Master Thesis Proposal 2021/2022

Title: Optimal signal processing of brain signals used for automatic control of a hearing device.

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Background: Auditory brainstem responses (ABRs) are electrical responses from the brain that are driven by sound input. ABRs are measured using brain signals captured with EEG from electrodes attached to the scalp. The size of the ABR response scales with input sound intensity, a property which allows ABRs to have diagnostic and clinical value. Usually, ABRs are generated in response to many brief, transient sounds such as clicks or short tones. However recent research has shown that time-resolved regression approaches can be used to generate temporal response functions (TRF's) which have similar properties to the ABR [1]. So far, TRFs have been estimated using simple linear regression models. However, it is known that the real neural system is highly non-linear. It is also known that the EEG input has a very low SNR and non-gaussian.

Project Description: This project will focus on comparing and selecting the best possible pre-processing of the EEG input data that will result in the most accurate TRF model.

Program Duration: 20 weeks, 30HP, with a flexible starting date.

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Relevant Literature:

[1] Maddox, Ross K., and Adrian K. C. Lee. "Auditory Brainstem Responses to Continuous Natural Speech in Human Listeners." *Eneuro* 5, no. 1 (2018): ENEURO.0441-17.2018. https://doi.org/10.1523/ENEURO.0441-17.2018.