Title: VCO-Based Wideband Continuous-Time Sigma-DeltaAnalog-to-Digital Converters

Abstract:
This talk examines the use of VCO-based quantization within continuous-time, Sigma-Delta ADC circuits. We consider the VCO-based quantizer as an efficient combination of a voltage-to- time converterand a time-to-digital converter, and discuss the advantages it offers in achieving improved quantization noise performance in the ADC. However, the common approach of using frequency as the output of theVCO-based quantizer presents a bottleneck to achieving high SNDR in the ADC due to Kv nonlinearity. We show that using phase as the key output variable removes this nonlinearity barrier. Measured resultsconfirm that 78 dB SNDR performance is achievable with 20 MHz bandwidth while achieving a 330 fJ/conversion step efficiency.

Bio:

Michael H. Perrott received the B.S. degree in Electrical Engineering from New Mexico State University, Las Cruces, NM in 1988, and the M.S. and Ph.D. degrees in Electrical Engineering and Computer Science from Massachusetts Institute of Technology in 1992 and 1997, respectively. From 1997 to 1998, he worked at Hewlett-Packard Laboratories in Palo Alto, CA, on high speed circuit techniques for Sigma-Delta synthesizers. In 1999, he was a visiting Assistant Professor at the Hong Kong University of Science and Technology, and taught a course on the theory and implementation of frequency synthesizers. From 1999 to 2001, he worked at Silicon Laboratories in Austin, TX, and developed circuit and signal processing techniques to achieve high performance clock and data recovery circuits. He was an Assistant and then Associate Professor in Electrical Engineering and Computer Science at the Massachusetts Institute of Technology from 2001 to 2008. He was with SiTime Corporation from 2008 to 2010, where he developed key technology for MEMS-based oscillators. He is currently a professor at Masdar Institute in Abu Dhabi, where he is focusing on low power, mixed-signal circuits for healthcare and other applications.