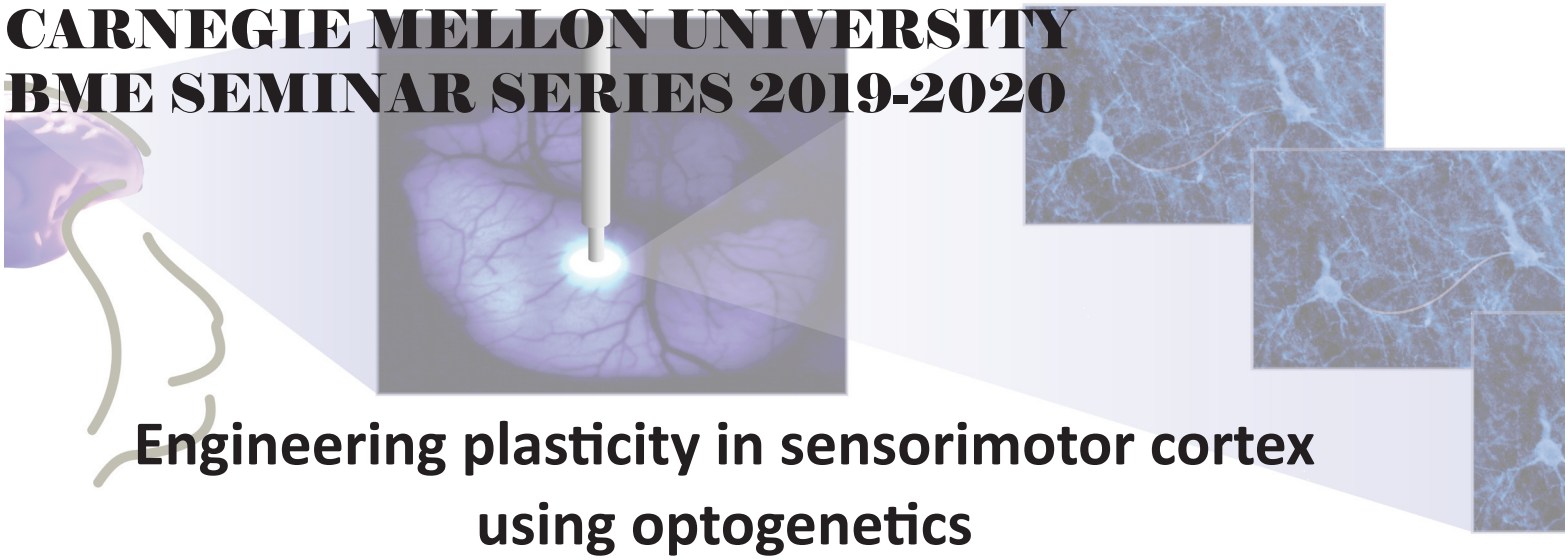
CARNEGIE MELLON UNIVERSITY
BME SEMINAR SERIES 2019-2020



Engineering plasticity in sensorimotor cortex using optogenetics

PRESENTED BY

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SCHEDULE AND LOCATION

Thursday, February 27
(10:30 AM-11:30AM)
Doherty Hall (DH) A302

The brain shows marked plasticity across a variety of learning and memory tasks as well as during recovery after injury. Many have proposed to leverage this innate plasticity using brain stimulation to treat neural disorders. Implementing such treatments requires advanced engineering tools and a thorough understanding of how stimulation-induced plasticity drives changes in network dynamics and connectivity at a large scale and across multiple brain areas. In this talk, I will cover our efforts to investigate targeted stimulation of sensorimotor cortex to drive cortical plasticity towards functional recovery. We have developed a large-scale interface consisting of state-of-the-art electrophysiology and optogenetics to simultaneously record and manipulate activity from about 5 cm2 of sensorimotor cortex in awake behaving macaques. Using this interface, for the first time, we have shown the feasibility of inducing targeted changes in sensorimotor networks using optogenetics. Furthermore, we have incorporated the capability of producing ischemic lesions in the same interface enabling us to stimulate the cortex around the site of injury and monitor functional recovery via change in blood flow, neurophysiology and behavior. Currently we are using these technologies towards developing therapeutic interventions for neurological disorders such as stroke.

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