Multi-carrier processing in auditory prosthetic devices

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Technology description

The Need

There are about 275 million adults globally with moderate to severe hearing loss and 360 million adults with mild hearing loss. The current solutions to allow these people to hear better include hearing aids, hearing loss counseling, cochlear implants, alerting devices, and other communication aids. In addition, the FDA has approved cochlear implants for sale in the United States for individuals with bilateral sensorineural hearing loss greater than 70dB HL. Implementation of this encoding strategy will significantly improve existing devices, which will allow patients to improve their speech recognition in noisy environmentswithout suppressing the background noise.

The Technology

The Ohio State University researchers, led by Drs. Frederic Apoux and Eric Healy, have developed an encoding strategy for transmitting temporal envelope information from multiple sources using multiple temporal fine structures. This strategy is primarily intended for integration in auditory prosthetic devices such as cochlear implants. Current auditory prostheses typically suppress the background to facilitate speech intelligibility. The present encoding strategy allows users to achieve higher levels of speech understanding in a noisy environment while preserving the entire auditory scene. This encoding strategy can be implemented almost immediately because it relies on existing processes. Overall, it provides an intelligibility-in-noise gain up to 70 percentage points in a more natural and complex acoustic environment and also allows for the possibility for users to mentally switch between sound sources.

Application area

Medical Devices
Cochlear Implants
Hearing aids

Advantages

Speech intelligibility in noise by CI users could be restored to a level comparable to that of normal-hearing listeners
Preserves the complexity of the acoustic environment
Use of artificial fine structure information alleviates many of the technical difficulties associated with speech fine structure extraction and encoding
Heightened awareness as a result of having access to the entire auditory scene, without sacrificing speech intelligibility
Background noise and speech are balanced for cochlear implant users in a way that more closely mimics natural hearing
Encoding strategy for improvement of speech understanding in a noisy environment for audiotory prosthetic devices

Institution

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