University of Houston - Biomedical Engineering Seminar

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Using artificial intelligence for personalized neuromodulation therapies for neurological and psychiatric disorders

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Abstract

Current therapeutic devices to treat neuropsychiatric disorders are often ineffective, in part due to an incomplete understanding of the mechanisms of actions of neuromodulation therapies. Next-generation closed-loop neuromodulation systems provide powerful tools for elucidating the causal effects of regulating physiological biomarkers and promise to enable precision therapies for a wide range of diseases. Real-time sensing and computing capabilities of closed-loop neuromodulation systems allows for precise measurement of the physiological states and generation of adaptive neuromodulatory actions. However, the complexity of optimally controlling the neuromodulatory actuators to induce desired physiological or behavioral states, in real-time, is a major barrier for developing more effective therapies. Our long-term goal is to develop an end-to-end platform for designing, prototyping and implementing intelligent Closed-Loop Neuromodulation systems that can automatically learn the optimal mapping between neural states and neuromodulatory actions from interacting with the neural systems.

Biosketch

Dr Mahmoudi is the director of the Neuroinformatics and Intelligent Systems lab at the Emory University School of Medicine. The primary focus of his research is centered on design, development and implementation of intelligent control systems that can learn to optimize and adapt neuromodulation therapies in neurological and psychiatric disorders including epilepsy, depression, Parkinson's disease and memory disorders.

Prior to joining the faculty at Emory University, Dr Mahmoudi completed a NIH NRSA postdoctoral fellowship in translational neurology. After training in electrical engineering and AI, he transitioned to biomedical engineering for his PhD at the University of Florida where he developed a framework for designing intelligent neuro-prosthetic control systems that could learn to decode brain signals by interacting with the environment.