University of Houston - Biomedical Engineering Seminar
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Evoked Resonant Neural Activity (ERNA) in patients with Parkinson's Disease (PD)

Abstract

Parkinson's Disease (PD) is a complex neurodegenerative disorder characterized by diverse symptoms. Deep Brain Stimulation (DBS) targeting the subthalamic nucleus (STN) and globus pallidus internus (GPi) effectively manages motor symptoms, with neurophysiological biomarkers from Local Field Potentials (LFPs) offering insights to optimize therapy. Previously, our lab demonstrated the Beta band activity and high-frequency oscillations (HFOs) may help identify patient-specific neural signatures and differentiate PD subtypes. Additionally, Evoked Resonant Neural Activity (ERNA) is a recently discovered biomarker that reflects direct responses to stimulation. Interactions between ERNA and HFOs may guide DBS parameter selection such as stimulation amplitude, frequency and contact selection. Leveraging these biomarkers may enable real-time recalibration of dysfunctional circuits, enhancing DBS efficacy and tailoring therapy to individual patient needs.

Biosketch

Luciano Branco is a PhD Candidate in the Clinical Neural Engineering Lab at the University of Houston and Mayo Clinic Rochester, specializing in signal processing, bioinstrumentation, and systems optimization. His research aims to enhance Deep Brain Stimulation (DBS) therapies for Parkinson's Disease by analyzing neurobiomarkers such as Beta band activity, High-Frequency Oscillations (HFOs), and Evoked Resonant Neural Activity (ERNA) from Local Field Potentials (LFPs) recorded intraoperatively. Luciano's prior work at the University of Houston (M.S., 2021) involved developing an emotion-based physiological simulator with a closed-loop fuzzy logic controller. Driven by a passion for programming, he designs biomedical engineering pipelines spanning embedded systems to advanced software solutions.