

*Holcombe Department of Electrical and Computer Engineering
Seminar Series*

Smart Sensing Systems for Disease and Ambient Detection

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Abstract

Our ambient air contains hundreds of volatile organic compounds released from our breath and perspiration, and emitted by various sources in our surroundings. These compounds carry markers of our diseases, health and wellness conditions, and environmental hygiene and toxicity. The goal of this research is to develop smart sensing systems that can generate valuable health and environmental information from these compounds. One of my research projects aims to develop a breathalyzer-type device for detecting low-blood glucose episodes from breath. As part of this work, breath from patients with diabetes was analyzed, sensor arrays capable of detecting identified compounds are being developed, and the sensors are being integrated into a portable smart device that collects, processes, and analyzes sensor data and communicates the results to the user. This device will enable persons with type-1 diabetes to non-invasively monitor blood glucose levels and avoid complications from low-blood glucose episodes. This is a collaborative research funded by the National Science Foundation. In this seminar, I will share the results from this work. In addition, I will present current efforts to design, develop, and implement smart sensing systems that can generate information about our health and immediate environment from the compounds in the ambient air.

Biography of Speaker

Dr. Sudhir Shrestha is a Visiting Assistant Professor in the Department of Electrical and Computer Engineering at Miami University, Oxford, Ohio. Previously, he was an Assistant Research Professor of Electrical and Computer Engineering from 2011 to 2016 and a postdoctoral researcher from 2009 to 2011 in the Purdue School of Engineering and Technology at Indiana University-Purdue University Indianapolis (IUPUI). He received his B.E. degree in Electrical and Electronic Engineering from Kathmandu University, Nepal in 2003 and his Ph.D. degree in Engineering (Electrical and Micro/Nanoscale Systems) from Louisiana Tech University in 2009. At Miami, he is teaching electrical engineering courses and conducting research in smart sensing systems for disease and ambient detection. At IUPUI, he worked on multiple research projects in the areas of sensors, smart sensing systems, flexible antennas, and paper-based electronics, co-taught two multidisciplinary advanced microelectronics and microfabrication courses, and assisted in collaborative research, education, and outreach programs. For his Ph.D. research, he worked on radio frequency identification (RFID)-based sensing systems and sensor integrated passive RFID tags. His current research interests include smart sensing systems, non-invasive disease-detection/health-monitoring, sensor data analysis, embedded systems, paper-based electronics, and microelectronics.