Analog and Mixed-Signal Center
3128 TAMU
College Station, TX 77843-3128
Tel. (979) 845-9586
Fax. (979) 845-7161
E-mail:kentesar@ece.tamu.edu

ELECTRICAL & COMPUTER ENGINEERING
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S E M I N A R

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Development of Integrated Circuits for Broadband Direct Conversion Receivers in CMOS Technologies

by

Jose Silva-Martinez
Department of ECE
Texas A&M University

Abstract: This presentation will provide insight into the development of building blocks required in broadband CMOS direct-conversion receivers realized in deep submicron CMOS technologies. Dr. Silva-Martinez will describe several techniques used within the front end amplifier, mixer design and baseband transimpedance amplifier to improve both Noise Figure and linearity of the receiver chain. For example, improved robustness to out-of-band interference and outstanding linearity are obtained by employing a broadband common-gate (CG) low-noise transconductance amplifier (LNTA) with dual feedback to improve both gain and noise figure (NF) without compromising other specifications such as input impedance, transconductance gain, and load impedance. The core of the most recently reported receiver in IEEE-JSSC (RF and baseband signal path) consumes only 13 mW, and the prototype receiver achieves over 22.4dB conversion gain, 7 dB NF, and over -1.5 dBm IIP3 from 1.4 to 5.2 GHz.
We will also discuss the design of a couple of highly linear broadband LNAs whose 1dB compression point is over 0dBm. Other relevant building blocks such as Power management circuits (LDOs), Mixers, and frequency synthesizers will be briefly discussed as well.

Dr. Jose Silva-Martinez is an IEEE-Fellow, Editor in Chief of the IEEE Transactions on Circuits and Systems part-II (2014-2015), Senior Associate Editor of the IEEE Journal on Emerging and Selected Topics in Circuits and Systems (2014-2015) and member of the 2013-2014 CASS Distinguish Lecture Program. His record of publications show over 106 journals, 170 conference papers, 3 books, 12 book chapters, 1 patent issued and 4 more pending. According to the citation index, he is the top 6th most prolific author when accounting JSSC and TCAS-Part-I papers in the period 2003-2013. He is the coauthor of the papers that deserved the 2011 IEEE-MWCAS best student paper award, IEEE-RF-IC 2003 best student paper award and recipient of the 1991 IEEE-ESCIRC best paper award. He currently holds the rank of Texas Instruments Professor in Analog Engineering at the Department of ECE, Texas A&M University.