

Pushing the Envelope of RF/mm-Wave Power Generation by Relearning Ohm's Law

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Date: Friday, April 7th, 2017

Time: 2:30pm Location: EEB 132

Abstract: Spectrum efficient modulations with high peak-to-average-power ratios (PAPR) are widely employed in many high-performance wireless communication systems from low-GHz software-defined radios to 5G mm-Wave links. This growing trend has posed stringent requirements on next-generation power amplifier (PA) designs and transmitter architectures. Going beyond more conventional PA design paradigms that mostly focus on peak output power and peak efficiency, next-generation RF/mm-Wave PAs should achieve both power efficiency and linearity in the entire power back-off region (PBO) to amplify the large-PAPR signals with high efficiency and fidelity. Moreover, it is increasingly important to explore PA carrier frequency reconfiguration and support large modulation bandwidth that will enable future multi-functional transmitters.

This seminar talk will present several new RF and mm-Wave PA architectures and their silicon-implementations recently developed at Georgia Tech Electronics and Micro-System (GEMS) lab. In addition, I will demonstrate a multi-feed antenna concept that achieves direct low-loss on-antenna power combining of multiple mm-Wave PAs for high-power long-range mm-Wave communications.

Biography: Hua Wang received his M.S. and Ph.D. degrees in electrical engineering from the California Institute of Technology, Pasadena, in 2007 and 2009, respectively. He worked at Intel Corporation and Skyworks Solutions. He joined the School of Electrical and Computer Engineering (ECE) at Georgia Institute of Technology as an assistant professor in 2012. Dr. Wang is interested in innovating mixed-signal, RF, and mm-Wave integrated circuits/systems and hybrid biotic (biology)-abiotic (electronics) systems.

Dr. Wang received the National Science Foundation CAREER Award in 2015, the IEEE MTT-S Outstanding Young Engineer Award in 2017, the Georgia Tech Sigma Xi Young Faculty Award in 2016, the DURIP Award in 2014, the Georgia Tech ECE Outstanding Junior Faculty Member Award in 2015, and the Lockheed Dean's Excellence in Teaching Award in 2015. He currently holds the Demetrius T. Paris Junior Professorship of the School of ECE at Georgia Tech. His research group Georgia Tech Electronics and Micro-System (GEMS) lab has won multiple best paper awards, including the IEEE RFIC Best Student Paper Awards in 2014 (1st Place) and 2016 (2nd Place), the IEEE CICC Best Student Paper Awards in 2015 (1st Place), the 2016 IEEE Microwave Magazine Best Paper Award, the 2016 IEEE SENSORS Best Live Demo Award (2nd Place), as well as multiple best paper award finalists at IEEE conferences. Dr. Wang is an Associate Editor of the IEEE Microwave and Wireless Components Letters (MWCL). He is currently a Technical Program Committee (TPC) Member for IEEE ISSCC, RFIC, CICC, BCTM, and BioCAS conferences. He is the Chair of the Atlanta's IEEE CAS/SSCS joint chapter that won the IEEE SSCS Outstanding Chapter Award in 2014.

Hosted by Prof. Hossein Hashemi, Prof. Mike Chen, Prof. Dina El-Damak, and Prof. Mahta Moghaddam.

Organized and hosted by Jae-Won Nam.