



IEEE SSCS Lehigh/Princeton/Columbia Chapters Present
Distinguished Lecture Colloquia, December 2015



Speaker: Prof. Jan Van der Spiegel
University of Pennsylvania

Talk Title: Bio-inspired Polarization Imagers - Making the invisible visible

Date: Wednesday, December 2, 2015

Time: 4:00 PM

Location: Packard Lab, Room 466
Lehigh University
19 Memorial Drive West
Bethlehem, PA 18015



Abstract: Biology provides us with fascinating examples of intelligent, low power, and highly efficient sensory systems. With the advances in CMOS technology, it has become feasible to build microelectronic systems that mimic some of the key features found in biology. This talk will focus on CMOS vision sensors for polarization imaging. We will review briefly the concepts of polarization and how it is used by various species in nature to enhance their vision or to aid with navigation and communication. Inspired by the biology we have explored polarization for a variety of applications to detect features that are hard to see or even invisible to the human eye. More recent results from the literature including the use of polarization imaging for disease detection will be reviewed. Motivated by the potential advantages of polarization imaging, we have developed a CMOS imager that combines the pixel array with micropolarizers and on-chip processing. Details of the design and polarizer optimization will be described.

Social Hour with Refreshments

Time: 5:30 PM

Location: Packard Lab Room 324

Speaker: Prof. Francesco Svelto
Università di Pavia, Italy

Talk Title: On the design of circuits for frequency synthesizers at MM-waves in ultra-scaled CMOS

Time: 7:00 PM

Location: Packard Lab Room 416



Abstract: Transceivers for wireless communications at millimeter-waves are becoming pervasive in several commercial fields. Taking advantage of a cut-off frequency of hundreds of GHz, CMOS technology is rapidly expanding from Radio Frequency to Millimeter-Waves, thus enabling low-cost compact solutions. The question we raise in this talk is whether scaling is just providing advantages at mm-waves or not. We present experimental data of single devices, comparing 65nm and 32nm nodes in a wide-frequency range. In particular, switches used in VCOs for tank components tuning, MOM and AMOS capacitors, inductors. f_T and f_{MAX} increase though slower than in the past, $r_{on} * C_{off}$, a figure of merit for switches, improves correspondingly. As a consequence, wide-band circuits benefit from scaling to 32nm. As an example, a frequency divider-by-4, based on differential pairs used as dynamic latches, realized in both technology nodes and able to operate up to 108GHz, is discussed. On the contrary, passive components do not improve and eventually degrade their performances. As a consequence, a conventional LC VCO, relying on tank quality factor, is not expected to improve. In this work we discuss a new topology for Voltage Controlled Oscillators, based on inductor splitting, showing low noise and wide tuning range in ultra-scaled nodes.

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