

Center for Wireless Integrated MicroSensing & Systems

presents

WIMS² SEMINAR

Tuesday, March 7, 2023 12:30 pm - 2:00 pm Haddad Conf Rm., EECS Bldg.

Closed Loop Precision Medicine – From Smart Bandages to Ingestible Diagnostics



Sameer Sonkusale

Professor
Electrical and Computer Engineering
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Abstract: The speaker will introduce a new paradigm of “Human in the loop” precision medicine, made possible by advances in flexible sensors, microfluidics, drug delivery, and electronics. The closed loop approach is expected to be more effective in improving the health outcomes of individuals across broad demographics, as opposed to the current open-loop one-size-fits-all approach to medicine. The presentation will draw on examples from the speaker’s own interdisciplinary research projects. For instance, the speaker will showcase a novel toolkit of sensors, microfluidics, electronics, and drug delivery, all integrated onto a surgical suture, which realizes the vision of tissue-embedded diagnostics. Even electronic transistors and integrated circuits can be created on a single thread, giving rise to “free-form three dimensional integrated circuits.” The use of textile threads offers unique advantages such as wide availability, affordability, versatility of materials, and easy textile-based processing. The talk will also feature a project that employs additive manufacturing and laser micromachining to develop smart lab-on-a-pill devices that can spatially sample the gut microbiome in vivo. These ingestible pills have the potential to capture the spatial microbial biogeography of the gut, providing valuable insights into host-microbiome interactions and opening up a new realm of ingestible diagnostics compared to traditional fecal analysis. The presentation will also touch upon other flexible bioelectronic platforms such as “sweat sensing patches” and “gas sensing textiles,” highlighting key advancements made by the speaker and his group in realizing this new vision for bioelectronics. The talk will conclude with a forward-looking perspective on the field of bioelectronics and the exciting possibilities it holds.

Bio: Sameer Sonkusale is a Professor of Electrical and Computer Engineering at Tufts University, where he holds joint appointments in the departments of Biomedical Engineering and Chemical and Biological Engineering. He also served as a visiting professor at the Wyss Institute at Harvard University and Brigham and Women’s Hospital of the Harvard Medical School during 2011-2012 and 2018-2019, respectively. In 2012-2013, Dr. Sonkusale also served as the Associate Dean of Graduate Education in the School of Engineering at Tufts University. He currently directs an interdisciplinary research group, the Nano Lab, which focuses on devices, circuits, and systems for healthcare, biology, life sciences, and the environment. Dr. Sonkusale’s innovation on “lab-on-a-pill” was listed as one of the top eight biomedical innovations in the world for the year 2020 in the STAT Madness challenge. The technologies developed in his lab have been licensed to several companies and have resulted in the creation of several start-ups. Dr. Sonkusale earned his MS and PhD in Electrical Engineering from the University of Pennsylvania and has received several awards, including the National Science Foundation CAREER award in 2010. Dr. Sonkusale is an alumnus of the National Academy of Engineering US Frontiers of Engineering meeting in 2015.

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