



SonicMold - 3-D Printed Quad-Driver Earbuds with Concha-Interface Bone Conduction

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Category

Hardware

Medical Devices

Life Sciences

Engineering & Physical Sciences

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Wireless version (Bluetooth 5.2):



Wired version:



OVERVIEW

This patent-pending earphone technology utilizes a precision 3D-printed, custom-fit shell to integrate a unique quad-driver array consisting of dynamic, balanced armature, electrostatic, and bone conduction units. By utilizing the ear's concha contour for vibration transfer, the device delivers a high-fidelity, immersive sound experience designed to meet the rigorous demands of both elite audio professionals and high-end audiophiles.

BACKGROUND

Finding comfortable, high-quality earphones has long been a challenge for many consumers. Traditional earphones often lack customization options, leading to discomfort and inadequate fit, which can result in pressure points, fatigue, and poor user experience over extended wear. Additionally, high-end earphones that offer advanced audio technology and superior sound

quality are often prohibitively expensive for the average consumer. Existing solutions fail to effectively balance comfort, noise isolation, and sound quality at an affordable price. Therefore, a need exists for inexpensive earphone solutions that can be personalized, that fit well, and that provide exceptional audio performance.

INNOVATION

Researchers have developed 3D-printed multi-unit earphones that address customer pain points by leveraging 3D printing technology to create highly customizable devices. A primary technical innovation is the placement of the bone conduction unit adjacent to the concha contour of the shell instead of relying on an external ear-hook or deep canal insertion. This allows the shell body to act as a continuous vibratory surface, transferring tactile low-frequency energy directly to the user's ear anatomy. The earphones also feature a refined acoustic architecture where multiple drivers cooperate through a single transmission channel, reducing internal complexity and phase interference. The innovation merges high-quality sound with customized comfort, offering professional-grade earphones comparable to existing products at nearly half the price. Real-world applications include usage by music professionals, audiophiles, frequent travelers, hearables and assistive technology, and immersive gaming.