PRESENTS
Neuro-Gastroenterologic Engineering

WEDNESDAY, JANUARY 18, 2017
2:00 – 3:00 PM
2101 ENGINEERING V

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ABSTRACT:

The discoordination between the central and autonomic nervous systems is increasingly being identified as playing a key role in affecting neurological, psychiatric, and gastroenterologic problems; the causal role that the enteric nervous system may play in Parkinson's disease serves as an example. However, traditionally, the brain and GI system have been studied scientifically and treated clinically, separately. There is a dearth of approaches to use engineering perspectives to better measure, characterize, and modulate these inter-relationships. In this talk, we will discuss our recent contributions to address this unmet need. Specifically, we will discuss our recent development of the high-resolution electrogastrogram, an approach to non-invasively measure and statistically characterize the propagation velocity and propagation patterns consistent with gastric serosal slow wave myoelectric activity, which had not been accomplished until now. We will also highlight our recent development and use of directed information graphs, a new class of probabilisitic graphical models that provides minimal descriptions of causal relationships in multiple time series. To enable the recording of multiple physiologic time series simultaneously and unobtrusively, we will lastly discuss our development of multi-electrode arrays embedded within skin-mounted adhesives for ambulatory monitoring. We will highlight how all of these methods and technologies are being used within the context of neuro-gastroenterologic engineering,. We will conclude with a vision of how advancing this field with principles of applied mathematics, engineering, and synthetic biology has the potential to improve health, reduce healthcare costs, and advance science.

BIOGRAPHY:

Dr. Todd P. Coleman received B.S. degrees in electrical engineering (summa cum laude), as well as computer engineering (summa cum laude) from the University of Michigan. He received M.S. and Ph.D. degrees from MIT in electrical engineering, and did postdoctoral studies at MIT in neuroscience. He is currently an Associate Professor in Bioengineering at UCSD, where he directs the Neural Interaction Laboratory. Dr. Coleman's research has been featured on CNN, BBC, and the New York Times. Dr. Coleman has been selected as a National Academy of Engineering Gilbreth Lecturer and a TEDMED speaker.