



**CECS**

**CENTER FOR EMBEDDED & CYBER-PHYSICAL SYSTEMS**  
**UNIVERSITY OF CALIFORNIA · IRVINE**

## CECS Seminar



### *“Towards Self-Sustainable Wearable IoT Devices for Reliable Mobile Health Applications”*

**Professor Ganapati Bhat**

Assistant Professor in Electrical and Computer  
Engineering, Washington State University

Thursday, April 25<sup>th</sup>

10:00-11:00 a.m.

Location: EH 2430

#### **Abstract:**

Electronic systems experience a major shift in their form factor every 10 to 15 years, as evidenced by the popularity of heterogeneous mobile systems in the last decade. Wearable internet of things (IoT) devices are the next big evolution in computing systems. Wearable sensors and IoT devices, along with smart home technologies, have the potential to transform healthcare by enabling cost-effective, reliable, continuous, and data-driven monitoring of users in a free-living environment. Despite the impressive potential of wearable technology, widespread adoption of wearable devices has been limited due to several technology and adaptation challenges. First, wearable devices have small batteries that necessitate frequent recharging to prolong their operation. Ambient energy sources are promising to tackle this problem, but they are highly stochastic and must be managed optimally. Second, wearable devices operate in dynamic environments with potential changes in data distribution. Sensor data could go missing due to energy constraints as well. This must be handled in an energy-efficient manner to enable reliable applications. I will present our solutions towards these challenges in this talk. First, I will describe imitation learning and uncertainty aware algorithms to enable recharge-free operation of wearable devices that harvest energy from the environment. After that, I will go over our research on algorithms to handle sensor data shifts and missing data in mobile health applications. I will conclude with some ongoing research and future directions.

#### **Biography:**

Ganapati Bhat is an Assistant Professor in the School of Electrical Engineering and Computer Science at Washington State University. He received his B.Tech degree in Electronics and Communication from Indian Institute of Technology (ISM), Dhanbad, India in 2012 and the PhD degree in Computer Engineering from Arizona State University in 2020. From 2012-2014, he worked as a software engineer at Samsung Research and Development Institute, Bangalore, India. His research interests include energy optimization in computing systems, dynamic thermal and power management, and energy management for wearable systems. Dr. Bhat received the NSF CAREER award (2023), 2022 ACM Outstanding Ph.D. Dissertation Award in Electronic Design Automation, the 2021 ACM Transactions on Design Automation of Electronic Systems (TODAES) best paper award, and 2019 Best Paper Award at CASES: International Conference on Compilers, architecture, and Synthesis for Embedded Systems during the Embedded Systems Week (ESWEEK). He serves as an Associate Editor of IEEE Embedded Systems Letters and IEEE Design & Test. He regularly serves as technical program committee member top-tier conferences including DAC, ICCAD, ISLPED, and ESWEEK.

**Hosted By:** Prof. Mohammad Al Faruque