



Dimes colloquium
Designing Analog and RF circuits for Ultra-low Supply Voltages

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Abstract

Many trends in IC technology and its applications are driving the supply voltage for integrated circuits down into the sub-1V region. Whereas important advantages for ultra-low voltage digital circuits have been demonstrated, the design of ultra-low voltage analog and RF integrated circuits poses a lot of challenges and require the rethinking of many basic analog circuit blocks. We will discuss these challenges and also opportunities for designing analog and RF integrated circuits to operate from ultra-low supply voltages down to 0.5V. Solutions ranging from exploiting the 4-terminals of the MOS device or the threshold voltage dependence on channel length, to the use of circuit topologies that require only stacks of two devices are discussed. The realization of full analog and RF system functions including 0.5V continuous-time filters, 0.5V pipelined and continuous-time sigma-delta ADC and 0.5V 2.4GHz RF receivers and synthesizers is demonstrated and the enabling architecture modifications are introduced. The techniques and results developed in this research aim to enable ultra-low voltage analog and RF circuits both in the context of relatively large threshold voltages, e.g., $|V_T|=V_{DD}$, as well as lower threshold voltages.

Biography

Peter R. Kinget received an engineering degree in electrical and mechanical engineering and the Ph.D. in electrical engineering from the Katholieke Universiteit Leuven, Belgium. He has worked in industrial research and development at Bell Laboratories, Broadcom, Celight and Multilink before joining the faculty of the Department of Electrical Engineering, Columbia University, NY in 2002. His research interests are in analog and RF integrated circuits and signal processing using nanoscale CMOS technologies. He was an Associate Editor of the IEEE Journal of Solid State Circuits (2003-2007) and is currently an Associate Editor for the IEEE Transactions on Circuits and Systems II. He is also serving on the Technical Program Committees of the International Solid-State Circuits Conference and the European Solid-State Circuits Conference. More details can be found at:

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