

A 'smarter' personal amplification device

The hearing aids available on the market today are undeniably impressive, particularly when compared to their clunky and squeaky predecessors. At a most basic level, hearing aids sample the surrounding auditory signal in real-time, breaking sounds down into frequency-specific channels. For each channel, an appropriate level of gain must be delivered to the user's ear according to the intensity of the input signal, as well as the severity of the hearing loss at that frequency. All of this occurs in the blink of an eye... actually, the blink takes about 100 times longer.

Of course, where possible, the majority of people with hearing loss should and do pursue hearing aids. However, given the investment of time and energy and money that is required for a hearing aid purchase, it is not always advisable for a person to pursue hearing aids right away. For example, some patients are too ill to undergo a proper hearing aid evaluation. Others are awaiting surgery that might impact hearing thresholds or have limited family / caregiver support. As an interim measure, personal amplification devices have long been a popular recommendation by audiologists. Historically, these devices have been quite pricey, particularly those with higher quality components (e.g. Pocketalker; approx. \$250 USD).

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It is perhaps not surprising that the newest innovation in personal amplification is in the form of an app. One option, The Ear Machine (free, Apple App Store), transforms the iPhone into a personal amplification device. It uses the onboard iPhone microphone to pick up the audio signal, which is then amplified and streamed through the attached audio headset (e.g. earbuds) according to the volume preference of the listener. The user can additionally choose to move the microphone closer to the speaker for an improved signal-to-noise ratio.

The Ear Machine app has a simple and intuitive interface. There are two main dials: one for adjusting overall loudness,

another for fine-tuning (i.e. giving the signal a higher- or lower-frequency emphasis). A feature called Earshare makes setting recommendations based on an analysis of environmental noise. Other features include a mute function, a sound level meter for monitoring environmental noise, and a music mode for amplifying songs from your music library.

It would be understandably tempting for users to assume that personal amplifiers are suitable substitutes for hearing aids and a careful audiological intervention – this is simply not the case. In fact, these devices can have the potential to do more harm than good by exceeding safe listening levels. Ultimately, caution should be exercised when using any type of personal amplifier without audiological supervision.

The Ear Machine is one of several options available on iOS. While Android alternatives are available, it is worth noting that the Android operating systems are not currently able to deliver amplified sounds within an acceptable latency (around 30 ms). Users should expect a noticeable delay. The problem is being actively addressed by Google. – CF

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