Department of Electrical and Computer Engineering

TEXAS TECH UNIVERSITY
Edward E. Whitacre Jr.
College *of* Engineering™

Fall 2023 Seminar Series

Seminar Title: ***Skeletal Muscle and Joint Focused Applications of Bioimpedance Spectroscopy***

Time: 2:00-2:50 PM, Friday, Sept 22, 2023
Location: Biology 101

Speaker:
Todd J. Freeborn
University of Alabama

Abstract:
Characterizing biological tissues to assess damage or disease progression is often accomplished using imaging technologies such as MRI, CT, x-ray, or ultrasound. However, these techniques are not (yet) easily integrated into wearable systems for continuous monitoring beyond clinical environments. One measurement technique being investigated to quantify and characterize soft tissues (such as skeletal muscle and joints) is bioimpedance spectroscopy (BIS). Bioimpedance spectroscopy quantifies the passive, frequency- dependent electrical properties of a biological tissue. The electrical properties of a tissue are dependent on tissue type, structure/geometry, and fluid status. In this presentation, recent efforts investigating localized knee-tissue bioimpedance as a marker of skeletal muscle fatigue, damage, and pain will be explored. Further, the use of this technique for estimating knee pain in older adults with knee osteoarthritis will be discussed, highlighting a wearable sensing system to collect this data, the processing techniques, and future applications of personalized medicine.

Speaker Bio:
Dr. Freeborn is currently an Associate Professor in the department of electrical and computer engineering at the University of Alabama (UA). He has been with UA in Tuscaloosa since 2015. Prior to joining UA he was a design engineer developing industrial and commercial electronics for clients in the oil & gas, medical, and consumer markets. He received his Ph.D degree in Electrical Engineering from the University of Calgary in Canada in 2014. His research interests include the design and application of wearable technologies for personalized medicine and the modeling of biological tissues. These efforts are focused on skeletal muscle and joint tissue for fatigue, damage, and pain assessment. His research at UA has been supported by the NIH, NASA, NSF, and also industry partners.