



Computer Engineering

CE Program Seminar



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Soft-Error Tolerance by Design

Radiation-induced soft errors started introducing reliability concerns in semiconductor memories more than three decades ago. The level of threat imposed by soft errors has increased dramatically for both memory and logic circuits, primarily due to decreasing circuit noise margin, increasing device density, and higher reliability requirement. How to build a reliable semiconductor engine while meeting the performance and power requirement is extremely important for future computing technology development.

In this talk, I will present a unified framework that helps understand and mitigate soft errors in a system through the employment of a soft error rate analysis (SERA) methodology and various circuit design techniques. The SERA methodology enables designers to evaluate the severity of the soft error problem in an existing design, to identify the most vulnerable blocks, and to evaluate the effectiveness of new circuit or architectural design techniques. Various classes of circuit design techniques have been devised to mitigate soft errors in distinct ways since different components oftentimes have different reliability requirements. These design techniques interact with one another as well as with the SERA methodology at the system level to achieve the optimal reliability-performance-power tradeoffs.

Speaker Bio

Ming Zhang is a PhD candidate in electrical engineering at the University of Illinois at Urbana-Champaign, where he received the MSEE degree in 2001. He received the BS degree in physics from Peking University, Beijing, China, in 1999. From May 2004 to May 2005, he interned at Intel Corporation and worked on soft error resilient circuit and fault-tolerant architecture development.

His research interests include error-resilient and low-power circuits, variation-tolerant architectures, and circuit/architecture design for nanotechnology. He has published fourteen technical papers and holds seven issued or pending US patents. His recent honors include an M. E. Van Valkenburg Graduate Research Award and a University Teaching Award.



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