Department of Engineering
Seminar Program
Wednesday, February 11, 2015
Shanahan Teaching and Learning Center
Lecture Hall 1430, 4:15pm

"A Charge-Based Approach in Designing Analog Integrated Circuits"

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Summary:
The demand for connectivity is expanding at an extremely rapid pace. By this year's end, the number of global network connections will exceed two times the world population and it is estimated that in 2020 more than 30 billion devices will be wirelessly connected to the cloud forming the Internet of Things (IoT). Enabling this new era are the revolutionary developments in mobile computing and wireless communication that have arisen over the last two decades. This was fueled in large part by the Moore's Law, coupled with research and development of highly-integrated and cost-effective silicon complementary metal oxide semiconductor (CMOS) devices which facilitated incorporating digital and analog circuit components, such as bulky transceivers, into a single chip.

However, in the last few years, while digital circuits have largely followed their predicted path and benefited from the scaling of CMOS technology into ultra-deep submicron (sub-μm), analog circuits have failed to follow the same trend. Analog and radio frequency (RF) designers remain to discover how to make high-performance integrated circuits (ICs) for feature sizes below 45nm without losing the benefits of shrinking including reduced power, compact area, and higher operational frequencies. A paradigm shift is needed to break through the established science of analog design to meet the system on chip (SoC) demands of the next generation.

This presentation explores the integration trends of analog circuits by discussing the current challenges and by introducing a novel charge-based approach for designing analog CMOS circuits—which ultimately enables their fabrication in an all-digital deep sub-μm IC process. This talk will conclude by envisioning the direction of where analog IC design is headed in the future through empowering the automation of analog IC design.

Bio:
Susan Schober is a Ph.D. Candidate in Electrical Engineering at the University of Southern California, Los Angeles, CA. She received the B.S. degree in Electrical Engineering and M.S. degrees in Electrical Engineering and Engineering Management, all from USC. Susan has over six years of experience working in the semiconductor industry including Qualcomm, Broadcom, Scintera Networks, and MOSIS. Her research interests include creating novel analog/RF circuits for deep sub-μm CMOS technologies, building ultra-low power wireless IC transceivers, developing PLLs for multi-GHz frequency synthesis, and designing wireless inductive/capacitive powering systems. She is named inventor on six issued and pending U.S. patents and has authored eight publications. Susan is the recipient of the 2014 ISI GSS Best Paper Award. Her research has been funded by DARPA, NSF, National Semiconductor /Texas Instruments, and MOSIS.