

*The Electrical and Computer Engineering Program presents
ECEN Seminar Series*

Novel FinFET Memory Circuits for Advanced Computing Systems

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The Hong Kong University of Science and Technology Clear Water Bay, Kowloon,
Hong Kong

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Conference room 310

Light lunch will be served

The amount of on-chip memory is increased to enhance the performance of modern microprocessors in each new CMOS technology generation. More than half of the chip area is occupied by hundreds of millions of Static Random-Access Memory (SRAM) cells in today's most advanced microprocessors. Achieving higher memory integration density, stronger data stability, faster data transfer, and lower energy consumption have been the most important goals of the novel memory technology development efforts for the past three decades. Further advancement of SRAM circuits based on the conventional single-gate Metal-Oxide-Semiconductor Field-Effect Transistor (MOSFET) technology faces severe limitations as the transistor channel length moves into the sub-22nm regime. Higher leakage currents and sensitivity to process and environmental parameter variations are important challenges against the further scalability of the standard single-gate planar transistors. Three-dimensional multi-gate Fin Field-Effect Transistor (FinFET) is the most promising device to continue the CMOS technology scaling into the sub-22nm channel lengths. New SRAM circuits with asymmetrical FinFETs are presented in this talk for achieving enhanced reliability and energy-efficiency without degrading the memory integration density in future microprocessors. With the proposed hybrid asymmetrical SRAM circuits, data stability is enhanced by up to 76% and leakage power consumption is reduced by up to 18.4% while providing similar write voltage margin and maintaining identical silicon area as compared to the standard symmetrical memory circuits in a 15nm FinFET technology.



Volkan Kursun received the B.S. degree in Electrical and Electronics Engineering from the Middle East Technical University, Ankara, Turkey in 1999, and the M.S. and Ph.D. degrees in Electrical and Computer Engineering from the University of Rochester, New York, USA in 2001 and 2004, respectively.

Dr. Kursun is currently a tenured associate professor of Electronic and Computer Engineering at the Hong Kong University of Science and Technology, China. His research interests are in the areas of gigascale 2D and 3D systems-on-chip integration with nanoscale devices and interconnect. He has more than 150 publications and 9 issued USA and China patents in the areas of low-power and high-performance integrated circuits and novel semiconductor devices. He is the author of the book *Multi-Voltage CMOS Circuit Design* (John Wiley & Sons Ltd., August 2006).

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