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Neural Prosthesis Seminar

"Integrated Circuits and Systems for Brain Neuromonitoring and Microstimulation"

January 15, 2010 • 8:30 AM

Biomedical Research Building • BRB 105

Case Western Reserve University

Pedram Mohseni, Ph.D.

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Assistant Professor, Department of EECS, Case Western Reserve University

Abstract:

New enabling technologies for monitoring and manipulation of chemical and electrical neural activity in the brain can provide a holistic image of neural signal pathways. Such new capabilities would be of great benefit to physicians to better understand neuronal communication for more effective clinical treatments. One such new enabling technology is low-power, multichannel, microchips that can be interfaced with recording micro-electrodes to condition, process, and wirelessly transmit electrical action potentials and neurochemical signals from inside the body to the outside world. This seminar will first present the design, implementation, testing, and performance characterization of wireless integrated recording systems to remotely monitor neurochemical signals and electrical action potentials in the brain. The resulting microchips have been interfaced with carbon-fiber microelectrodes and successfully recorded extracellular levels of dopamine elicited by electrical stimulation in both anesthetized and ambulatory rats using fast-scan cyclic voltammetry (FSCV). The presentation will next focus on the development of an implant-able device for activity-dependent intracortical microstimulation to demonstrate a novel approach for orchestrating new long-range connectivity patterns in the cerebral cortex after a traumatic brain injury. The neurophysiological rationale behind this work as well as our preliminary measurement results from a microfabricated prototype device in anes-thetized rats will be presented. This work has the potential to remarkably advance the neuro-rehabilitation field at the level of functional neurons and networks.

This seminar will not be webcast. For more information, please contact Cathy Naples at (216) 707-6490.

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