

EIGHT KHZ, LLC
v.
META PLATFORMS, INC.; META PLATFORMS TECHNOLOGIES, LLC

Case No. 6:22-cv-00575-ADA

Asserted U.S. Patent No. 10,917,737
“Defining a Zone with a HPED
and Providing Binaural Sound in the Zone”

Plaintiff’s Infringement Contentions
Exhibit 16

March 3, 2023

This claim chart is based on publicly available literature regarding Defendants' products. Plaintiff will be seeking Defendants' internal documentation, including technical documentation such as schematics and datasheets, in discovery and therefore Plaintiff reserves the right to amend or further supplement this claim chart.

The term "Accused Products" herein refers to all products manufactured, used, tested, imported, or sold by or on behalf of Defendants practicing the Asserted Claims of the '737 Patent, and all processes employed by Defendants that practice the Asserted Claims of the '737 Patent, consisting of at least Defendants' products that support Oculus, including by way of example and without limitation the Oculus Quest product lines. On information and belief, such Accused Products include without limitation the following: Oculus Quest, Oculus Quest 2, and Oculus Pro. To the extent Defendants have substituted the name "Meta" or "Reality Labs" for "Oculus" in any of the above products, such products are also included in the Accused Products.

This claim chart specifically addresses infringement of Claims 1, 14, 15 and 16 ("Asserted Claim") of the '737 Patent by Defendants' Oculus Quest product. Defendants' Oculus Quest product is representative of Defendants' infringement of the Asserted Claim. While this chart specifically addresses the functionality of the Oculus Quest, these infringement contentions are illustrative rather than exhaustive and they are representative of, and apply to, all Accused Products based on the fact that all the Accused Products infringe in the same general way.

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

- The Accused Products include one or more electronic devices capable of performing the patented method.
- By way of example, the Quest Pro provides all-in-one virtual reality (VR) through its headset and hand-held controllers. These electronic devices practice the patented method.



Source: <https://www.meta.com/blog/quest/why-im-excited-for-vr-in-2019/>



Source: <https://www.youtube.com/watch?v=ryvsAjCaKKk&t=80s> at 1:20

¹By charting the preamble, we do not concede that the preamble is a limitation and reserve the right to contend that the preamble is not a limitation of the claim.

Claim: 1 – Element (A)

tracking, with a wearable electronic device (WED) worn on a head of a user, movement of a handheld portable electronic device (HPED) held in a hand of the user such that the movement of the HPED defines a size and a shape of a three-dimensional (3D) zone that extends from a physical floor and around the user;

- The Accused Products include a wearable electronic device (WED) in the form of the headset worn on the head of a user.
- The WED tracks the movement of a handheld portable electronic device (HPED), in the form of a hand-held controller, held in the hand of the user such that the movement of the HPED defines a size and a shape of a three-dimensional (3D) zone that extends from a physical floor and around the user.
- As shown to the right, the WED tracks the movement of the HPED as the user defines the zone of play.



Source: <https://www.youtube.com/watch?v=7TFWckMXCWk&t=5s> at 0:22 and 0:25

Claim 1, Element (A) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

Claim: 1 – Element (B)

designating, with the HPED held in the hand of the user, a sound localization point (SLP) in empty space in the zone above the physical floor from where binaural sound originates to the user;

- The Accused Products designate, with the HPED held in the hand of the user, a sound localization point (SLP) in empty space in the zone above the physical floor from where binaural sound originates to the user.
- By way of example only, a virtual image in an environment is shown to the right. This image is taken from a video depicting the user experience with the “Bogo” application.
- In this example, the game character may be moved by direction of the HPED, and the SLP will likewise move along with the corresponding location of the game character.



Source: <https://www.youtube.com/watch?v=sKDXksl7S6o> at 7:04 and 7:37

Claim 1, Element (B) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

Claim: 1 – Element (B)

designating, with the HPED held in the hand of the user, a sound localization point (SLP) in empty space in the zone above the physical floor from where binaural sound originates to the user;

- With the Accused Products, the SLP in empty space in the zone above the physical floor is where binaural sound originates to the user.
- Public literature confirms the Accused Products use of sound localization and 3D audio spatialization.
- Oculus video demo of user throwing a ball where its impact on the walls originates spatial sound.

3D Audio Spatialization

An essential element of VR audio is spatialization: the ability to play a sound as if it is positioned at a specific point in three-dimensional space. Spatial audio is essential to deliver an immersive experience because it provides powerful cues that make the user feel they are actually in the 3D environment.

The Audio Localization page discussed how humans localize audio sources in three dimensions, we will now explore methods to synthesize those localization cues, to produce spatial audio.

The two key components to spatialization are direction and distance, in this guide we'll cover both of these topics, and the technologies which enable them.

Directional Spatialization with Head-Related Transfer Functions (HRTFs)

The sounds we experience are directly impacted by the shape and geometry of our body (especially our ear), as well as direction of the incoming sound. These two elements: our body + the direction of the audio source, form the basis of HRTFs which are filters we use to localize sound.

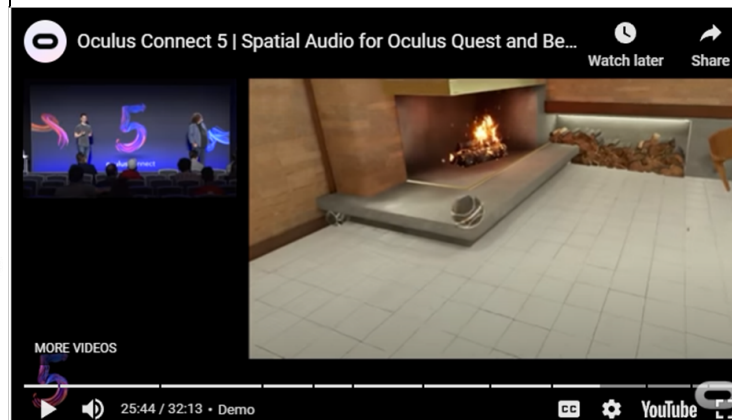
Applying HRTFs

Given an HRTF set, if we know the direction we want a sound to appear to come from, we can select an appropriate HRTF and apply it to the sound. This is usually done either in the form of a time-domain convolution or a frequency domain convolution using FFT. If you don't know what these are, don't worry - those details are only relevant if you are implementing the HRTF system yourself. Our discussion glosses over a lot of the implementation details (e.g., how we store an HRTF, how we use it when processing a sound). For our purposes, what matters is the high-level concept: we are simply filtering an audio signal to make it sound like it's coming from a specific direction.

Since HRTFs take the listener's head geometry into account, it is important to use headphones when performing spatialization. Without headphones, you are effectively applying two HRTFs: the simulated one, and the actual HRTF caused by the geometry of your body.

Source: <https://developer.oculus.com/resources/audio-intro-spatialization/>

Claim 1, Element (B) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.



Source: https://www.meta.com/blog/quest/simulating-dynamic-soundscapes-at-facebook-reality-labs/?utm_source=www.bing.com&utm_medium=oculusredirect

Claim: 1 – Element (C)

tracking, with the WED worn on the head of the user, the HPED held in the hand of the user such that the HPED provides a location to the WED of the SLP in empty space in the zone above the physical floor from where the binaural sound originates to the user;

- The Accused Products track, with the WED, the HPED such that the HPED provides a location to the WED of the SLP in empty space in the zone above the physical floor from where the binaural sound originates to the user.
- In this example, the user may cause the game character to move through movement of the HPED, and the WED will track that movement and provide corresponding movement of the SLP.



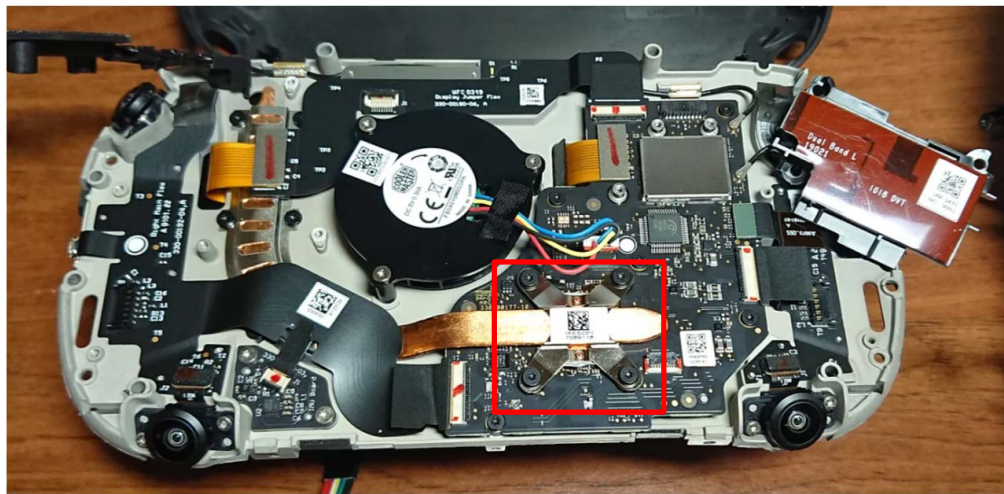
Source: <https://www.youtube.com/watch?v=sKDXksl7S6o> at 7:04 and 7:37

Claim 1, Element (C) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

Claim: 1 – Element (D)

processing, by a processor, sound with head-related transfer functions (HRTFs) to generate the binaural sound that externally localizes to the user at the location of the SLP in empty space in the zone above the physical floor; and

- The Accused Products process, by a processor, sound with head-related transfer functions (HRTFs) to generate the binaural sound that externally localizes to the user at the location of the SLP.
- By way of example, the Quest Pro has 3D spatial audio, including the binaural sound that externally localizes to the user at the location of the SLP.
- By way of further example, the Accused Products also include an integrated DSP chip. The screenshot on the right shows the Snapdragon 835 chip as a component within the Quest.
- Integrated on the Snapdragon 835 chip is the Hexagon 682 DSP and Aqstic audio codec for audio processing

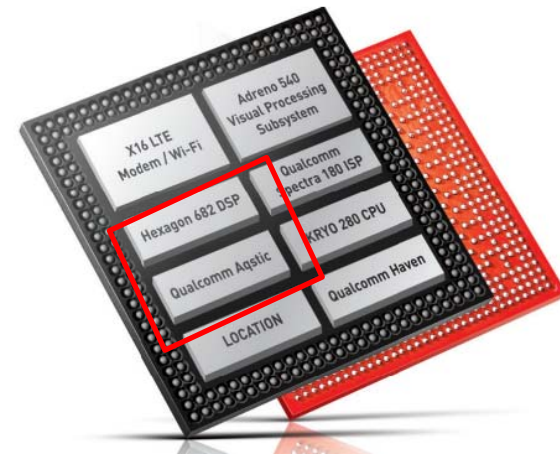


Source: <https://medium.com/badvr/oculus-quest-headset-disassembly-2f404b004a3c>

Oculus Quest VR Headset Specs

SoC	Qualcomm Snapdragon 835
Display	Dual 1440x1600 72Hz OLED panels
IPD Setting	Mechanical IPD adjustment (range undisclosed)
Storage	64GB or 128GB of internal flash storage
Audio	Integrated speakers and microphone, dual 3.5 mm audio jack (one on each side), in-ear headphone accessory available

Source: <https://www.tomshardware.com/reviews/oculus-quest-standalone-vr-system,6110.html>



Source: https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/snapdragon_product_brief_835_0.pdf

Claim 1, Element (D) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

Claim: 1 – Element (D)

processing, by a processor, sound with head-related transfer functions (HRTFs) to generate the binaural sound that externally localizes to the user at the location of the SLP in empty space in the zone above the physical floor; and

- Public literature confirms the Accused Products' use of sound localization and 3D audio spatialization.

3D Audio Spatialization

An essential element of VR audio is spatialization: the ability to play a sound as if it is positioned at a specific point in three-dimensional space. Spatial audio is essential to deliver an immersive experience because it provides powerful cues that make the user feel they are actually in the 3D environment.

The Audio Localization page discussed how humans localize audio sources in three dimensions, we will now explore methods to synthesize those localization cues, to produce spatial audio.

The two key components to spatialization are direction and distance, in this guide we'll cover both of these topics, and the technologies which enable them.

Directional Spatialization with Head-Related Transfer Functions (HRTFs)

The sounds we experience are directly impacted by the shape and geometry of our body (especially our ear), as well as direction of the incoming sound. These two elements: our body + the direction of the audio source, form the basis of HRTFs which are filters we use to localize sound.

Applying HRTFs

Given an HRTF set, if we know the direction we want a sound to appear to come from, we can select an appropriate HRTF and apply it to the sound. This is usually done either in the form of a time-domain convolution or a frequency domain convolution using FFT. If you don't know what these are, don't worry - those details are only relevant if you are implementing the HRTF system yourself. Our discussion glosses over a lot of the implementation details (e.g., how we store an HRTF, how we use it when processing a sound). For our purposes, what matters is the high-level concept: we are simply filtering an audio signal to make it sound like it's coming from a specific direction.

Since HRTFs take the listener's head geometry into account, it is important to use headphones when performing spatialization. Without headphones, you are effectively applying two HRTFs: the simulated one, and the actual HRTF caused by the geometry of your body.

Source: <https://developer.oculus.com/resources/audio-intro-spatialization/>

Claim 1, Element (D) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

Claim: 1 – Element (E)

displaying, with the WED worn on the head of the user, a virtual image at the location of the SLP in empty space in the zone above the physical floor from where the binaural sound originates to the user.

- The Accused Products include a WED with a display for displaying a virtual image at the location of the SLP in empty space in the zone above the physical floor from where the binaural a sound originates to the user.
- By way of example only, a virtual image in an environment is shown to the right. This image is taken from a video depicting the user experience with the “Bogo” application. In this example, the SLP is located at the virtual image of the game character displayed by the WED.



Source: <https://www.youtube.com/watch?v=sKDXksl7S6o> at 13:53

Claim 1, Element (E) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

An electronic system,
comprising:

- The Accused Products include an electronic system.
- By way of example, the Quest Pro provides all-in-one virtual reality (VR) through its headset and hand-held controllers. The headset and hand-held controllers constitute an electronic system.



Source: <https://www.meta.com/blog/quest/why-im-excited-for-vr-in-2019/>



Source: <https://www.youtube.com/watch?v=ryvsAjCaKKk&t=80s> at 1:20

¹By charting the preamble, we do not concede that the preamble is a limitation and reserve the right to contend that the preamble is not a limitation of the claim.

Claim: 14 – Element (A)

a portable electronic device (PED) that moves to define a boundary of a three-dimensional (3D) zone extending from a physical floor on which a user holding the PED stands and around the user and that designates a sound localization point (SLP) in empty space inside the 3D zone; and

- The Accused Products include a portable electronic device (PED) in the form of hand-held controllers.
- The PED may be moved by the user in order to define a 3D zone extending from a physical floor on which the user holding the PED stands and around the user.
- In the video shown to the right, the user moves the PED to define the boundary of a 3D zone.



Source: <https://www.youtube.com/watch?v=7TFWckMXCWk&t=5s> at 0:22 and 0:25

Claim 14, Element (A) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

Claim: 14 – Element (A)

a portable electronic device (PED) that moves to define a boundary of a three-dimensional (3D) zone extending from a physical floor on which a user holding the PED stands and around the user and that designates a sound localization point (SLP) in empty space inside the 3D zone; and

- The 3D zone represents the space for all game play, so the Accused Products will designate a sound localization point (SLP) for presentation of spatial audio to the user within the 3D zone.
- By way of example, the boundary created by the user in the oculus is an SLP that will attenuate the user approaches. Shown is a video demonstration of interacting with the designated boundary.

3D Audio Spatialization

An essential element of VR audio is spatialization: the ability to play a sound as if it is positioned at a specific point in three-dimensional space. Spatial audio is essential to deliver an immersive experience because it provides powerful cues that make the user feel they are actually in the 3D environment.

The Audio Localization page discussed how humans localize audio sources in three dimensions, we will now explore methods to synthesize those localization cues, to produce spatial audio.

The two key components to spatialization are direction and distance, in this guide we'll cover both of these topics, and the technologies which enable them.

Directional Spatialization with Head-Related Transfer Functions (HRTFs)

The sounds we experience are directly impacted by the shape and geometry of our body (especially our ear), as well as direction of the incoming sound. These two elements: our body + the direction of the audio source, form the basis of HRTFs which are filters we use to localize sound.

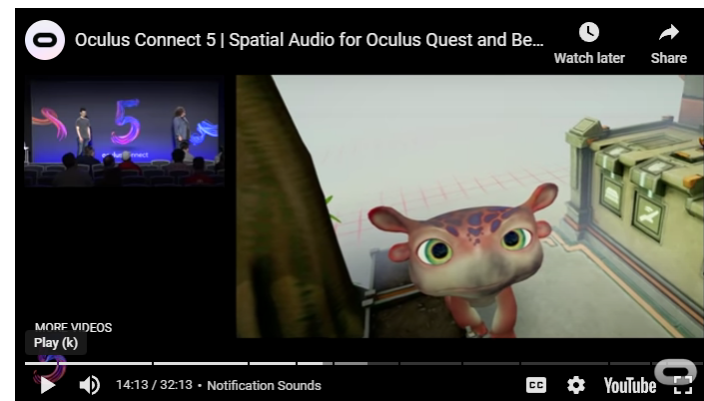
Applying HRTFs

Given an HRTF set, if we know the direction we want a sound to appear to come from, we can select an appropriate HRTF and apply it to the sound. This is usually done either in the form of a time-domain convolution or a frequency domain convolution using FFT. If you don't know what these are, don't worry - those details are only relevant if you are implementing the HRTF system yourself. Our discussion glosses over a lot of the implementation details (e.g., how we store an HRTF, how we use it when processing a sound). For our purposes, what matters is the high-level concept: we are simply filtering an audio signal to make it sound like it's coming from a specific direction.

Since HRTFs take the listener's head geometry into account, it is important to use headphones when performing spatialization. Without headphones, you are effectively applying two HRTFs: the simulated one, and the actual HRTF caused by the geometry of your body.

Source: <https://developer.oculus.com/resources/audio-intro-spatialization/>

Claim 14, Element (A) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.



Source: https://www.meta.com/blog/quest/simulating-dynamic-soundscapes-at-facebook-reality-labs/?utm_source=www.bing.com&utm_medium=oculusredirect

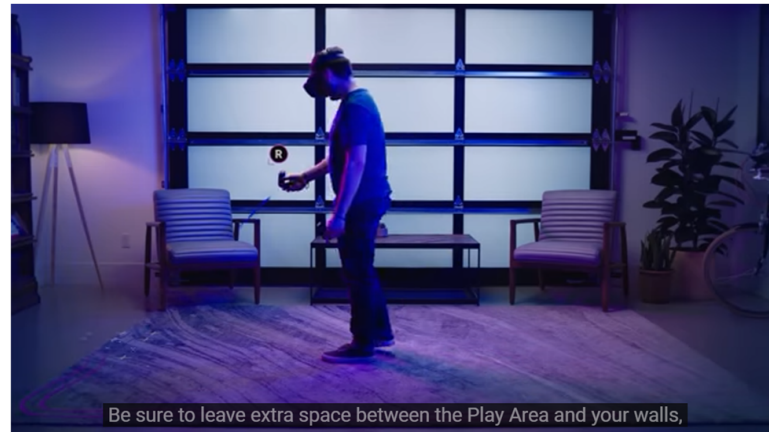
Claim: 14 – Element (B)

a wearable electronic device (WED) that is worn on a head of the user, tracks movement of the PED to determine the boundary of the 3D zone that extends from the physical floor and around the user, includes a processor that processes sound with head-related transfer functions (HRTFs) so sound externally localizes as binaural sound to the user at the SLP in empty space inside the 3D zone defined by movement of the PED, and displays a virtual image at the SLP in empty space inside the 3D zone, and displays a 3D virtual image that shows the boundary of the 3D zone that extends from the physical floor and around the user.

- The Accused Products include a wearable electronic device (WED) in the form of the headset that is worn on a head of the user.
- By way of example, the Quest tracks handsets (PEDs) to define a 3D zone around the user.



Source: <https://www.youtube.com/watch?v=pVFcsedWsKE>



Claim 14, Element (B) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

Claim: 14 – Element (B)

a wearable electronic device (WED) that is worn on a head of the user, tracks movement of the PED to determine the boundary of the 3D zone that extends from the physical floor and around the user, includes a processor that processes sound with head-related transfer functions (HRTFs) so sound externally localizes as binaural sound to the user at the SLP in empty space inside the 3D zone defined by movement of the PED, and displays a virtual image at the SLP in empty space inside the 3D zone, and displays a 3D virtual image that shows the boundary of the 3D zone that extends from the physical floor and around the user.

- The WED tracks the movement of the PED to determine the boundary of the 3D zone.
- As shown to the right, the user can see the boundary being drawn.
- The 3D zone extends from the floor and around the user.



Source: <https://www.youtube.com/watch?v=7TFWckMXCWk&t=5s> at 0:22-0:25

Claim 14, Element (B) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

Claim: 14 – Element (B)

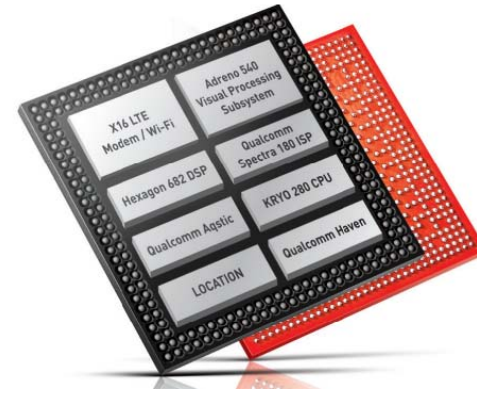
a wearable electronic device (WED) that is worn on a head of the user, tracks movement of the PED to determine the boundary of the 3D zone that extends from the physical floor and around the user, **includes a processor that processes sound with head-related transfer functions (HRTFs) so sound externally localizes as binaural sound to the user at the SLP in empty space inside the 3D zone defined by movement of the PED**, and displays a virtual image at the SLP in empty space inside the 3D zone, and displays a 3D virtual image that shows the boundary of the 3D zone that extends from the physical floor and around the user.

- The WED includes a processor that processes sound with head-related transfer functions (HRTFs) so sound externally localizes as binaural sound to the user at the SLP in empty space inside the 3D zone.
- By way of example, the Quest includes a Qualcomm Snapdragon processor that processes the Accused Products' 3D spatial audio. By way of further example, the Accused Products creates spatial sound in relation to SLPs created by user movements of the PEDs (handsets).

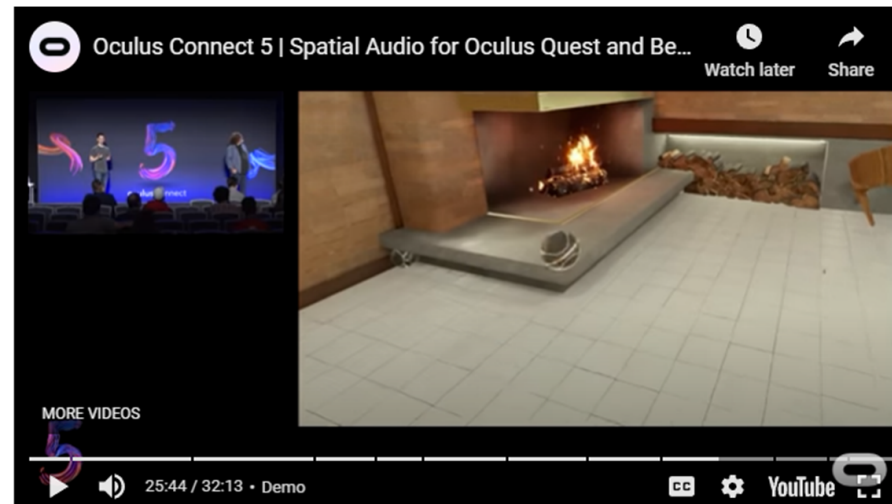
Oculus Quest VR Headset Specs

SoC	Qualcomm Snapdragon 835
Display	Dual 1440x1600 72Hz OLED panels
IPD Setting	Mechanical IPD adjustment (range undisclosed)
Storage	64GB or 128GB of internal flash storage
Audio	Integrated speakers and microphone, dual 3.5 mm audio jack (one on each side), in-ear headphone accessory available

Source: <https://www.tomshardware.com/reviews/oculus-quest-standalone-vr-system,6110.html>



Source: https://www.qualcomm.com/content/dam/qcomm-martech/dm-assets/documents/snapdragon_product_brief_835_0.pdf



Source: https://www.meta.com/blog/quest/simulating-dynamic-soundscapes-at-facebook-reality-labs/?utm_source=www.bing.com&utm_medium=oculusredirect

Claim 14, Element (B) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

Claim: 14 – Element (B)

a wearable electronic device (WED) that is worn on a head of the user, tracks movement of the PED to determine the boundary of the 3D zone that extends from the physical floor and around the user, **includes a processor that processes sound with head-related transfer functions (HRTFs) so sound externally localizes as binaural sound to the user at the SLP in empty space inside the 3D zone defined by movement of the PED**, and displays a virtual image at the SLP in empty space inside the 3D zone, and displays a 3D virtual image that shows the boundary of the 3D zone that extends from the physical floor and around the user.

- The WED processor processes sound with HRTFs, so that the user perceives 3D binaural sound in the zone defined by the movement of the PED.

3D Audio Spatialization

An essential element of VR audio is spatialization: the ability to play a sound as if it is positioned at a specific point in three-dimensional space. Spatial audio is essential to deliver an immersive experience because it provides powerful cues that make the user feel they are actually in the 3D environment.

The Audio Localization page discussed how humans localize audio sources in three dimensions, we will now explore methods to synthesize those localization cues, to produce spatial audio.

The two key components to spatialization are direction and distance, in this guide we'll cover both of these topics, and the technologies which enable them.

Directional Spatialization with Head-Related Transfer Functions (HRTFs)

The sounds we experience are directly impacted by the shape and geometry of our body (especially our ear), as well as direction of the incoming sound. These two elements: our body + the direction of the audio source, form the basis of HRTFs which are filters we use to localize sound.

Applying HRTFs

Given an HRTF set, if we know the direction we want a sound to appear to come from, we can select an appropriate HRTF and apply it to the sound. This is usually done either in the form of a time-domain convolution or a frequency domain convolution using FFT. If you don't know what these are, don't worry - those details are only relevant if you are implementing the HRTF system yourself. Our discussion glosses over a lot of the implementation details (e.g., how we store an HRTF, how we use it when processing a sound). For our purposes, what matters is the high-level concept: we are simply filtering an audio signal to make it sound like it's coming from a specific direction.

Since HRTFs take the listener's head geometry into account, it is important to use headphones when performing spatialization. Without headphones, you are effectively applying two HRTFs: the simulated one, and the actual HRTF caused by the geometry of your body.

Source: <https://developer.oculus.com/resources/audio-intro-spatialization/>

Claim 14, Element (B) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

Claim: 14 – Element (B)

a wearable electronic device (WED) that is worn on a head of the user, tracks movement of the PED to determine the boundary of the 3D zone that extends from the physical floor and around the user, includes a processor that processes sound with head-related transfer functions (HRTFs) so sound externally localizes as binaural sound to the user at the SLP in empty space inside the 3D zone defined by movement of the PED, and displays a virtual image at the SLP in empty space inside the 3D zone, and displays a 3D virtual image that shows the boundary of the 3D zone that extends from the physical floor and around the user.

- The Accused Products include a WED that has a display to display a virtual image at the SLP in empty space inside the 3D zone.
- By way of example only, a virtual image in an environment is depicted to the right. This image is taken from a video showing the user experience with the “Bogo” application. In this example, the SLP is located at the virtual image of the game character displayed by the WED.



Source: <https://www.youtube.com/watch?v=sKDXksl7S6o> at 13:53

Claim 14, Element (B) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

Claim: 14 – Element (B)

a wearable electronic device (WED) that is worn on a head of the user, tracks movement of the PED to determine the boundary of the 3D zone that extends from the physical floor and around the user, includes a processor that processes sound with head-related transfer functions (HRTFs) so sound externally localizes as binaural sound to the user at the SLP in empty space inside the 3D zone defined by movement of the PED, and displays a virtual image at the SLP in empty space inside the 3D zone, and displays a 3D virtual image that shows the boundary of the 3D zone that extends from the physical floor and around the user.

- The Accused Products include a WED that has a display to display a 3D virtual image that shows the boundary of the 3D zone that extends from the physical floor and around the user.



Source: <https://www.youtube.com/watch?v=7TFWckMXCWk&t=5s> at 0:25

Claim 14, Element (B) - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

The electronic system of claim 14, wherein the 3D zone has a customized size and shape defined by movement of the PED while held in a hand of the user.

- With the Accused Products, the 3D zone has a customized size and shape defined by movement of the PED (the hand-held controllers) while held in the hand of the user.
- In the video depicted to the right, the user defines a customizable shape of a 3D zone by moving the PED along the desired boundary.

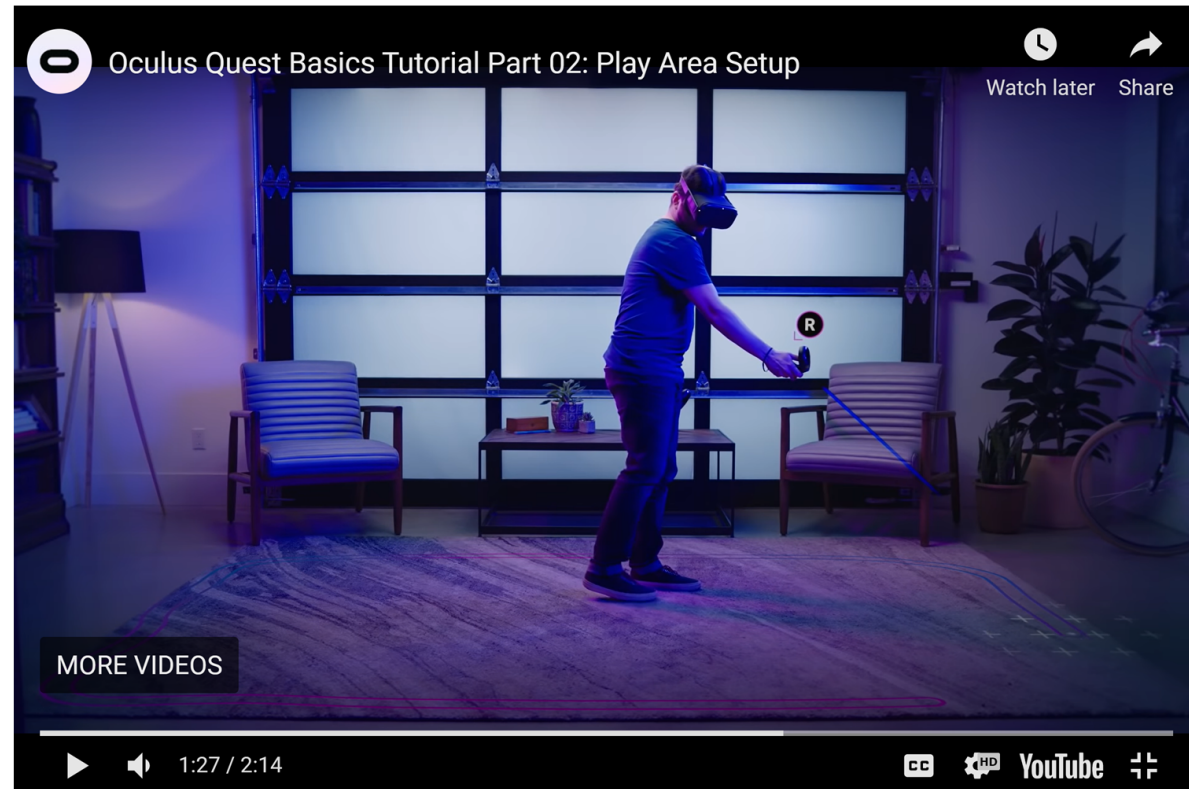


Source: <https://www.youtube.com/watch?v=7TFWckMXCWk&t=5s> at 0:22-0:25

Claim 15 - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

The electronic system of claim 14, wherein the 3D zone has a customized size and shape defined by movement of the PED while held in a hand of the user.

- With the Accused Products, the 3D zone has a customized size and shape defined by movement of the PED (the hand-held controllers) while held in the hand of the user.
- In the video depicted to the right, the user defines a customizable shape of a 3D zone by moving the PED along the desired boundary.



Source: <https://www.youtube.com/watch?v=zh5ldprM5Mq> at 1:27

Claim 15 - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

The electronic system of claim 14, wherein the WED tracks the PED to determine when the PED is at the boundary of the 3D zone, and the WED automatically displays the 3D virtual image that shows the boundary of the 3D zone to alert the user that the PED is at the boundary of the 3D zone.

- The Accused Products include a WED (headset) that locates the PED (hand-held controllers) to determine when the PED is at the boundary of the 3D zone, and to display a 3D virtual image showing the boundary of the 3D zone to alert the user that the PED is at the boundary of the 3D zone.



Source: <https://www.youtube.com/watch?v=zh5ldprM5Mq> at 1:44

Claim 16 - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.

The electronic system of claim 14, wherein the WED tracks the PED to determine when the PED is at the boundary of the 3D zone, and the WED automatically displays the 3D virtual image that shows the boundary of the 3D zone to alert the user that the PED is at the boundary of the 3D zone.

- By way of example, the Quest WED tracks hand-held controller (PED) via constellation LEDs on the PEDs, including when the PED is at the boundary of the 3D zone.



Inside Oculus Quest Hardware: Here Are The Sensors Which Track Head And Hand Movement

Source: <https://www.youtube.com/watch?v=AZ7ufYef-dM> at 0:22

Claim 16 - The Accused Products literally infringe this claim element. Alternatively, the limitations of this claim element are present under the Doctrine of Equivalents because to the extent there are any differences between the Accused Product and this claim element, such differences are insubstantial. Further, equivalency may be shown by the fact that the Accused Product performs substantially the same function in substantially the same way to achieve substantially the same result as recited in this claim element.