University of Southern California

USC

Department of Biomedical Engineering   Division of Biokinesiology and Physical Therapy

Engineering Neuroscience & Health Seminar Series Presents:	Monday	Locations: Seminar is simultaneously presented
Dr. Gerald Loeb Gloeb@usc.edu	September 29, 2008 4:00 p.m. Refreshments will be served 3– 4 p.m.	**UPC: HNB 100 – LIVE** Hedco Neurosciences Building UPC Campus Map/Directions: http://www.usc.edu/about/visit/upc/ **HSC: 147 – Video Conference** Center for the Health Professional HSC Campus Map/Directions: http://www.usc.edu/about/visit/hsc/

The Spinal Cord Makes Sensorimotor Control Easy to Do but Difficult to Understand

The performance of motor tasks requires the coordinated control and continuous adjustment of myriad individual muscles in response to sensory feedback. For relatively automatic tasks such as locomotion, most of that coordination and adjustment is known to occur in the spinal cord, with the brain providing mostly high-level commands specifying speed and direction. For reach and grasp movements, the relative contributions of brain and spinal cord are less clear. We have developed two complementary approaches to identifying what role the spinal cord might play. The first involves treating it as a “black box” that can be characterized by a mathematical model that describes how the spinal cord converts input signals (brain activity and sensory feedback estimated from observed motion in naturally behaving non-human primates) into output signals (recorded as electromyographical signals from their muscles at the same time). The second involves creating an explicit model of the spinal cord circuitry from the various types of interneurons that have been described in the literature. We then program this model to emulate human performance of a wide range of tasks. Even though both of these models are grossly over-simplified, they account surprisingly well for details of the natural behaviors, suggesting that they capture important features of the role of the spinal cord in simplifying the task of learning and producing complex movements. The proposed research will extend these models to larger portions of the limb musculature and a wider range of behaviors. The two models will be merged in order to reveal the contributions of known elements of the spinal circuitry to the transformation of brain activity into limb function.

Web Cast
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