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Tackle the Cocktail Party Problem using Joint Auditory Attention Decoding and Adaptive Beamforming Optimization

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The cocktail party problem has remained to be one of the most difficult problems for hearing devices even after decades of extensive research. One of the key challenges is to determine the desired talker in a cocktail party. Recently, researchers have successfully demonstrated the decoding of auditory attention using EEG, MEG or EMG. In addition, several research studies have attempted to incorporate the decoded auditory attention information into speech enhancement solutions. However, existing solutions are less optimal in the sense that auditory attention decoding is often separate from speech enhancement. In this talk, we propose a joint auditory attention decoding and multichannel speech enhancement approach. The proposed approach eliminates the need of extracting speech envelope of each talk, which is a very difficult problem in practice by itself. Furthermore, the proposed solution is optimal in the sense that the attended talker's speech is optimized using both microphone inputs and EEG inputs in a united framework. Preliminary evaluation results are presented to demonstrate the effectiveness of the algorithm. Finally, future research directions will be discussed..