Hearing aid will unscramble the cocktail party cacophony

Oliver Moody Science Correspondent

A new generation of sharper hearing aids may be on its way after scientists solved the age-old "cocktail party problem" of distinguishing between several voices speaking at the same time.

For decades electrical engineers have been working to copy the human ear's remarkable capacity for teasing apart sounds coming from several directions at once. Now researchers in the US have built a device that can tell the difference between three simultaneous voices with 97 per cent accuracy.

Mimicking the sophisticated bone labyrinth of the inner ear, the microphone is a 3D-printed circle of 36 plastic tunnels radiating outwards from the centre. When a soundwave enters each tunnel it is bent by "metamaterials" — artificial substances that can mould light and sound into a distinctive shape. The waves meet in the middle, where they are combined into a single soundwave that can then be unscrambled into its components by a computer.

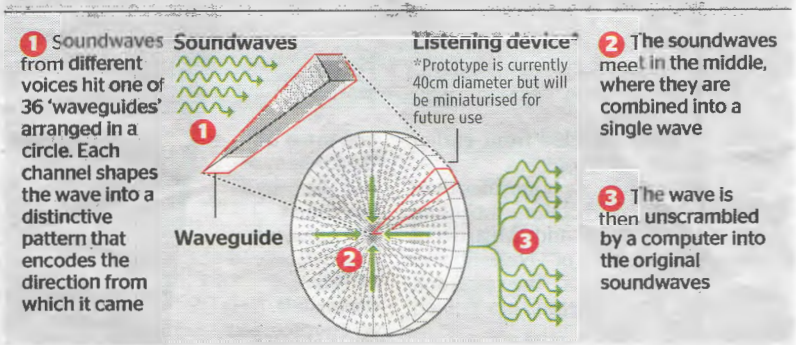
In a test the device was placed in the middle of three speakers emitting random words at the same time and proved able to reconstruct the words with a high level of precision. The researchers said that if the model could be scaled down it might be used in hearing aids or speech-recognition devices attached to smartphones or laptops.

"The system employs only a single sensor, yet it can reconstruct the segregated signals with high fidelity," the scientists wrote in the journal *Proceedings of the National Academy of Sciences*.

There are several substantial obstacles between the prototype and the marketplace, not least of which is its size. At 40cm [16ins] in diameter, the first model is far bigger than a human head, let alone an inner ear.

"It is this big in order to provide a full 360 degrees of coverage," said Steven Cummer, a professor of electrical and computer engineering at Duke University and one of the study's authors. "The key step for a lot of different applications is shrinking the device by a factor of ten or more. We are actively exploring approaches to try to do this."

How it works



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