Time Frequency Analysis for Localization of Imagined Motor Movement of the Human Brain

The Oakland University and School of Engineering and Computer Science communities are invited to attend Suraj Singh Bhamra's defense of his Ph.D. dissertation. Seating is limited. RSVP with Katie Loodeen at loodeen@oakland.edu.

Time Frequency Analysis for Localization of Imagined Motor Movement of the Human Brain

Committee: Dr. Mohamed Zohdy, Ph.D. (Chair), Dr. Hongwei Qu, Ph.D., Dr. Darrell Schmidt, Ph.D., Dr. Christopher Kobus, Ph.D.

Time: **3:00 – 5:00 p.m.**
Date: **Friday, February 15, 2019**
Location: **347 EC**

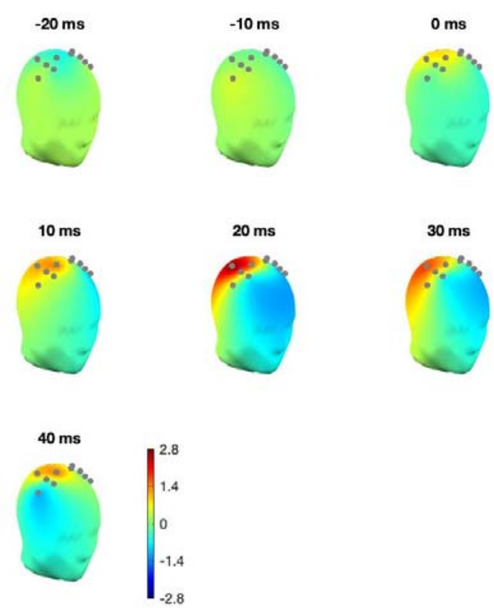
The objective of this research is to implement a set of signal processing techniques, namely the Short Time Fourier Transform, spectrogram, and power spectral density in conjunction with computational neuroscience techniques such as ERPs and ICA decomposition of EEG signals to investigate the origin and distribution of neurological signals associated with the imaginary motor movement of the human hands. This research contributes the following:

1) Application of the principles governing power spectral density, ERP analysis, ICA decomposition, and the Short Time Fourier Transform spectrogram through the use of computer modeling and simulation to provide a technique to identify the cortical pathways associated with left and right handed imaginary motor movement of the human hands.

2) Investigation into the effects of left and right-handed dominance and decussation of nerve pathways on the localization of imaginary motor movement of the human hands in addition to investigation into the components comprising the stream of EEG data used to conduct the analyses.

3) Application of the aforementioned signal processing and computational neuroscience methods in this abstract to provide insight into a frequency band of brain waves associated with imaginary motor movement of the human hands.

4) An exploratory look into future research opportunities surrounding electrode technology using a modeling and simulation-based mechanical analysis of an implantable intracortical electrode to investigate potential structural geometries, materials, and mechanical attributes of a cortical sensor that may be used in the future to aggregate neurological information in future studies.



ERP Scalp Plot Subject 06 Left Stimulation