

Tutorial: High-Speed Interconnect Technology: On-Chip and Off-Chip

Speakers

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Computing needs for business, communications and gaming applications continue to increase. Innovative IC processing and fabrication techniques developed by researchers from around the globe have allowed microprocessor manufacturers to continue their technology scaling trends such that current processors have hundreds of millions of transistors and have clock rates in multiple giga-Hertz. However, interconnect delays, both on-chip and off-chip, are quickly becoming the bottleneck and will limit the maximum performance attainable from device scaling. On-chip RC and RLC delays are becoming significantly larger than gate delays forcing circuit designers to alter basic design methodologies and system designers to alter traditional architectures and design paradigms. This tutorial provides both timely and relevant information for both on-chip and off-chip interconnect technologies. Topics covered in this tutorial include on-chip wire modeling, delay calculations, optimization and design techniques; off-chip interconnect and cross-talk modeling, high-speed I/O transceivers and drivers, binary and multi-level signaling, clock and data recovery circuits, jitter and phase noise modeling. The speakers bring both academic and industrial experience to bear on this critical topic. The tutorial is aimed at senior students and practicing engineers interested in high-performance circuit designs.

Professors Sachin Sapatnekar, Jaijeet Roychowdhury and Ramesh Harjani are faculty in the Department of Electrical and Computer Engineering at the University of Minnesota. The three speakers are recognized authorities in the fields of on-chip interconnect and high performance digital design; analysis, and simulation of electronic, electro-optical, and mixed-domain systems, and in the design of high-speed and high-frequency communications circuits.

Prof. Sapatnekar received the B.Tech. degree from the Indian Institute of Technology, Bombay in 1987, the M.S. degree from Syracuse University, NY, in 1989, and the Ph.D. degree from the University of Illinois at Urbana-Champaign in 1992.

Prof. Roychowdhury received the Bachelor's degree in electrical engineering from the Indian Institute of Technology, Kanpur, India, in 1987, and the Ph.D. degree in electrical engineering and computer science from the University of California, Berkeley, in 1993.

Prof. Harjani received the B.S. degree from the Birla Institute of Technology and Science, Pilani, the M.S. from the Indian Institute of Technology, New Delhi, and the Ph.D. degree in electrical engineering from Carnegie Mellon University, Pittsburgh, PA, in 1982, 1984, and 1989, respectively. The speakers bring both their industrial and academic experience to bear on material presented.