

Neural Prosthesis Seminar

Biological and Bionic Hands: Natural Neural Coding and Artificial Perception

Friday, April 13 • 8:30 am

Biomedical Research Building, Room 105
Case Western Reserve University



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Abstract

Our ability to manipulate objects dexterously relies fundamentally on sensory signals originating from the hand. To restore motor function with upper-limb neuroprostheses requires that somatosensory feedback be provided to the tetraplegic patient or amputee. Given the complexity of state-of-the-art prosthetic limbs, and thus the huge state-space they can traverse, it is desirable to minimize the need of the patient to learn associations between events impinging upon the limb and arbitrary sensations. With this in mind, we seek to develop approaches to intuitively convey sensory information that is critical for object manipulation – information about contact location, pressure, and timing – through intracortical microstimulation (ICMS) of primary somatosensory cortex (S1). To this end, we test in psychophysical experiments with monkeys, the sensations evoked by ICMS of S1. Based on these results, we show how to build a biomimetic encoding algorithm for conveying tactile feedback through a cortical interface and show that artificial touch improves the dexterity of brain-controlled bionic hands.

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