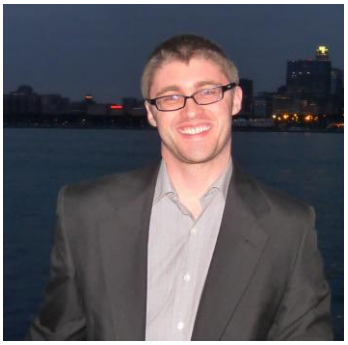
FIU Engineering & Computing
FLORIDA INTERNATIONAL UNIVERSITY

Biomedical Engineering
Wallace H. Coulter Foundation
Seminar Series

Integrating technology with physiology to drive novel neurorehabilitation interventions

Dr. Jacob G. McPherson

Northwestern University



Monday, May 12th, 2014
Lecture: 9:00 AM-10:00 AM
FIU Engineering Center
Location EC 2300
10555 West Flagler Street
Miami, Florida 33174

Abstract: Neurological impairments and their associated complications can severely limit quality of life in individuals with stroke or spinal cord injury (SCI). Of these impairments, persistent motor deficits frequently represent the most substantial barrier to functional recovery. Although new rehabilitation strategies are being introduced at an accelerating rate, the clinical benefit of many approaches remains limited by an incomplete understanding of the neural mechanisms that drive both impairment and recovery. In this presentation I will describe how our fundamental understanding of neuropathophysiology and our ability to create more effective rehabilitation interventions can be facilitated through creative use of engineering techniques. Specifically, I will focus on the following two examples: (1) the use of robotics to quantify the impact of neuropharmacological interventions on upper limb motor deficits in individuals with chronic hemiparetic stroke, and (2) the development and implementation of a recurrent neural-computer interface that enhances forelimb motor recovery in a rodent model of chronic cervical SCI by facilitating Hebbian-type plasticity in specific spinal motor circuits. Additionally, I will discuss how similar approaches can be used to study sensory deficits, including pain, and how a more comprehensive understanding of sensorimotor integration post-injury may lead to the development of improved interventions.

Biography: Jacob McPherson is currently a post-doctoral fellow in Northwestern University's Feinberg School of Medicine. Dr. McPherson's research focuses on revealing neuropathophysiological changes that contribute to motor and sensory impairments following injury to the central nervous system. The ultimate goal of his work is to design technology-driven interventions that improve quality of life by directly addressing the underlying mechanisms of impairment. His research integrates engineering approaches (e.g., robotics, neural-computer interfaces, medical imaging) with neuropharmacology, biophysics, and physical therapy. Prior to his current position, Dr. McPherson conducted post-doctoral research at the University of Washington in Seattle, WA, where he was a Sackler Scholar of Integrative Biophysics and Senior Fellow in the Department of Physiology and Biophysics. He holds M.S. and Ph.D. degrees in Biomedical Engineering from Northwestern University and a B.S. in Biomedical Engineering/Applied Sciences from the University of North Carolina at Chapel Hill.

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