Abstract:
The wearable electronic market has been very successful in the last few years. It has been estimated that 411 million units of wearables will be sold by 2020 for a total of $34.2 billion. Crucial to this success is the low-power devices and sensors and their ability to be powered in absence of batteries or other charging accessories. Opposed to traditional harvesting circuits and antennas, we develop textile based RF-power harvesters for seamless integration of harvester electronics into daily garments. Furthermore, the developed technique allows us to embroider conductive threads onto fabrics using existing embroidering machine via automated methods, enabling cost-effective and scalable. Potential applications of this technology include healthcare, fitness monitoring/tracking, defense, automotive, home security, childcare, space etc.
In our work, we have recorded power levels within 5 feet from Wi-Fi router emissions within home environment, showing promise for powering health and environment trackers (HET). To harvest this power we have developed textile antennas and harvesting circuits with consideration for challenges like robustness, flexibility, durability, while maintaining PCB-like RF performance in ambient power collection. Textile based antenna and textile circuits have been implemented with efficiency of more than 50% demonstrating the potential of efficient Wi-Fi-power harvesting for HET.

About the Speaker:
Dieff Vital received his Bachelor of Science (Summa Cum Laude) in Mechanical and Industrial engineering at Florida Polytechnic University, with a concentration in multifunctional materials in May 2017. He worked as a research assistant from January 2016 to July 2017. His research involved the development of a supercapacitor using clay-diatom mixture, dielectric spectroscopy of epoxy-diatom composites, and water remediation via photocatalytic reaction/TiO2 Nanoparticles. He is currently a PhD student in electrical and computer engineering at Florida International University under the supervision of Prof. Shubhendu Bhardwaj. His main research focuses on large-area textile RF power harvester.