NEURAL ENGINEERING SEMINAR SERIES

Bi-directional Neural-Machine Interface to Enable Dexterous Control of Robotic Hands

Zoom Link: https://psu.zoom.us/j/97520429633?pwd=TnQwS0FnTDV4Q2xPNDEwdWlMOU9kdz09

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ABSTRACT: An intuitive neural interface is critical for effective communications between humans and assistive devices. We will discuss bi-directional noninvasive neural-machine interfaces that decode user intended movement and encode sensory information of the machine state and environment. We perform continuous decoding of intended finger movement based on population motoneuron firing activities, extracted from high-density electromyographic signals. It allows intuitive and robust control of individual fingers of a prosthetic hand. We also deliver artificial somatosensory (haptic and proprioceptive) feedback to people with an arm amputation using transcutaneous nerve stimulation and vibrotactile stimulation. The evoked sensory feedback can facilitate tactile-based object recognition and enhance closed-loop control of robotic hands. The bi-directional neural interfaces can enable dexterous control of assistive robotic devices in individuals with sensorimotor deficits.

BIOGRAPHY: Xiaogang Hu is an associate professor in the Joint Department of Biomedical Engineering at University of North Carolina at Chapel Hill and North Carolina State University. He was trained in motor control and biomechanics at Penn State University during his PhD study, and he completed his postdoc training in stroke neurophysiology at the Rehabilitation Institute of Chicago (currently Shirley Ryan AbilityLab). His research focuses on neural-machine interface and neural stimulation, targeting upper limb sensorimotor functions of individuals after stroke, traumatic brain injury, or limb loss.