Design and low-cost implementation of a robust multichannel noise reduction scheme for cochlear implants

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Abstract

Cochlear implant users experience large difficulties to understand speech when background noise and reverberation are present. Hence, incorporating a noise reduction algorithm with the cochlear implant's speech coder is indispensable to improve speech intelligibility. A widely studied multichannel adaptive algorithm for commercial hearing aids is the Generalized Sidelobe Canceller (GSC). However, due to the small intermicrophone distance, a small amount of microphone mismatch suffices to severely degrade the performance of the GSC, limiting its practical use. In this project, a robust adaptive multichannel noise reduction algorithm, combining a fixed spatial pre-processor and an adaptive multichannel Wiener filter, has been developed. In this talk, both the robust design of the fixed and the adaptive stage are addressed. In addition, we show that the computational complexity can be drastically reduced using stochastic gradient techniques, enabling a real-time implementation in cochlear implants.