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The Electrical and Computer Engineering Program presents
ECEN Seminar Series

Practical Low Power Architectures and Link Improvement Techniques for High Data Rate Wireless Systems

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Monday, 21 April 2014, 12 – 1 pm

Lecture Hall 144

Light lunch will be served

Enabling a vision of a wirelessly interconnected ecosystem involving every aspect of our life including society, machines and the supporting infrastructure, requires innovation and optimization at all levels of the hierarchy.
In this talk, we first consider the Achilles heel of wireless systems, namely, power consumption. Traditionally, reliability is always attributed to higher power consumption. We show that this is not necessarily true. In fact, one can design systems to be both reliable (within desired specifications) and low power. We present a unique approach for power management which factors in the built-in algorithmic resilience to errors inherent in all wireless designs. This error tolerance can be utilized and co-designed with the hardware circuitry in mind to provide resilience not only to channel induced errors but also to hardware induced faults (due to low power modes), thus expanding the adaptation space to unexplored domains. We discuss applying this concept to basic building blocks such as MIMO detectors, FFT blocks, FEC blocks etc. and then proceed to a unified system view that incorporates error modelling.
Secondly, from a link enhancement perspective, we present recent results from our group directed at enabling Full-duplex communications. Currently systems operate in "Half duplex mode" to avoid self-saturation, where the high powered transmitter saturates the receive path. Full-duplex transmission promises to almost double the efficiency by allowing bidirectional communications to be carried out over the same resources. Several recent research efforts have demonstrated that the key challenge in practical full-duplex systems is the un-cancelled self-interference power caused by a combination of hardware imperfections. We discuss recent work that identifies system limitations, performance, optimizations, and the practicality of proposed architectures.

Ahmed M. Eltawil is an Associate Professor and Henry Samueli Faculty Fellow of Engineering at the Electrical Engineering and Computer Science Dept. at the University of California, Irvine (UCI) where he is the founder and director of the Wireless Systems and Circuits Laboratory (WSCL). He received his doctorate degree from the University of California, Los Angeles in 2003.
His current research interests are in digital circuit and signal processing architectures for communication systems. Dr Eltawil received several distinguished awards, including the NSF CAREER award in 2010 supporting his research in low power systems. Since 2006, he has been a member of the Association of Public Safety Communications Officials (APCO) and has been actively involved in expert policy panel discussions towards the applications of cognitive and software defined technology for critical first responder communication networks. He is on the technical program committees for numerous IEEE and ACM workshops, symposia and conferences in the area of VLSI, and communication system design. Dr. Eltawil held several industry positions including the director of ASIC Engineering at a start-up company (Innovics Wireless), where his team delivered the first reported diversity enabled third generation W-CDMA mobile transceiver system on a chip. He was a partner at Silvus Communications, a company that delivers scalable Multi-Input-Multi-Output platforms for OFDM and OFDMA applications. Currently, he works with companies including Broadcom and Mindspeed among other, as a technical expert and consultant.

FOR MORE INFORMATION:

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