SOCIETY *for* NEUROSCIENCE | *Advancing the Understanding of the Brain and Nervous System* | ROCHESTER CHAPTER

# Society for Neuroscience–Rochester Chapter
# **Post-doc / Faculty Seminar Series**

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## *Hand brain-machine interfaces: Moving beyond linear state space models*

The field of motor brain-machine interfaces (BMIs) has advanced dramatically. Our ability to accurately decode neural activity to directly control a cursor or robotic arm continues to improve. However, this control remains robotic and limited compared with natural human performance. Most BMI decoding relies on each neuron having a fixed and linear relationship to a given set of degrees of freedom. In experimental results from a reach-to-grasp task I will describe the sequential phases of movement observed with EMG, kinematic, and single-unit neurophysiologic recordings. Additionally, I will show the broad tuning throughout the entire upper forelimb region of primary motor cortex to both reach location and grasp object type and how it transitions between phases of the movement.

I will also demonstrate why this sequential, selective tuning can serve as an important principle for BMI design. By using active dimension selection and 4 ethologically relevant dimensions of control, I will show how a simple 16 single unit BMI can efficiently control a virtual hand to achieve 8 different postures with 95% accuracy with average movement times of ~1 second.

## **Thursday, January 15**
## 4:00 pm, K-207 (2-6408)
## University of Rochester Medical Center

*Refreshments will be provided*
*Sponsored by the Rochester Chapter of the Society for Neuroscience*