Title: CMOS Circuits and Systems for Passive Wireless Microsystems
Speaker: Prof. Fei Yuan, Department of Electrical and Computer Engineering, Ryerson University
Day/Time: 1:00 - 2:00 pm, Thursday, September 24, 2015
Location: ENG 105, Ryerson University, Toronto, (http://www.ryerson.ca/map)

Abstract: Passive wireless microsystems (PWMs) harvest their operational power from radio-frequency waves or other energy sources such as vibration and solar. The absence of bulky batteries not only minimizes the physical dimension and implementation cost of these microsystems, it also removes the need for routine maintenance. As a result, PWMs can be embedded in products or implanted in living bodies permanently to provide the identification of the products or living bodies in which they reside, carry out micro-scale measurement or control that otherwise cannot be performed. This talk will focus on circuit techniques that address the need of a number of critical aspects of PWMs including power harvest from radio-frequency waves, the remote frequency calibration of system clocks, and ultra-low power analog-to-digital converters (ADCs). On power harvest from radio-frequency waves, the talk will focus on the techniques that yield the maximum power harvest efficiency. On the remote frequency calibration of system clocks that control the operation of baseband blocks of PWMs, the talk will center on injection-lock based frequency calibration with an emphasis on the theory and techniques that increase the lock range. On low power analog-to-digital converters, various ADC architectures suitable for low-power applications are examined. Time-mode approaches that are particularly suitable for ultra-low power applications are briefly reviewed.

Biography: Fei Yuan received the BEng. degree in electrical engineering from Shandong University, Jinan, China in 1985, the MASc. degree in chemical engineering and the PhD degree in electrical engineering from University of Waterloo, Ontario, Canada in 1995 and 1999, respectively. During 1985-1989, he was a lecturer in the Dept. of Elec. Eng., Changzhou Institute of Technology, Jiangsu, China and was engaged in the development of microprocessor-based instruments and process control systems. In 1989 he was a visiting faculty at Humber College of Advanced Learning, Toronto, ON. and Lambton College of Applied Arts and Technology, Sarnia, ON. He was with Paton Controls Limited, Sarnia, ON as a Controls Engineer during 1989-1994 where he designed and commissioned total distributed control systems for petrochemical, fertilizer, and food processes worldwide. He joined the Dept. of Elec. and Comp. Eng., Ryerson University, Toronto, ON, Canada as an Assistant Professor in 1999 and was promoted to the rank of Associate Professor in 2003 and Full Professor in 2008. Dr. Yuan served as the Chair of Dept. of Elec. and Comp. Eng. during 2010-2015 and currently serves as the Director of Quality Assurance, Faculty of Eng. and Arch. Science, Ryerson University.

Dr. Yuan is the editor and a lead co-author of CMOS time-mode circuits: principles and applications (CRC Press, in press), the author of CMOS circuits for passive wireless microsystems (Springer, 10), CMOS active inductors and transformers: principle, implementation, and applications (Springer, 08), CMOS current-mode circuits for data communications (Springer, 06) and the primary co-author of Computer methods for analysis of mixed-mode switching circuits (Kluwer, 04). In addition, he authored/coauthored of some 200 research papers in refereed scientific journals and conference proceedings. Dr. Yuan was awarded the Ryerson Research Chair in 2005, the Research Excellence Award from the Faculty of Eng. and Arch. Science in 2004, the Early Tenure from Ryerson Univ. in 2002, the Doctoral Scholarship from Natural Science and Eng. Research Council of Canada during 1997-1998, and the Teaching Excellence Award from Changzhou Institute of Technology in 1988. Dr. Yuan serves as the member of the editorial board of a number of international journals. He is a senior member of IEEE and a registered professional engineer in the province of Ontario, Canada.

All are welcome. No registration needed

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