BIOMEDICAL ENGINEERING
Carnegie Mellon University

Monday, February 18, 2019
10:30 – 11:30 a.m.
Hamerschlag Hall B103

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Coordination of neuronal populations during preparation and perception

Abstract: Our perceptual systems do not operate only in reaction to incoming sensory stimuli, but rather act to prepare us for what comes next. This preparation can aid in performing difficult sensory discriminations and readying a motor action, such as when a tennis player prepares to receive and return a serve. A key form of preparation is attention, the process by which we select some aspects of the external world for special processing, while withdrawing from or ignoring others. We utilize attention because it improves our perceptual abilities, increasing the speed and accuracy with which we recognize sensory inputs. Understanding attention is critical to deciphering the neural code because we are bombarded with an overwhelming amount of sensory input in our daily lives, and attention is a key mechanism by which the brain manages this information overload. My laboratory uses experimental and computational techniques to reverse engineer the biological principles by which the brain deploys attention. In order to do this, we combine single-cell electrophysiology with non-invasive physiological and imaging techniques in the context of a rigorous behavioral paradigm in non-human primates. A particular focus of our work is understanding how groups of neurons, both within local regions of cortex and globally across the brain, coordinate their activity during preparation and perception. Bringing all of these methods together, we have been able to identify important principles by which the brain prepares for the rich experiences of our complex natural environment.