Electrical & Computer ENGINEERING **SEMINAR**

Thursday, October 29th
Scaife Hall Auditorium
Room 125
4:30 p.m.
Refreshments at 4:00 p.m.

Assistant Professor Douglas Weber
Department of Physical Medicine and Rehabilitation
University of Pittsburgh

Dr. Weber is an Assistant Professor in the Department of Physical Medicine and Rehabilitation at the University of Pittsburgh. He is also a faculty member in the Department of Bioengineering and the Center for the Neural Basis of Cognition. Dr. Weber received a B.S. ('94) in Biomedical Engineering from the Milwaukee School of Engineering and an M.S. ('00) and Ph.D. ('01) in Bioengineering from Arizona State University. He was a postdoctoral fellow ('01-03') and Assistant Professor ('03-'05) in the Centre for Neuroscience at the University of Alberta before joining the University of Pittsburgh. His primary research area is Neural Engineering, including studies of motor learning and control of walking and reaching with particular emphasis on applications to rehabilitation technologies and practice. Specific research interests include functional electrical stimulation, activity-based neuromotor rehabilitation, neural coding, and neural control of prosthetic devices. Currently, his research is supported by grants from the National Institute of Biomedical Imaging and Bioengineering (NIBIB), the National Institute of Neurological Diseases and Stroke (NINDS), and the US Army's Telemedicine and Advanced Technology Research Center (TATRC). Dr. Weber has been a member of IEEE EMBS since 1994 and a member of the Society for Neuroscience since 1995.

Sensorimotor Neuroprosthetics

Over the last 2 decades, advances in microfabrication and digital signal processing technologies have enabled the development of machines that interface directly with neurons in the brain, spinal cord and periphery. These so-called "neural interfaces" serve as bi-directional communication channels, allowing information to be *read-out* from the brain in the form of neural recordings or *written-in* via patterned electrical stimulation. We are exploiting these technologies for two purposes: 1) to advance our understanding of how the nervous system senses and controls limb motion, and 2) to develop advanced prosthetic devices that interface directly with the nervous system for control. The ultimate goal is to create neuroprosthetic limbs that literally look, feel, and function naturally, with user intention and state feedback communicated by a neural interface linking the prosthesis to the brain. One key to enabling this communication is to understand how neurons encode information. Fortunately, neuroscientists and engineers have made great progress in deciphering the language of the nervous system, and we are now able to "decode" information in real-time from measurements of neural activity. Conversely, electrical stimulation pulses can be patterned appropriately to activate sensory neurons, for example, to restore hearing to persons with profound deafness. My talk will focus on research in my lab that is aimed at understanding how somatosensory neurons encode information about touch and proprioception (i.e. sense of body position). I will also highlight some of our work in the recording and decoding of neural signals from the brain for expression of motor commands.

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