IEEE SSCS Lehigh/Princeton/Columbia Chapters Present

Distinguished Lecture Colloquia, December 2016

Speaker: Prof. Pavan Hanumolu
University of Illinois, Urbana-Champaign

Talk Title: **Time-based signal representation and its applications to data conversion, filtering and control**

Date: Wednesday, December 7, 2016
Time: 4:15 p.m.
Location: Lehigh University
Packard Lab Room 466
Bethlehem, PA 18015

Abstract: Classical analog and mixed signal processing functions such as filtering and analog to digital conversion are performed in voltage, current, or charge domains. High precision is typically achieved by processing voltage/current/charge using high gain amplifiers embedded in negative feedback. However, achieving high gain in deeply scaled and beyond CMOS technologies is difficult. In this tutorial, I will present time-based signal representation as an alternative to classical voltage or charge-based signal representations. I will then show how this representation enables the implementation of fundamental building blocks such as integrators using mostly digital circuits. Finally, I will present case studies of time-based analog filters, analog to digital converters, and DC-DC converters to highlight the advantages, opportunities, and drawbacks of the time-based approach.

Bio: Pavan Kumar Hanumolu is currently an Associate Professor in the Department of Electrical and Computer Engineering at the University of Illinois, Urbana-Champaign. He received the Ph.D. degree from the School of Electrical Engineering and Computer Science at Oregon State University, in 2006, where he subsequently served as a faculty member till 2013. Dr. Hanumolu's research interests are in energy-efficient integrated circuit implementation of analog and digital signal processing, sensor interfaces, wireline communication systems, and power conversion.

Social Hour: 5:30 pm Packard Lab Room 324

Please register at **http://events.vtools.ieee.org/m/42221**

IEEE SSCS Lehigh/Princeton/Columbia Chapters Present

Distinguished Lecture Colloquia, December 2016

Speaker: Prof. Sven Mattisson
Lund University

Talk Title: **Overview of 5G Requirements and Future Wireless Network**

Date: Wednesday, December 7, 2016
Time: 6:45 p.m.
Location: Lehigh University
Packard Lab Room 416
Bethlehem, PA 18015

Abstract: The impending advent of 5th generation (5G) mobile communications promises near unlimited access to information and data sharing any time and everywhere. This will challenge the reliability, security as well as energy and cost efficiency, for both future devices and future radio access networks (i.e. the infrastructure). We review the evolution of radio access networks with respect to energy and cost efficiency and introduce 5G in this context.

The 5G networks will cover diverse applications such as high capacity low-latency cells with large antenna arrays as well as low-power machine-type communications with modest data rate requirements. Future system requirements are discussed in this context and potential access methods outlined. Array-antenna systems for high-speed cells pose new design challenges and several hardware-based test-bed demonstrators are in development. We provide examples from ongoing work and discuss implementation issues.

Bio: Sven Mattisson received his PhD in Applied Micro Electronics from Lund University in 1986. From 1987 through 1994 he was an associate professor in Applied Micro Electronics in Lund where his research was focused on circuit simulation and analog ASIC design. In 1995 he joined Ericsson in Lund to work on cellular handset development. Presently he is with Ericsson Research in Lund, where he holds a position as senior expert in analog system design. Since 1996 he is also an adjunct professor at Lund University. Dr. Mattisson is a coinventor of Bluetooth and has been serving as technical program committee member for the International Solid-State Circuits Conference and the European Solid-State Circuits Conference. Presently he is working on 5G radio circuits.

IEEE SSCS Lehigh/Princeton/Columbia Chapters Present

Distinguished Lecture Colloquia, December 2016

Speaker: Prof. Samuel Palermo
Texas A&M University

Talk Title: **Silicon Photonic Microring Resonator-Based Transceivers for Compact WDM Optical Interconnects**

Date: Wednesday, December 7, 2016
Time: 8:00 p.m.
Location: Lehigh University
Packard Lab Room 416
Bethlehem, PA 18015

Abstract: The rapid growth of I/O bandwidth in applications such as datacenters and supercomputers motivate the development of interconnect architectures that can dramatically scale bandwidth density in an energy-efficient manner. This talk examines the potential of silicon photonic microring resonator-based optical transceivers for compact wavelength-division multiplexing (WDM) optical interconnects. An overview of the photonic devices typically found in a ring resonator optical interconnect platform is provided and the design of transceiver circuits which address key challenges related to the modulators and drop filters is described. The possibility of further improvements in bandwidth density via efficient implementations of >50Gb/s PAM4 modulation with the microring modulators is detailed.

Bio: Samuel Palermo (S'98-M'07) received the B.S. and M.S. degree in electrical engineering from Texas A&M University, College Station, TX in 1997 and 1999, respectively, and the Ph.D. degree in electrical engineering from Stanford University, Stanford, CA in 2007. From 1999 to 2000, he was with Texas Instruments, Dallas, TX, where he worked on the design of mixed-signal integrated circuits for high-speed serial data communication. From 2006 to 2008, he was with Intel Corporation, Hillsboro, OR, where he worked on high-speed optical and electrical I/O architectures. In 2009, he joined the Electrical and Computer Engineering Department of Texas A&M University where he is currently an associate professor. His research interests include high-speed electrical and optical interconnect architectures, high performance clocking circuits, and integrated sensor systems. Dr. Palermo is a recipient of a 2013 NSF-CAREER award. He is a member of Eta Kappa Nu and IEEE. He has served as an associate editor for IEEE Transactions on Circuits and System – II from 2011 to 2015 and has served on the IEEE CASS Board of Governors from 2011 to 2012. He is currently the General Co-Chair of the IEEE Optical Interconnects Conference. He was a coauthor of the Jack Raper Award for Outstanding Technology-Directions Paper at the 2009 International Solid-State Circuits Conference and the Best Student Paper at the 2014 Midwest Symposium on Circuits and Systems. He received the Texas A&M University Department of Electrical and Computer Engineering Outstanding Professor Award in 2014 and the Engineering Faculty Fellow Award in 2015.