IEEE Canada

IEEE COMMUNICATIONS SOCIETY

IEEE Hamilton Section Communications Chapter

CMOS Integrated Circuits for Ultra-Broadband Optical Wireless Communication

Prof. Valencia M. Joyner
Department of Electrical and Computer Engineering
Tufts University

Friday, June 8, 2007, 10:30am
McMaster University
Information Technology Building Annex, Room 113B (ITB/A113)

Abstract:

The explosive growth of performance in themicroprocessor/computing industry coupled with the escalating user demand for internet services and information technology has made the development of broadband wireless communication systems a national imperative. For broadband communication, wireless links based on optical transmission offer several advantages over conventional radio frequency (RF) wireless systems in terms of connection speed, power efficiency, networking security, and unregulated bandwidths in the terahertz range. Optical wireless technology will have significant broader impacts in a wide variety of arenas, including homeland security efforts to reduce wireless network vulnerabilities; health-care networks that transfer, dense high-content digital imaging, process high-bandwidth applications in the midst of critical equipment sensitive to electromagnetic interference; and energy-constrained autonomous sensor systems that require ultra-low power transceivers with millimeter dimensions. This talk will present an overview of research work conducted in the Tufts Advanced Integrated Circuits and Systems Lab focused on developing novel optoelectronic integrated circuit architectures for broadband communication systems. We present a custom flip-chip integrated imaging receiver for use in a tracking line-of-sight optical wireless links operating in the 1.3µm – 1.55µm near-infrared band. A novel selector-combiner circuit architecture implementing optical diversity combining has been demonstrated with good eye diagrams up to 310 Mb/s. In addition, we present the design and experimental results of a CMOS optical receiver front-end amplifier for use in 1Gb/s free-space channels.

Presenter: Prof. Valencia M. Joyner

Dr. Joyner is currently Assistant Professor in the Department of Electrical and Computer Engineering at Tufts University. Prior to joining Tufts, she held an appointment as a VLSI Research Engineer at the University of Southern California's Information Sciences Institute. She completed the B.S . and M.Eng. degrees in electrical engineering and computer science at MIT and the Ph.D. in electrical engineering at the University of Cambridge (UK) in 2003. Her research interests are in silicon-based analog/mixed-signal integrated circuits with a particular focus on circuits that interface with photonic devices for imaging, sensing, and wireless communications. Dr. Joyner is a former Marshall Scholar, Intel Foundation Scholar and National Science Foundation Graduate Research Fellow.

All those interested are welcome to attend, this is a free event.

For more information please contact chapter chair, Dr. Steve Hranilovic (hranilovic @ mcmaster.ca).