



Tuesday June 17, 2014
10:30 - 11:30 a.m.
MoIES Bldg, Room 315

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Interfacing with the Nervous System Through Implantable Microsystems

Abstract

The combination of micromachined sensors (MEMS), low-power electronics, and wireless power and data transfer will have a profound impact on many aspects of our lives, from health care to environmental monitoring and homeland security. These Wireless Integrated Microsystems (WIMS) will play a major role in the biomedical arena, where they could be used for restoring function in individuals affected by deafness, blindness, paralysis, Parkinson, epilepsy, among others. By directly interfacing with the body, it is possible to sense biological signals, use these signals as controls, and provide electrical/chemical stimuli to specific organs, where needed, to restore lost function. This talk will review research conducted at the University of Michigan on implantable biomedical microsystems for use in closed-loop neural prostheses. It will present the latest developments in micromachined microprobes for recording neural activity and electrical stimulation, the design of electronic circuits required for processing neural signals and wireless transmission of power and data to/from implantable systems, and the development of hermetic and biocompatible packaging and encapsulation technologies for long-term operation in the body. The talk will discuss future challenges as well as opportunities for implantable microsystems aimed at overcoming many biological disorders.

Presenter



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Khalil Najafi is the Schlumberger Professor of Engineering and the Chair of Electrical and Computer Engineering, University of Michigan. He served as the Director of the Solid-State Electronics Laboratory from 1998-2005, has been the director of NSF's National Nanotechnology Infrastructure Network (NNIN) since 2004, and served as the deputy director of the NSF Engineering Research Center (ERC) on Wireless Integrated Microsystems (WIMS) from 2000-2008. He received the B.S., M.S., and the Ph.D. degree in 1980, 1981, and 1986 respectively, all in Electrical Engineering from the University of Michigan. His research interests include: micromachining technologies, micromachined sensors, actuators, and MEMS; analog integrated circuits; microsystems and micromachined sensors and actuators for biomedical applications; hermetic and vacuum packaging technologies; and low-power wireless sensing/actuating systems.

Dr. Najafi has been active in the field of solid-state sensors and actuators for thirty years. He has been involved in several conferences and workshops dealing with micro sensors, actuators, and microsystems, including the International Conference on Solid-State Sensors and Actuators, the Hilton-Head Solid-State Sensors and Actuators Workshop, and the IEEE/ASME Micro Electromechanical Systems (MEMS) Conference. He has served as associate editor or editor of several journals, including *IEEE J. of Micro Electromechanical Systems (JMEMS)*, *J. of Micromechanics & Microengineering*, *J. of Sensors and Materials*, *IEEE J. of Solid-State Circuits*, *IEEE Trans. on Electron Devices*, and *IEEE Trans. Biomedical Engineering*. He is a Fellow of the IEEE and the AIBME.