

HEARING BEYOND THE NORMAL RANGE

Relevant for: Science & Technology | Topic: Science and Technology- developments and their applications and effects in everyday life

Device providing super-hearing. The spherical array has 6 microphones sensitive to ultrasound. The ultrasounds are played back to the headphones so that the listener can detect the direction of their source correctly. Credit: Ville Pulkki/Aalto University

It is an established fact that human beings observe what and where something is happening around them using their sense of hearing. Humans, however, have a limited range of hearing and can perceive only certain sound frequencies – generally stated to lie between 20 Hz and 20,000 Hz.

A new audio technique, developed by researchers at Aalto University, Finland, will now allow people to hear ultrasonic sources that generate sounds of frequencies over 20,000 Hz. [The results](#), which were published in *Scientific Reports* early in June, also state that the technique would also allow for perception of the direction from which the sound is coming.

Bats in their natural habitats were employed as the source of ultrasonic sound in this study. Using their technique, the researchers were able to hear the direction of arrival of bat sounds, effectively allowing them to track the bats in flight as well as hear them.

While previous devices have allowed humans to listen to bats, the fact that this allows us to locate them as well is novel. They achieved this by recording the sound using an array of microphones that were mounted uniformly on a small sphere, performing a sound-field analysis and obtaining the most prominent direction from which the sound originates. Additionally, a parameter also indicates if the sound comes from a single source.

The signal thus produced is then pitch-shifted to audible frequencies and a sound is played in headphones immediately, allowing the listener to perceive the sound and the source based on the direction from which it was analysed to arrive. While the pitch-shifting was performed in a computer during the research, scientists believe that this could be achieved using electronics mounted on headphones as well.

Apart from the general appeal that it has for humans in the fact that it allows us to hear sounds that we normally can't, researchers also suggest practical applications. Minor pipe leaks and sometimes even damaged electrical equipment produce ultrasonic sounds that we can't hear with our ears. Their device would enable quickly detecting the location of such faulty equipment, saving valuable time.

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Besides models, all-cause mortality numbers from India's Civil Registration System suggest that official figures may have been exceeded by far

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