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CECS Seminar

"Beyond Approximate Computing: Quality-Scalability for Low-Power Embedded Systems and Machine Learning"

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2:00-3:00 p.m. PST
Location: https://uci.zoom.us/j/98632011722

Abstract: Approximate computing is a new paradigm to accomplish energy-efficient computing in this twilight of Moore's law by relaxing the exactness requirement of computation results for intrinsically error-resilient applications, such as deep learning and signal processing, and producing results that are "just good enough." It exploits that the output quality of such error-resilient applications is not fundamentally degraded even if the underlying computations are greatly approximated. This favorable energy-quality tradeoff opens up new opportunities to improve the energy efficiency of computing, and a large body of approximate computing methods for energy-efficient "data processing" have been proposed. In this talk, I will introduce approximate computing methods to accomplish "full-system energy-quality scalability." It extends the scope of approximation from the processor to other system components including sensors, interconnects, etc., for energy-efficient "data generation" and "data transfer" to fully exploit the energy-quality tradeoffs across the entire system. I will also discuss how approximate computing can benefit the implementation of machine learning on ultra low-power embedded systems.

Biography: Prof. Younghyun Kim is an Assistant Professor in the Department of Electrical and Computer Engineering and an ECE Grainger Faculty Scholar at the University of Wisconsin-Madison, where leads the Wisconsin Embedded Systems and Computing (WISEST) Laboratory (https://wisest.ece.wisc.edu/). Prof. Kim received his B.S. degree in computer science and engineering and his Ph.D. degree in electrical engineering and computer science from Seoul National University in 2007 and 2013, respectively. He was a Postdoctoral Research Assistant at Purdue University and a visiting scholar at the University of Southern California. His current research interests include energy-efficient computing and security and privacy of the Internet-of-Things. Prof. Kim was a recipient of several awards, including the NSF Faculty Early Career Development Program (CAREER) Award, Facebook Research Award, IEEE Micro Top Pick, the EDAA Outstanding Dissertation Award, and the Design Contest Awards at the ACM/IEEE International Symposium on Low Power Electronics and Design (ISLPED). He served on the Technical Program Committees of various conferences on design automation and embedded systems, including the Design Automation Conference (DAC), ISLPED, Asia and South Pacific Design Automation Conference (ASP-DAC), International Conference on VLSI Design (VLSID), and Symposium on Applied Computing (SAC). He served as a Guest Editor for a Special Issue of VLSI Integration Journal (Elsevier).