Hearing Assistance Device for Improved Fine Structure Processing

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Technology description

A cochlear implant is a surgically implanted prosthetic device that can provide profoundly deaf individuals with sensations of sound. These devices improve the quality of life for hundreds of thousands of people worldwide; however, electric hearing still lacks the resolving ability found in normal hearing and cochlear implant users have difficulty with pitch detection and sound source localization.

Current cochlear implant processing does not preserve many of the physical attributes of sounds that make then unique, such as temporal fine structure; thus, listening in noisy environments often is difficult for cochlear implant users. Additionally, the nervous system can adapt to the signals sent by the implant, making it less effective. An improved hearing assistance device that assists with sound reception and perception is needed. A UW–Madison researcher has developed a cochlear implant with an improved processing algorithm that has the potential to provide additional temporal fine structure information to the nervous system, including binaural timing cues. This implant also is expected to improve pitch detection and sound source localization.

The implant comprises an electrode and a processor in communication with the electrode. To generate a stimulating signal for the cochlear implant, the processor receives an acoustic signal, generates a transformed signal, analyzes the transformed signal to identify at least one positive-moving zero crossing (i.e., where the sign of the signal changes from negative to positive) and then triggers an electric current pulse that is delivered to an electrode. This method also can be applied to other hearing assistance devices.

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing an improved cochlear implant and method for improving the quality of life for those living with hearing impairment.

Application area

Cochlear implant processors

Assistive listening devices for cochlear implant users, such as CD or digital media players

Advantages

Provides an improved processing algorithm
Encodes at least a portion of the temporal fine structure of an audio signal
Improves pitch detection and sound source localization
Can provide monaural or binaural timing cues
Reduces adaptation issues found in traditional hearing assistance devices
Improves quality of life for those living with cochlear implants

Institution

Wisconsin Alumni Research Foundation

Inventors

Tyler Churchill

联系我们

叶先生

电 话：021-65679356
手 机：13414935137
邮 箱：yeyingsheng@zf-ym.com