BIOMEDICAL ENGINEERING
Carnegie Mellon University

Thursday, October 4, 2018
10:30 – 11:30 a.m.
Baker Hall 136A

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Implantable, injectable, and wearable devices for sensing and effecting neurological functions

Abstract: Significant advances in materials and microelectronics over the last decade have enabled clinically relevant neurotechnologies that measure and regulate neural activity in the brain, spinal cord, and peripheral nerves. These technologies provide new capabilities for studying basic mechanisms of information processing and control in the nervous system, while also creating new opportunities for restoring function lost to injury or disease. Devices that measure the activity of sensory neurons can be used to monitor physical and physiological parameters, such as limb posture and movement or bladder volume and pressure, providing a natural source of feedback for controlling neural prostheses. Neural sensors can also measure the activity of motor neurons to enable direct neural control over prosthetic limbs and assistive technologies. Conversely, these neural interface technologies can stimulate activity in sensory and motor neurons to create sensory percepts and reanimate paralyzed muscles. Although many of these applications rely currently on devices that must be implanted into the body for precise targeting, ultra-miniaturized devices can be injected through the skin or vascular system to access deep structures without open surgery. Furthermore, improved and alternative technologies for sensing and stimulating neural activity through the skin are extending capabilities of wearable neurotechnologies for monitoring, rehabilitation, training applications.