USC Viterbi
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Ming Hsieh Department of Electrical Engineering

Ming Hsieh Institute Seminar Series
Ming Hsieh Department of Electrical Engineering

Integrated Systems

Time Varying Circuits for Radio Receiver Applications

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Date: Friday, October 13, 2017
Time: 2:00pm   Location: EEB 132

Abstract: Sharp, programmable, linear, integrated filters are enabling components for software defined and cognitive radio applications. They are used to isolate the desired signal in the frequency domain prior to sampling so as to avoid undesirable aliasing. However, they are difficult to realize: SAW and MEMS based filters are sharp and linear but not very programmable; active filters can be sharp and programmable but are not very linear; sampled charge domain filtering is sharp and programmable but the burden of the linearity is on the front end voltage-current converter. This talk describes an alternative approach that uses time-varying (as opposed to time-invariant) circuits.

While any circuit that employs a mixer or a sampling switch can be classified as time-varying, this technique differs in employing circuit components whose values are intentionally varied in time. The technique upends the conventional wisdom that strong filters are required to prevent signal aliasing upon sampling. Instead, it exploits the very same sampling aliases to realize very sharp, filtering. The basics of the time-varying circuit design approach will be explained and its application illustrated with radio front-ends and spectrum scanner examples. Measurement results from recent prototype integrated circuits will also be presented. Time permitting, an analysis technique will also be described.

Biography: Dr. Sudhakar Pamarti is a professor of electrical engineering at the University of California, Los Angeles. He received the Bachelor of Technology degree in electronics and electrical communication engineering from the Indian Institute of Technology, Kharagpur in 1995, and the M.S. and the Ph.D. degrees in electrical engineering from the University of California, San Diego in 1999 and 2003, respectively. Prior to joining UCLA, he has worked at Rambus Inc. ('03-`05) and Hughes Software Systems ('95-`97) developing high speed I/O circuits and embedded software and firmware for a wireless-in-local-loop communication system respectively. Dr. Pamarti is a recipient of the National Science Foundation's CAREER award for developing digital signal conditioning techniques to improve analog, mixed-signal, and radio frequency integrated circuits. Dr. Pamarti currently serves as an Associate Editor of the *IEEE Transactions on Circuits and Systems I: Regular Papers* and as a member of the technical program committees of IEEE CICC and ISSCC.

Hosted by Prof. Hossein Hashemi, Prof. Mike Chen, Prof. Mahta Moghaddam and Prof. Dina El-Damak. Organized and hosted by Shiyu Su.