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ELECTRICAL & COMPUTER ENGINEERING
TEXAS A&M UNIVERSITY

S E M I N A R

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Low-Power Circuit Design of Wireless Medical Systems for Invasive and Non-Invasive Applications

by

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Abstract: Recent advances in physiological research and CMOS technology have allowed the development of wireless medical systems (WMS) able to provide reliable monitoring along with high accuracy diagnosis for home care and short stays in health centers. The main issues related with the implementation of such systems are size, cost and lifetime, especially when the monitoring unit is an implantable medical device (IMD). Key solutions to these issues are the selection of the right hardware along with the use of a smart software control algorithm to optimize the power consumption. This presentation will discuss the design, implementation and measurement results of two low-power-oriented WMS for invasive and non-invasive applications: blood pressure monitory of small laboratory animals and a 12-lead ECG for cardiac-activity monitoring.
Additionally, design and characterization of a fully integrated ultra-low-power/low-noise biopotential amplifier for ECG/EEG/EMG applications will be presented. The circuit has been fabricated in the 0.5 um CMOS ON-SEMI process with an total area of 2.25 mm^2. Experimental results show a pass-band gain of 40.2 dB, input referred noise of 2.74 µVrms and a minimum CMRR of 83 dBm. The bioamp operates from a 2 V rail to rail power supply, consuming 1.75 µA.

Jesus Efrain Gaxiola-Sosa was born in Merida, Yucatan, Mexico in 1985. He received the B.S. degree in electrical engineering with high honors from the Merida Institute of Technology, Mexico in 2008. He is currently pursuing the Ph.D. degree in electrical engineering at Texas A&M University, College Station, TX. He participated as system engineer intern with Texas Instruments (Power Management Group) in 2010 and as IC design inter with Biotronik in 2012, working on DC/DC converters design and medical implantable circuit design respectively. His research interests include ultra-low power analog front-ends for biopotential signals, RF baseband circuits and WMS design.