

# Electromagnetic-based Wearable Biosensor for Non-Invasive Blood Glucose Monitoring Systems

**Date:** Tuesday, October 26, 2021

**Time:** 1: 10 PM – 2: 00 PM

**Location:** Bldg. 59-2015

and ONLINE at : Meeting ID: 711 610 8767 Passcode: 103923

Or following:

<https://kfupm.zoom.us/j/7116108767?pwd=Rk1lcHJ1SEJLTjFmWE80YUJaS1hHdz09>

## Speakers:

**Dr. Hussein Attia; (10 min)**

**Dr. Khurram Qureshi (10 min)**

**Dr. Yaqub Mahnashi (10 min)**

**Audience (15 min)**

## Abstract:

Diabetes is one of the leading causes of death globally and is considered one of the most significant health challenges of the 21st century. The development of a low-cost, non-invasive blood glucose monitoring system would be life-changing for diabetic patients. In this talk, we will brief the audience on the different sensing mechanisms to measure blood glucose. Also, we will highlight our recent work to develop a first-of-its-kind wearable electromagnetic(EM)-based biosensor that can safely and accurately detect the changes in the dielectric properties (e.g., glucose level) of the blood through the transmission and reflection of EM waves. The biosensor transmitting waves inside the human body is suggested to be a miniaturized antenna operating at the microwave band (e.g., sub-6 GHz band) to allow proper wave penetration through skin, fats, and muscles. The reflected data from the human body (i.e., arm) will be processed and analyzed to estimate the blood glucose level continuously. The measured glucose level will be wirelessly transmitted to a mobile phone via Bluetooth. The main challenge of this project is to associate the changes in the reflected EM waves off the human body with the blood glucose fluctuations.

## Bio:

**Dr. Hussein Attia** received his Ph.D. degree in Electrical and Computer Engineering from the University of Waterloo, Ontario, Canada, in March 2011. During 2011-2013, he worked as Research Engineer at the Coding and Signal Transmission Lab., University of Waterloo. He is currently an associate professor at the Electrical Engineering Dept., KFUPM. His research interests include applied electromagnetics, biomedical engineering and sensing, and millimeter-wave antennas. Dr. Attia published about 85 journal and conference papers.

**Dr. Khurram Karim Qureshi** received a BSc degree with honors in Electrical Engineering from the University of Engineering and Technology (UET), Lahore, Pakistan, and a Ph.D. in Electrical Engineering from the Hong Kong Polytechnic University in 2006. He is with the Electrical Engineering Department of King Fahd University of Petroleum and Minerals (KFUPM). His research interests include, the development of: lasers for optical communications, optical and microwave sensors, and energy harvesting circuits. He is a senior member of IEEE, USA, and has published more than 70 journal and conference papers.

**Dr. Yaqub Mahnashi** received the B.S. and M.S. degrees in electrical engineering from the King Fahd University of Petroleum & Minerals (KFUPM), Dhahran, Saudi Arabia, in 2008 and 2012, respectively, and the Ph.D. degree in electrical engineering from Michigan State University, East Lansing, MI, USA, in 2018. From 2008 to 2009, he was an Instrumentation and Control Design Engineer with Saudi Basic Industrial Corporation, Jubail, Saudi Arabia. Since 2009, he has been with KFUPM, where he is currently an Assistant Professor at the Department of Electrical Engineering. His current research interests include switched-capacitor circuits, IC power converters, and low power circuits for biomedical and energy harvesting applications. Dr. Mahnashi is a recipient of SABIC Scholarship in 2007 and the Discovery Scholarship from the King Abdullah University of Science and Technology in 2009.