Department of
Biomedical Engineering
UNIVERSITY OF WISCONSIN–MADISON

Fall 2017 Seminar Series

Technology for Neural Interfacing at Scale:
from Single Cells to the Whole Cortex

About the Speaker

Suhasa Kodandaramaiah
Benjamin Mayhugh Assistant Professor of Mechanical Engineering, University of Minnesota

Originally from India, Dr. Kodandaramaiah obtained a Masters degree from the University of Michigan, Ann Arbor and PhD from Georgia Institute of Technology, both in Mechanical Engineering. He then completed post doctoral training in Dr. Edward Boyden's laboratory in the Media Lab and McGovern Institute for Brain Research at Massachusetts Institute of Technology. His research is at the intersection of robotics, precision engineering and neuroscience. During his graduate studies and post-doctoral training, Dr. Kodandaramaiah developed robotic tools for observing and analyzing neuronal circuit computations in intact living brains. In 2010, the work was awarded the R. V. Jones Memorial Award by the American Society for Precision Engineering. In 2012, Dr. Kodandaramaiah was recognized by Forbes magazine's 30 under 30 list of rising researchers in science and healthcare.

Computations in the brain that mediate behavior occur at multiple spatial and temporal scales. Information is integrated in the brain within single cells, which are interconnected in dense local circuits, which are in turn, incorporated in larger networks spanning many brain regions. A critical challenge for modern neuroscience is to study the brain across these multiple spatial scales. Traditionally, the modalities used to observe activities at one level do not scale to the next level without loss of signal fidelity or information. In this presentation, I am going describe technologies we have been developing to bridge some of these experimental scales.

First, I am going to talk about a robotic tools we have developed that enable us automatically perform patch clamping, a high fidelity recording technique that enables comprehensive electrophysiological and morphological characterization of single cells in awake and anesthetized animals. Building upon this basic technology, we have now extended the automation algorithms to scale up the number of electrodes to perform patch clamp recordings from intact circuits in vivo, and have also incorporated computer vision algorithms to target specific genetically tagged populations of cells within them.

Finally, I am going to briefly talk about neurotechnologies we are engineering in our laboratory at the University of Minnesota, that seek to extend cellular resolution calcium imaging, traditionally done in small brain regions, to pan-cortical activity mapping.

Monday, November 6, 2017
12 - 1 PM in Tong Auditorium (1003 Engineering Centers)