Acoustical Society of America
The Journal of the Acoustical Society of America

Neuro-steered noise suppression for auditory prostheses

Tom Francart[1], Neetha Das[1], Simon Van Eyndhoven[2], Wouter Biesmans[2] and Alexander Bertrand[2]

J. Acoust. Soc. Am. **139**, 2044 (2016); http://dx.doi.org/10.1121/1.4950048

In a multi-speaker scenario, a major challenge for noise suppression systems in hearing instruments is to determine which sound source the listener is attending to. It has been shown that a linear decoder can extract a neural signal from EEG recordings that is better correlated with the envelope of the attended speech signal than with the envelopes of the other signals. This can be exploited to perform auditory attention detection (AAD), which can then steer a noise suppression algorithm. The speech signal is passed through a model of the auditory periphery before extracting its envelope. We compared 7 different periphery models and found that best AAD performance was obtained with a gamma-tone filter bank followed by power-law compression. Most AAD studies so far have employed a dichotic paradigm, wherein each ear receives a separate speech stream. We compared this to a more realistic setup where speech was simulated to originate form two different spatial locations, and found that although listening conditions were harder, AAD performance was better than for the dichotic setup. Finally, we designed a neuro-steered denoising algorithm that informs the voice activity detection stage of a multi-channel Wiener filter based on AAD, and found a large signal-to-noise-ratio improvement at the output.