Fly Inspires Tiny Microphones

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New acoustic sensor research could soon help many people hear better and lead to improved audio clarity for mobile phone ar device users.

The research being conducted by Ron Miles, a mechanical engineering professor at the State University of New York at Bingha lead to a revolution in hearing aid technology within the next four years. Miles' aim is to dramatically improve the ability of the h understand speech in noisy environments. The work could help the more than 28 million Americans who already suffer from or hearing loss. The number of people with hearing problems is likely to become even larger as aging Baby Boomers move into th "Our focus is to improve the technology of acoustic sensing and signal processing so that we can minimize the influence of unv Miles. "Research shows that hearing in noisy environments remains the number one unsolved problem faced by hearing aid w

Miles' work is based on discoveries about the directional hearing capabilities of a small fly--Ormia ochracea. Miles has used a t the fly's ear as a model to develop the world's smallest directional microphones. The research holds promise in any number of applications where microphones and acoustic sensing systems are or could be employed.

Improving the directionality of hearing aids, enhancing their ability to filter out unwanted noise and producing microphones that noise, will mean major enhancements to speech intelligibility in noisy environments, Miles says. He notes that the improvemen accomplished by research in three interrelated areas: directional microphones, optical electronic sensors and signal processing

As the project's principal investigator, Miles will partner with researchers Douglas Jones of the University of Illinois, an expert in algorithms, and Levent Degertekin of the Georgia Institute of Technology, an expert in optical sensors. The optical sensors will upon the variable capacitors used in traditional hearing-aid technology.

By "reading out" sound waves hitting the microphone's diaphragm through signals created by changes in light rather than in ele much thinner and more sensitive diaphragms can be used. "This will remove some of the key design constraints that have limit of small microphones," says Miles. "It should permit a revolution in microphone designs and enable the achievement of much g lower noise."

The signal processing algorithms will allow for the fine-tuning and customization of hearing aid sensitivity and will reduce unwa what is possible with existing hearing aid technology. Ultimately, the signal processing could be tuned based on any of a numb directionality, frequency or volume of sounds, Miles says. Initially, the researchers will focus on directionality, since most hearin hear the speaker or sound source they are facing more than other ambient room noise.

Ultimately, Miles' work will affect any application in which a miniaturized microphone and signal processing technology could in utility and performance. Besides the development of next-generation hearing aids, other envisioned applications include securi phones and teleconferencing equipment.

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