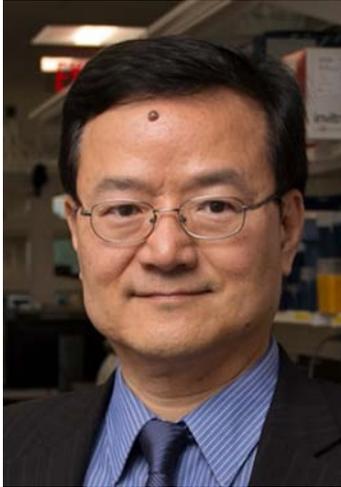


# BIOENGINEERING

PRESENTS

## Dynamic Mapping & Interfacing with the Brain



THURSDAY, Nov 15, 2018

12:00 – 1:00 PM

2101 ENGINEERING V

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Carnegie Mellon University

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Department of Biomedical Engineering

### ABSTRACT:

Brain activity is distributed over the 3-dimensional volume and evolves in time. Mapping spatio-temporal distribution of brain activation with high spatial resolution and high temporal resolution is of great importance for understanding the brain and aiding in the clinical diagnosis and management of brain disorders. Electrophysiological source imaging (ESI) from noninvasively recorded high density electroencephalogram (EEG) has played a significant role in advancing our ability to image brain function and dysfunction. We will discuss principles and current state of EEG-based ESI in localizing and imaging human brain activity with applications to seizure localization. Promising clinical results validated by intracranial recordings and surgical resection outcomes demonstrate the merits of noninvasive EEG-based ESI in mapping epileptogenic zones, aiding surgical treatment of intractable epilepsy. We will also discuss the merits and challenges of multimodal functional neuroimaging by integrating electrophysiological and hemodynamic measurements. Our work indicates that the BOLD functional MRI and EEG can be integrated in a principled way, leading to substantially enhanced spatio-temporal resolution for functional imaging of dynamic brain activation. Finally, we will discuss the co-localization of hemodynamic and electrophysiological signals, and discuss our recent progress in brain-computer interface, demonstrating that humans can control a quadcopter and robotic arm by “mind” from noninvasive EEG signals.

### BIOGRAPHY:

Bin He is Professor and Head of Department of Biomedical Engineering at Carnegie Mellon University (CMU), Pittsburgh, USA. He is also a Professor at CMU Department of Electrical and Computer Engineering and the Center for Neural Basis of Cognition. Dr. He has made significant research contributions to the fields of neuroengineering and biomedical imaging, including electrophysiological source imaging, multimodal neuroimaging, noninvasive brain-computer interface, and bioimpedance imaging. Dr. He has received a number of awards including the IEEE Biomedical Engineering Award and the Academic Career Achievement Award from the IEEE Engineering in Medicine and Biology Society. He is an elected Fellow of International Academy of Medical and Biological Engineering, IEEE, American Institute of Medical and Biological Engineering, and Biomedical Engineering Society. Dr. He served as a Past President of the IEEE Engineering in Medicine and Biology Society, and is the Chair of the International Academy of Medical and Biological Engineering. He has served as the Editor-in-Chief of IEEE Transactions on Biomedical Engineering from 2013-2018.