

Friday, October 18, 2024

11:15 am ITE 336

(Refreshments in ITE 301 at 11 am)



## ***Emerging Blood Gas Monitors as Wearable Devices for Continuous Remote Health Monitoring***

**Prof. Ulkuhan Guler**

The importance of continuously monitoring the vital signs of at-risk patients and providing improved outpatient care has been a driving force to promote the required device technology in today's modern digital health care system. Among the vital signs of human health, respiration is a key component of a person's health. Despite recent developments in medical wearable technology, monitoring of respiration parameters, other than respiration rate and blood oxygen saturation, has yet to be sufficiently investigated. While well-known, these are only a subset of respiration parameters that caregivers utilize in the inpatient setting for medical decision-making. Blood oxygen and carbon dioxide partial pressures also have great medical significance and have the potential of being measured noninvasively. Continuous and accurate remote monitoring of blood oxygen and carbon dioxide, along with other physiological data can help caregivers improve quality of care and would allow patients have greater freedom outside the hospital. These monitoring systems can potentially lead to highly tailored treatment plans and shorten the stay at a medical facility and reduce the cost of treatment. In order to develop a noninvasive, wearable, wireless system for continuous monitoring of respiration parameters, we will elaborate on the challenges and opportunities in the field and talk about the requirements of a state-of-the-art system. Some of the recently emerging systems will also be discussed.

Bio:

*Ulkuhan Guler is an associate professor of Electrical and Computer Engineering and director of the Integrated Circuits and Systems (ICAS) Laboratory at Worcester Polytechnic Institute (WPI), MA, USA. In 2024-2025 academic year, she joins the MIT RLE lab as a visiting scientist. Before joining WPI in 2018, Dr. Guler was a postdoctoral researcher at Georgia Tech, GA, USA. She received her B.Sc. degree in Electronics and Telecommunication Engineering from the Istanbul Technical University, Istanbul, Turkey, her M.E degree in Electronics Engineering from the University of Tokyo, Tokyo, Japan, and her Ph.D. degree from Bogazici University, Istanbul, Turkey. Her research interests lie in the broad area of circuits and systems, and her primary area of interest is analog/mixed-signal integrated circuits. More specifically, she is interested in the circuit design of sensing interfaces, bioelectronics, energy harvesting and wireless power transmission systems, and security for applications in healthcare. Recently, her research interest has focused on determining how electronic interfaces can be engineered along with biosensors to facilitate the creation of wireless wearable sensors that measure physiological parameters in the human body. She is the recipient of the 2022 NSF CAREER award and the Interstellar Initiative Young Investigator award. She is a senior member of IEEE. She serves as an associate editor for several IEEE journals, including IEEE SSC-L, IEEE TBioCAS, and IEEE TCAS: II. Dr. Guler co-authored three book chapters. She also serves a steering committee member of the IEEE CICC and TPC member of the IEEE BioCAS conferences. In addition, she is a member of several solid-state circuits and circuits and system communities, including the Women in Circuits Committee. [www.icaslab.org](http://www.icaslab.org)*