



INTEGRATED CIRCUITS AND SYSTEMS GROUP (ICSG)

THE ICS SEMINAR SERIES

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Enhancing RF Receivers using Interference Cancellation and Digital Assistance

As IC technology feature sizes scale, the functional density of system-on-chip ICs increases and they often include multiple analog and RF interfaces. At the same time, nanoscale CMOS devices can only operate from lower supply voltages and can have poorer analog characteristics. This makes the design of analog and RF interfaces in nanoscale CMOS technologies particularly challenging.

In this talk we present our recent research in using digital gates to enhance the performance of RF circuits, more specifically of RF receivers. We review where digital gates can help to improve the RF performance. We discuss in detail two specific receiver circuits. The first example uses digital calibration to enhance the IIP2 performance of a direct conversion receiver for full duplex cellular systems. Thanks to digital calibration, the receiver design can be simplified while the performance can be drastically improved.

In the second example we will discuss the design of an ultra-low voltage direct-conversion receiver for cellular applications. So far the performance level of ULV receivers had been limited to wireless personal-area network applications due a degraded trade-off between the noise figure and the linearity caused by the supply voltage reduction. We show that this limit can be overcome by using an in-band feed-forward cancellation receiver architecture. It relies on digital calibration to achieve a robust, high performance across process and environmental variations.

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.

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