UF UNIVERSITY of FLORIDA

Spring 2009 Seminar Series

Department of
Mechanical & Aerospace Engineering

Tuesday, February 24, 2009
4:00 pm
in Room 303 MAE-A

"Neuromorphic Design of Adaptive Systems for Neuromotor Rehabilitation"

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Abstract

Neural systems often adapt in response to the patterns of activity across the network of neurons. This type of adaptation, or activity-dependent plasticity, is likely to be the primary process involved as a child learns how to ride a bike or as a spinal cord injured person re-learns how to walk. Several rehabilitation technologies are designed to promote adaptation in neural systems and recovery of function by tapping into these processes of activity-dependent plasticity. 'Neuromorphic' is a term used to describe technology that is designed to function in a manner that is similar to neural systems. This talk will describe the use of neuromorphic technologies to promote adaptation in a rehabilitation setting. We have designed and developed a system to control movements using electrical stimulation of paralyzed muscles that is based on a model of the spinal cord circuitry responsible for controlling locomotion. The rationale for this approach is that neuromorphic technology that operates like a nervous system may be readily integrated with the biological system and may be highly effective in promoting adaptation. Results will be presented from evaluations of this technology in computer simulation studies, in a rat model of spinal cord injury, and in studies on people with spinal cord injury.

Biography

Jimmy Abbas received his B.S. in bioelectrical engineering from Brown University in Providence, RI and his M.S. and Ph.D. in biomedical engineering from Case Western Reserve University in Cleveland, OH. He is currently an Associate Professor in the Harrington Department of Bioengineering in the Fulton School of Engineering and is co-director of the Center for Adaptive Neural Systems (http://ans.asu.edu/) at Arizona State University. Dr. Abbas is on the Editorial Board of the Journal of Neuroengineering and Rehabilitation and has served as an officer of the International Functional Electrical Stimulation Society. His research interests are in applications of neural engineering techniques and technology in the area of medical rehabilitation. Current projects include the development and assessment of systems that use electrical stimulation for therapy after spinal cord injury, systems to improve neuromotor control in children with cerebral palsy, systems to restore sensory capabilities to amputees, and techniques to improve sensorimotor function in people with Parkinson's Disease.

Refreshments served in 303 MAE-A beginning at 3:50 pm