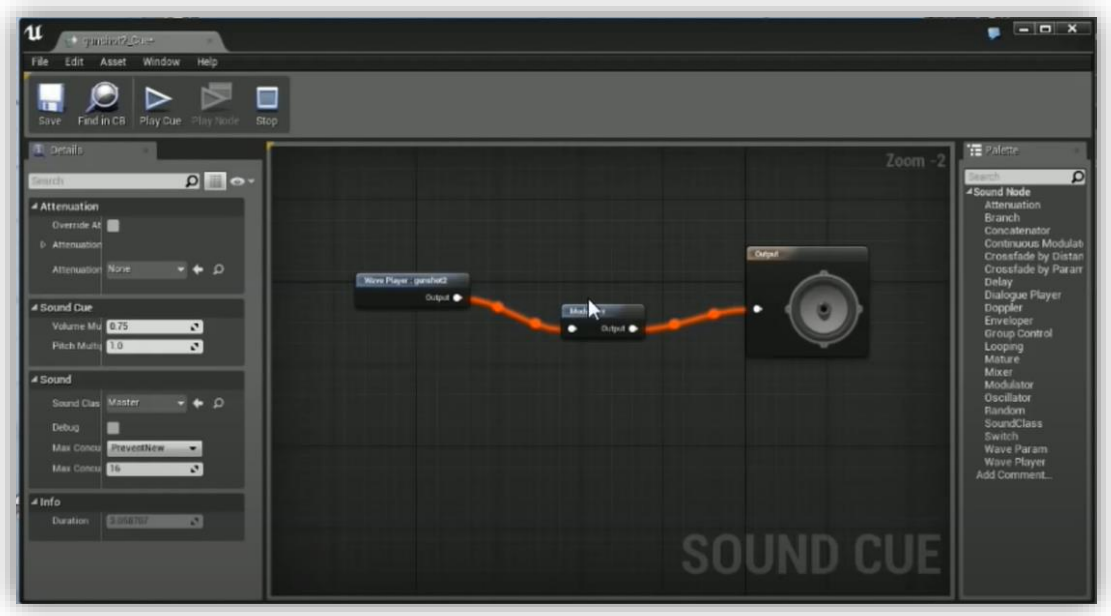
[170] VRChat v0.1 Development, https://web.archive.org/web/20140121030858/http://grahamgaylor.com/2014/01/; *see also* https://web.archive.org/web/20140511130557/http://grahamgaylor.com/category/vrchat/

[171] *See* [RELEASED] USpeak Voice Chat – Voice Chat For All Your Multiplayer Games, https://forum.unity.com/threads/released-uspeak-voice-chat-voice-chat-for-all-your-multiplayer-games.154609/ (last edited November 17, 2013).

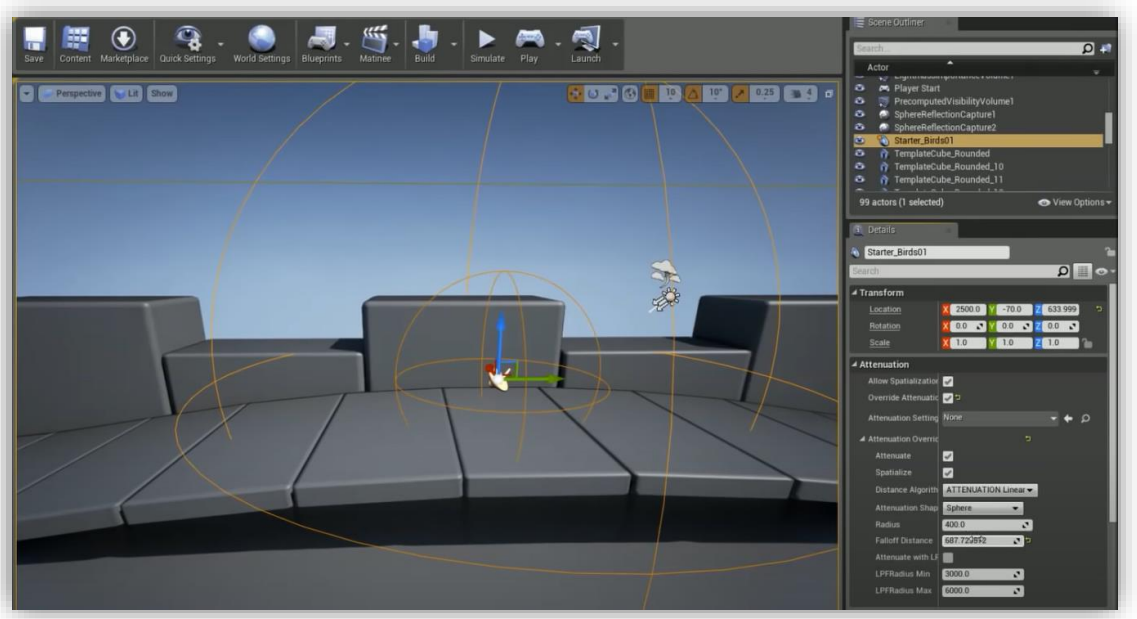
Claim	Oculus DK1 System's Exemplary Disclosures
	  See Procedural Audio and Binauralisation in Unity's Bootcamp Demo (v 1.0) (Aug. 15, 2011).[172] Likewise, the Couch Knights application was developed using Unreal Engine 4.[173] Unreal Engine includes "Sound Node[s]" for game objects that allowed for spatialization of the object's audio.

[172] https://www.youtube.com/watch?v=sQlKPaKNCPY

[173] *See* Couch Knights is a UE4 developed Oculus Rift title from Epic (March 19, 2014) https://www.vg247.com/couch-knight-is-a-ue4-developed-oculus-rift-title-from-epic

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See, e.g.*, Unreal Engine 4 Tutorial – Sound Cues at 1:39.[174]

[174] https://www.youtube.com/watch?v=rZhrjHSN_II (showing attenuation option for "Sound Node" in Unreal Engine 4).

Claim	Oculus DK1 System's Exemplary Disclosures
	 *See also, e.g.*, Unreal Engine 4 Tutorial – Ambient Audio (Basic!) at 1:06.[175] Additionally, the audio for other residents in applications like SecondLife is spatialized, as described above. In addition, teleconferencing application applications with spatialized audio, such as vSpace, allowed users to connect to teleconferences using a phone:[176] In vSpace, "[p]articipants using vSpace will hear [the phone user] localized."[177] For example, a person of ordinary skill in the art would have understood that a first person wearing the Oculus DK1 headset and earphones while

[175] https://www.youtube.com/watch?v=qtgY7esjB6I (showing attenuation and "Allow Spatialization" options).

[176] https://web.archive.org/web/20110828133313/http://www.vspace.net/faq

[177] https://web.archive.org/web/20110828133313/http://www.vspace.net/faq

Claim	Oculus DK1 System's Exemplary Disclosures
	using the vSpace application to participate in a call on the exemplary Inspiron 7720 would hear the "localized" voice of a second person connected to the same call using a phone and wearing earphones connected to that phone. In addition, applications allowed two users to directly connect to each other over a call prior to any date to which the '090 Patent can claim priority. For example, the Skype application, which can be run on a Windows computer[178], supported one-to-one, or peer-to-peer, calls.[179] A person of ordinary skill in the art would have understood that the Oculus DK1 System could be used with the Skype application to perform one-to-one, or peer-to-peer, calls between only two individuals and could be displayed on the Oculus DK1 headset using Oculus Overlay. A person of ordinary skill in the art would also have found it obvious to combine the spatialized audio of the vSpace application with the peer-to-peer calls of the Skype application. A person of ordinary skill in the art would also have found it obvious to incorporate one-to-one, or peer-to-peer, calls between two individuals into other applications, such as VRChat, SecondLife, and/or Couch Knights. The Oculus DK1 System discloses and/or renders obvious, alone or in combination with other prior art, "wherein the sound localization point represents an origin of the binaural voice of the second person to the first person," as explained above. *See* disclosures and cited evidence for limitation 8[b] and 15[b]. To the extent Plaintiff argues that the Oculus DK1 System does not disclose this limitation, either expressly, implicitly, and/or by inherency, a person of ordinary skill in the art would have determined that the limitation would have been obvious in light of the Oculus DK1 System alone or in combination with any applicant admitted prior art, the knowledge of one of ordinary skill in the

[178] *See* https://web.archive.org/web/20140209181315/https://support.skype.com/en/faq/FA10328/what-are-the-system-requirements-for-skype (February 9, 2014) (supports, for example, Windows Vista, Windows 7, and Windows 8).

[179] *See* https://web.archive.org/web/20140315232126/http://www.skype.com/en/features/ (March 15, 2014) (describing "Skype to Skype calls," "One to one video calls," and calls with phones like "mobiles and landlines"); https://www.computerworld.com/article/2543670/how-dangerous-is-skype.html (March 6, 2007) ("Skype is a peer-to-peer (P2P) application, meaning that users connect to one another directly and not through a central server for communication.").

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	art, or any one or more of the references identified in Meta's Invalidity Contentions under Sections IV.J.10 for at least the reasons stated in Meta's Invalidity Contentions cover pleading. *See, e.g.*, **Billinghurst 1998** at 4 ("With this display configuration a wearable conferencing space could be created that allows remote collaborators appear as virtual avatars distributed about the user (figure 2.0). The avatars could be live video streams and as they speak their audio streams spatialized in real time so that they appear to emit from the corresponding avatar."), 5 ("The wearable interface also supports 3D spatialized Internet telephony. When users connect to the conferencing space their audio is broadcast to all the other users in the space."); **Haddick 248** at [00636] ("An image of the wearer 1512AA may then be displayed on the display area 1518AA of the eyepiece and transmitted to others on the videoconference, such as along with the images 1514AA of other participants on the videoconference call."), [00662] ("The indicator may be an icon, a picture, a color, symbol, a blinking object, and the like, and indicate an alert, an email arriving, an incoming phone call, a calendar event, an internal or external processing facility that requires attention from the user, and the like."), [00731] ("In embodiments, the eyepiece may provide for an interface to accept wireless streaming media (e.g. video, audio, text messaging, phone call and calendar alerts) from an external facility, such as a smart phone, a tablet, a personal computer, an entertainment device, a portable music and video device, a home theater system, a home entertainment system, another eyepiece, and the like."), [00637], [00730], [00822], [00995], Figs. 7, 15AA; **Jarvinen** at 26:30-37 ("For purposes of illustration and not of limitation, consider an example in which a user is participating in a teleconference or listening to music. In this example, presume that Peter (e.g., a fictitious person) is participating in a spatial audio teleconference (or is listening to music) using a smartphone (e.g., apparatus 50) with a headset/headphones while Anna (e.g., another fictitious person) suddenly enters the room."); **Pedersen** at 13:14-24 ("The upper part of FIG. 1 schematically illustrates a meeting in which one of the participants 100 uses a new hearing device system (not visible) comprising a binaural hearing aid (not visible) and his or her smartphone 110 controlling the binaural hearing aid and illustrated in the lower part of FIG. 1. The other meeting participants 102, 104, 106 wear spouse microphones (not visible) that transmit speech from the respective meeting participants to the binaural hearing aid of participant 100. Further, a participant in a remote location also participates in the meeting using a teleconference system (not shown)."); **Boustead** at 7:14-20 ("The conference server 110 may e.g. be an application server of an audio conference service provider within a telecommunication network. The terminals 120 may e.g. be computing devices, such as laptop computers, desktop computers, tablet computers, and/or smartphones; as well as

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	telephones, such as mobile telephones, cordless telephones, desktop handsets, etc."); **Bedingfield** at 3:25-32 ("An improved telephone or network-based communication system may more closely simulate an in-person conference setting. For example, a communication system may provide multi-channel sound to a listener by modifying a single channel signal provided by another participant's system. To further enhance the listener's experience, the communication system may assign each participant a virtual position within a virtual sound field."); **Nystrom** at 5:27-34 ("User device 204 may include any of the following devices to which earphones may be attached (e.g., via a headphone jack): a personal computer; a tablet computer; a cellular or mobile telephone; a smart phone; a laptop computer; a personal communications system (PCS) terminal that may combine a cellular telephone with data processing, facsimile, and/or data communications capabilities; a personal digital assistant (PDA) that includes a telephone . . ."), 5:38-39 ("Via user device 204, a user may place a telephone call, text message another user, send an email, etc."); **Ballas 439** at 1:42-58 ("Possible applications of spatial audio processing techniques include: . . . teleconferencing and telepresence applications; virtual and augmented reality environments"); **Craner** at 4:18-21 ("Voices are projected over the voice-projecting device in a manner that can be heard by a listener, whether the voice-projecting device includes a telephone, audio system, personal speaker system, or some other system."), 4:58-64 ("The voice capture device 14 (or a plurality of voice capture devices) is configured to capture voices from one or more talkers, and transmit the voices as voice information over the network to the voice-projecting device 23. The voice capture device and the associated voice projecting device 23 may be as simple as a telephone or stereo phone or, alternatively, may be as complex as a teleconferencing system with video, audio, and data communications."), 17:12-17 ("In voice/video teleconferencing applications, spatialization provided by at least two-dimensional spatialization equipment processing at both the voice capture device 300 and the voice-projecting device 400 allows for the relative locations of the different talkers to be accurately reflected (both in voice and in video) to the listener."); **Gardner** at 3:16-18 ("More generally, the present invention relates to audio teleconferencing systems that recreate a sound-field effect of participants in a shared acoustical space."), 11:59-63 ("The server 900 can receive calls from telephones if it is equipped with one or more line interface devices (LIDs), which connect the server to the public switched telephone network (PSTN) 922. FIG.9B shows how a telephone client 920 can connect to the server 900."), 13:55-58 ("As shown in FIG. 9C, the spatializing server 900 can receive calls from telephones if it is equipped with one or more LIDS 925 which connect the server 900 to the PSTN 922.").