Method for Correcting Sound for the Hearing-Impaired

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Invention

Most present hearing-aid technologies rely on amplification strategies, attempting to control gain across frequency. By using different independently controlled frequency channels, the magnitude spectrum of the acoustic stimulus can be manipulated. However, there is no purposeful manipulation of the phase spectrum. In an impaired ear, there are changes in the tuning properties of the inner ear that result in changes in the timing of neural responses. This can result in a reduced latency due to broadening of the filters in the impaired ear. This invention describes a method of computing corrections for each frequency channel as a function of time, incorporating a spatiotemporal pattern correction (SPC) algorithm into a wide dynamic range compression (WDRC) strategy.

Technology

U.S. Patent No. 7,428,313

The incoming sound is analyzed and divided into multiple signals in each of a plurality of frequency channels. A group delay of each frequency channel is computed and compared to group delay expectations for a healthy ear to determine a correction factor. Based on this correction and the group delays, the required delay to restore a healthy nonlinear response is calculated for each frequency channel as a function of time. The delay is imposed on the appropriate frequency channel, and the signal level is scaled to adjust audibility. The delayed and scaled signals from all frequency channels are combined into a single outgoing sound.

Application

Correcting sound for the hearing-impaired

Advantages

- Compensates for loss of nonlinearity due to reduced phase delays between low- and high-level input sounds
- Enables greater discrimination between subtle contrasts embedded in speech, increasing speech recognition
- Allows increased recognition of vowels and consonants
- Corrects abnormal spatiotemporal response pattern without changing the magnitude spectrum of the sound

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