IEEE SSCS/CASS Atlanta Joint Chapter Seminar

Title: The Next Wave of Digital-Centric Wireless Transmitters - Marrying Digital Bits and RF Power Amplifier

Speaker: Dr. Debopriyo (Debo) Chowdhury, Senior Staff Scientist

Affiliation: Broadcom Corporation, San Diego, California, USA

Abstract: The continuous downscaling of CMOS technology has made faster and smaller integrated circuits a reality today. Analog/RF circuits, particularly power amplifiers, however often try to fight the technology scaling instead of embracing it. This is because newer nanoscale processes, in spite of offering higher speed, often come with lower supply voltages, higher threshold voltages, and thinner metals closer to substrate, which make analog design extremely challenging. Moreover, RF circuits utilize multiple passive components which do not scale with technology and end up dominating silicon area and bandwidth of the radio. Hence an architecture that can benefit truly from technology scaling as well as offer wideband multi-mode performance will be beneficial. Digitally modulated transmitters, which have been proposed recently in literature, offer such a solution. In this talk, we will cover the pros and cons of a digitally modulated transmitter with special emphasis on a power amplifier. Challenges associated with the design of a high power digital PA will be discussed along with simulations and measurement results. Ways of achieving higher efficiency enhancement by using novel impedance modulation will be introduced. Comparison between polar and Cartesian based mixed signal PAs will be discussed as well. In particular, a high power 65nm mixed-signal Inverse Class-D power amplifier design with switchable power combiner in 65nm CMOS process will be presented and its integration into a complete transmitter will be discussed.

Speaker Biography: Debopriyo (Debo) Chowdhury received the Bachelor of Technology in Electrical Engineering from the Indian Institute of Technology, Kharagpur, in 2005, and the Ph.D. in Electrical Engineering from the University of California at Berkeley in 2010. He is currently a Senior Staff Scientist at Broadcom Corporation, San Diego, CA, working on next-generation mobile and wireless solutions. His major research interests are RF and mm-wave circuits, power amplifiers and efficiency enhancement techniques, high-speed circuits and biomedical devices. He has held several internship positions at Qualcomm Inc., Intel Corporation and Texas Instruments India Pvt. Ltd. Dr. Chowdhury was the recipient of the Best Student Paper Award at IEEE RFIC in 2007, IEEE Microwave Graduate Fellowship in 2008, Intel Fellowship for graduate studies in 2008–2009, and the Intel–CICC Student Scholarship Award in 2010. He has over 20 publications in reputed conference and peer-reviewed journals and holds 1 issued and 2 pending patents.

Seminar Time: 1:30PM-3:00PM on April 25th 2014

Seminar Location: Technology Square Research Building (TSRB), 1st Floor Auditorium (Rm118), 85 5th Street NW, Atlanta, GA 30308

Organizer: Dr. Hua Wang, IEEE SSCS/CASS Atlanta Joint Chapter Chair, Assistant Professor, School of Electrical and Computer Engineering, Georgia Institute of Technology. Email: hua.wang@ece.gatech.edu. Phone: (404) 385-6003

Light refreshments will be served at the seminar.