USC Viterbi School of Engineering
Ming Hsieh Department of Electrical and Computer Engineering

Seminar

Next Generation Intelligent and Secured Wireless World: From IoT and Sensors to Wideband and Multi-band Scalable Circuit and System

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Friday, March 18, 2022
EEB 248 @ 10:00am
And Via Zoom
Zoom link: https://usc.zoom.us/j/95860155573?pwd=MjFpMUtCVlp4bzNYZHVGZi9aNUd0UT09
Meeting ID: 958 6015 5573 Passcode: 225496

Abstract: The future intelligent and secured wireless world needs connectivity at any time anywhere and under extreme conditions with over one trillion sensors and Internet-of-Things (IoT) devices connected to the network. To this end, the autonomous, and yet connected, wireless world is envisioned to provide sensing and high-data-rate communications, accurate localization and ranging, and resiliency. The major challenges to attain these goals are latency and energy efficiency requirements, that are largely affected by interference, multi-path, and channel fading. To tackle these challenges, wideband high frequency scalable arrays are desired to provide high data-rate communications and directional beams for interference cancellation. Furthermore, wideband/multiband circuits and systems are needed for accurate localization in the presence of severe multipath and fading in ultra-dense environments in IoT networks.

In this talk, firstly, I will present novel techniques to overcome the challenges for future wideband/multiband scalable transceiver arrays, including power-efficient local oscillator distribution and phase shifting, image selection architecture, and novel compact antenna-IC integration. I will then discuss our ongoing work towards the wideband/multiband signal generation and modulation for 6G and beyond as well as heterogonous integration of different technologies and modules for extending the Moore's law. Secondly, I will present multi-band circuit generation for IoT and sensor nodes to be employed in dense wireless networks. More specifically, I will present the first bidirectional circuitry for IoT transponder that reciprocally generates harmonics and subharmonics, covering two communication frequency bands interchangeably, which makes it a premier tool for localization and sensing protocols. I will also discuss future directions on advanced multi-band reconfigurable architecture for wireless sensors and IoTs compatible with network and physical layer protocols for security, communications, and localization.

Biography: Najme Ebrahimi is an Assistant Professor of Electrical and Computer Engineering at the University of Florida. Her research focuses on Mm-Wave/THz Scalable Array for high data rate communications and sensing as well as the security and connectivity of the next generation of distributed Internet-of-Things (IoT) networks. She was a post-doctoral research fellow at the University of Michigan- Ann Arbor from 2017 to 2020 under the departmental fellowship and earned her Ph.D. from the University of California, San Diego in June 2017. She was selected as a Rising Star by MIT EECS Rising Star program in 2019 and by ISSCC Rising Star program of the IEEE Solid-State Circuits Society in 2020. She is a member of the Microwave and Mm-Wave Integrated Circuits committee (MTT-14) and serves in the IMS2022 Technical Paper Review Committee (TPRC). She is the recipient of the 2021 DARPA Young Faculty Award (YFA).