



Neuroengineering Seminar

Memristor models, read/write circuits, and neuromorphic applications



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**Fung Auditorium, Powell-Focht Bioengineering Building
University of California San Diego**

Memristors are a universal class of charge-dependent resistance devices that recently have found applications as binary-state storage elements in crossbar resistive array digital memories such as Phase Change Memory, ReRAM, and MRAM. Owing to the analog nature of their dynamics, a variety of applications based on analog memory function and adaptation are also emerging, such as synapse arrays for neuromorphic systems. In this presentation, the basic operation principles of memristors are briefly introduced. Verilog-A model, SPICE macromodels, and emulation circuits for simulating and designing memristor circuits are explained. Read and write schemes of memristors that can compensate for severe Process-Voltage-Temperature variations are presented. Finally, neuromorphic applications are illustrated with the implementation of cellular neural networks and spike time dependent plasticity using memristors.

Biography: Kyeong-Sik Min received the B.S. degree in Electronic and Computer Engineering from Korea University, Seoul, Korea, in 1991, and the M.S.E.E. and Ph. D. degrees in Electrical Engineering from the Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Korea, in 1993 and 1997, respectively. In 1997, he joined Hynix Semiconductor Inc., where he was engaged in the development of low-power and high-speed DRAM circuits. From 2001 to 2002, he was a research associate at the University of Tokyo, Tokyo, Japan, where he designed low-leakage memories and logic circuits. In September 2002, he joined the faculty of Kookmin University, Seoul, Korea, where he is currently a Professor in the School of Electrical Engineering. From Aug. 2008 to Aug. 2009, he was a visiting professor at the School of Engineering, University of California, Merced. His research interests include low-power VLSI, memory design, and power IC design. Prof. Min served on several technical program committees of the international and domestic conferences including the Asian Solid-State Circuits Conference, International Symposium on SOC, and Korean Conference on Semiconductors. He is a member of IEEE, IEICE, and IEEK.

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