

CARNEGIE MELLON UNIVERSITY

BME 2025 SPRING SEMINAR SERIES

Functional optical imaging for visualizing cellular dynamics in vivo across systems and scales



PRESENTED BY

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SCHEDULE

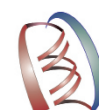
Doherty Hall (DH) 2315

Tuesday,

February 18, 2025

(11:00-12:00 PM)

Neural activity in peripheral nervous system organs is increasingly appreciated for its impact on brain activity and broader systemic physiology, but capturing these interactions demands specific and scalable monitoring tools. Optical imaging is well-suited to access these dynamics with molecular and cell-type specificity at high spatiotemporal resolution, but faces challenges in chronic implementation within peripheral organs, such as the highly innervated gastrointestinal (GI) tract. Here, we present our recent progress in developing thin, soft, and multifunctional endoscopic imaging devices for visualizing neuronal firing alongside complementary electrochemical activity in the mouse brain and colon. Informed by parallel development of GI structural imaging technology for clinical use, we leverage advances in fiber-based device fabrication, microelectronics, and custom, complementary signal processing pipelines to confront increasingly multi-scale monitoring demands. Through detailed capture of gradual changes, our devices are poised to characterize key signaling dynamics at baseline and during transitions to pathology and dysfunction, furthering our understanding of brain-body physiology and offering new insights into potential therapeutic windows and interventions for chronic diseases.



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