BIOENGINEERING
Fall 2019 Seminar

Date: Thursday, September 19, 2019
Time: 12:00 pm - 1:00pm
Location: Exploratory Hall, Room L111
(*Videoconferencing to SciTech, Colgan Hall, Room 221)*

George Mc Connell, Ph.D.

Biography: Prof. McConnell is an Assistant Professor in the Department of Biomedical Engineering at the Stevens Institute of Technology, where he has been since 2015. From 2009 to 2015, he was a research scientist in the Department of Biomedical Engineering at Duke University. Prof. McConnell earned a PhD degree (2008) in Bioengineering from Georgia Institute of Technology, and before that received Master's and Bachelor's degrees in Biomedical Engineering from Drexel University. His research program focuses on neuromodulation, movement disorders, and neural engineering, with support from the National Institutes of Health (NINDS), the Brain & Behavior Research Foundation, and the Branfman Family Foundation.

Title: Reliably Targeting Deep Brain Stimulation Sweet Spots to Treat Gait Dysfunction in Parkinson's Disease.

Abstract: Deep Brain Stimulation (DBS, a brain pacemaker) effectively treats the distal symptoms of Parkinson's disease (PD), including tremor, bradykinesia, and rigidity. The full development of this promising therapy is hampered by the ineffective treatment of axial symptoms, namely, gait dysfunction and postural instability. We found that in rats rendered parkinsonian by unilateral 6-hydroxydopamine injection, DBS of the Substantia Nigra pars reticulata (SNr) generated significant improvements in gait dysfunction, which depended strongly on the location of stimulation. These results are in agreement with recent clinical studies of SNr DBS highlighting the importance of stimulation location within the SNr on the treatment of gait dysfunction. Further, we investigated the utility of intraoperative microelectrode recordings (MERs) to refine placement of the DBS electrode within the SNr. We tested the hypothesis that the coherence between stimulation-evoked MERs from adjacent depths in the brain correlates with electrode position. Our results suggest the Stimulus Pulse Aligned Coherence analysis in Evoked Recordings (SPACER) technique provides a quantitative approach to determine the position of SNr borders and SNr subregions. Future studies will investigate the use of the SPACER technique to accelerate precise DBS targeting of other heterogeneous brain structures, and thereby maximize benefits and minimize side effects to the patient.