

# Embody



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Company website: <https://www.embodyvr.co/>

Company highlight reel: <https://vimeo.com/324403254>

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# Embody

## *Personalized Spatial Audio*

### Our Story

Embody is an audio lifestyle technology company. It was founded in Nov 2016 and is headquartered in San Mateo, California; with operations in North America, Japan, and Europe. Embody's mission is to replicate the engineering marvel of the human auditory system which brings spatial sound and spatial awareness to an individual of its surroundings, on all devices including headphones and hearing aids. Embody develops audio technologies for Gaming - Console, Mobile, PC, and eSport, Augmented Reality, Sports Wearables, Hearing Aids, and Music Streaming. Its patented technologies enable ambient awareness and synesthetic immersion by modeling the individual and unique characteristics of each user's auditory anatomy in real-time.

The shape of an individual's torso, shoulders, head and especially the inner folds of his/her ear - called the pinna, determine how an individual detects the direction of sound in real-life. To emulate these directional cues in gaming, music and medical devices, it is required to model the individual's unique auditory system. Artificial Intelligence algorithms invented by Embody create such model in under 30-seconds for an individual. On March 6, 2018, the New York Times published an in-depth dive editorial on How the Shape of Your Ears Affects What You Hear. This article explores the science of human ear anatomy and how one's individual and unique ear structure shapes their ability to identify the direction of sound all around them. (Appendix A) <https://www.nytimes.com/2018/03/06/science/ears-shape-hearing.html>

With such a model, Embody makes it possible for a wearer of headphones or hearing aids to experience directional life-like sound on their device. In essence, when an individual is listening to sounds using a headphone powered with Embody technology, he/she identify sound direction - delivering immersive, synesthetic entertainment.

### The Executive Team

Embody has 14 employees with a management team consisting of the following executives.

**Kapil Jain** - Co-founder and CEO. Audio Technologist and Entrepreneur. Led Audio Business at Marvell Semiconductor. On a mission to transform auditory experiences in gaming, entertainment, and healthcare. Author of 40+ patents.

**Greg Lewis** - Co-founder and COO. Designed and built the US NPR network. Created the Marvell Thin Modem business unit growing to \$400M/year and drove its divestiture.

**Shruti Badhwar** - Co-founder & VP of Data Science. Ph.D., University of Cambridge, Previously Co-founder at Commerce.ai and Research scientist at IBM Research.

## **Description of the Problem & the Solution**

**Problem Statement:** Elevate sense of Immersion, Realism and Ambient Awareness in Gaming and Music Headsets, VR/AR and Sports wearables, Hearing Aids and Hearables.

**Solution:** Embody S/W technologies enable ambient awareness and 360-degree immersion with all headsets including wired/wireless earbuds, music and gaming headphones and hearing aids by modeling the individual and unique characteristics of each users' auditory anatomy in real-time.

## **Market Opportunity**

### **In gaming and entertainment**

Today, the world utilizes Dolby software to create surround sound experiences. This solution requires a multi-speaker setup to simulate sound positioning and movement. To represent an accurate life-like movement of sound, a massive number of speakers (sometimes more than 100) are needed with this existing approach. Besides the enormous cost of such systems putting them out of reach for the everyday consumer, there are numerous other shortcomings of this solution:

- This solution is not portable because of the need for multiple speakers. Sixty percent of music and media is consumed on-the-go over portable devices including headphones, mobile phones, and hearing aids.
- Without being optimized to the listener's unique auditory system, the listener will perceive that the sound is not is correctly positioned. For instance, the sound of fireworks might appear in a horizontal plane rather than its desired location of above the listener.

Embody has introduced a breakthrough solution in gaming and entertainment with Personalized Spatial Audio. Embody technology emulates over a thousand virtual speakers around the listener and also tailors the sound to every person's unique ear

characteristics. Virtual speakers indicate that this revolutionary solution is portable and can be used with all earbuds and headphones. With Personalized Spatial Audio and a dense virtual speaker arrangement, the listener can now perceive sound coming from its true intended direction in all angles, straight out of their headphones. For a listener to replicate the Personalized Spatial Audio immersive sound experience using existing Dolby technologies, the listener needs to set up a home theater system with over a thousand speakers. Using over a thousand speakers is not only cost prohibitive but also unrealistic. Even then the solution will be incompatible with headphones and will not create the correct sound positioning due to non-personalization. Moreover, Embody's patented and proprietary system solution requires no extra hardware, memory or higher performance processors and delivers a genuine immersive entertainment experience on all devices. Embody technology gives gamers an advantage unheard of and unseen. With an ability to identify enemies and their location early through sound cues, Embody is poised to change the gaming universe - eSport, console, mobile, PC and VR.

### **In lifestyle and hearing aids**

By being able to identify the direction of a sound source (for example an approaching car behind the listener's left or right); the wearer of a hearing aid/ hearing implant powered with Embody technology can react and respond naturally. With such directional awareness of an individual's surroundings, Embody restores an individual's ability to hear the actual direction of sound on hearing aids. Today Embody is an R&D partner with two of the biggest hearing aid conglomerates in the world who are significant suppliers to hearing aid distributors in the US including Costco.

On Friday, August 19, 2017, the Food and Drug Administration Reauthorization Act of 2017 legislation was passed that includes the Over the Counter (OTC) Hearing Aid Act designed to provide greater public accessibility and affordability with OTC hearing aids.

The OTC Hearing Aid Act is designed to enable adults with perceived mild-to-moderate hearing loss to access OTC hearing aids without being seen by a hearing care professional. The new law, which was introduced in March by Senators Elizabeth Warren (D-Mass) and Chuck Grassley (R-Iowa), was passed by the US House on July 12, 2017, and the US Senate on August 3, 2017. It also comes on the heels of the elimination of the physician waiver system which had required consumers first to seek a physician for a medical evaluation or sign a waiver before obtaining a hearing aid. Apple and Bose have been successfully lobbying the US government to deregulate the hearing aid requirements and create lifestyle category devices.

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