USC Viterbi School of Engineering
Ming Hsieh Department of Electrical Engineering

Ming Hsieh Institute Seminar Series
Ming Hsieh Department of Electrical Engineering

Integrated Systems

Highly Efficient Neuromorphic Computing Systems with Emerging Nonvolatile Memories

Dr. Hai "Helen" Li

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Date: Friday, September 13rd, 2019 - Time: 2:00pm - Location: EEB 132

Abstract: Inspired by the working mechanism of human brains, neuromorphic computing system (NCS) possesses a massively parallel architecture with closely coupled memory. NCS can be efficiently implemented by emerging nonvolatile memories, e.g. memristor crossbar arrays, because of its analogy to matrix multiplication and high resistance. However, memristor fabrication process cannot produce perfect devices: limited high/low resistance ratio and resistance level, varying resistance range and nonlinearity bring difficulties into hardware implementation. In this talk, we will start with spike and level versions of memristor based Neuromorphic chip prototypes using Integrate-and-Fire-Circuit and their applications in pattern recognitions, followed by the discussion on the challenges and our solutions on bridging the gap between software algorithm and hardware implementation. Both circuit design techniques and algorithm tailoring will be covered.

Biography:

Dr. Hai "Helen" Li is Clare Boothe Luce Associate Professor with the Department of Electrical and Computer Engineering at Duke University. She received her B.S and M.S. from Tsinghua University and Ph.D. from Purdue University. At Duke, she co-directs Duke University Center for Computational Evolutionary Intelligence. Her research interests include neuromorphic circuit and system for brain-inspired computing, conventional and emerging memory design and architecture, machine learning acceleration and security, and software and hardware co-design. She received the NSF CAREER Award (2012), the DARPA Young Faculty Award (2013), TUM-IAS Hans Fisher Fellowship from Germany (2017), seven best paper awards and another eight best paper nominations. Dr. Li is a fellow of IEEE and a distinguished member of ACM. For more information, please see her webpage at http://cei.pratt.duke.edu/.

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Organized and hosted by Aoyang Zhang (aoyangzh@usc.edu).