

School of Biomedical Engineering & Faculty Candidate Seminar

Cracking the Neural Circuitry of Volition Using Brain Machine Interfaces

A seminar by



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MSL Room 102 - 2185 East Mall

The experience of volition – of having control over one’s self and environment – is integral to our sense of self and responsibility, and its dysfunction in a number of psychopathologies can have devastating social effects. The fluency of our control over external objects is informed by our sensory experience of them, in a continuous dialog between action and perception. How such control is represented at the neuronal level, or its efficacy judged, however, is not understood. In this talk, I will discuss studies in which I have begun to explore these topics using brain-machine interfaces (BMIs). BMIs are a promising tool for neurological applications, but also a powerful technique for revealing how the brain learns, as well as how it controls its own activity. We’ve developed several imaging-based BMI tasks in mice that enable us to monitor brain activity in single cells and across the cortex as animals learn to control neural firing, allowing us to bridge the gap between the dynamics of individual neurons with cortex-wide activity patterns. We used these methods to screen for cortical areas implicated in the BMI task to reveal how brain areas coordinate their activity to effect causal control.



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