

SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Faculty of Engineering

Website: <https://www.eng.nus.edu.sg/ece/>

Area: Integrated Circuits & Embedded Systems

Host: Prof Massimo Alioto

Research/Technical Seminar

TOPIC	:	Building Neuromorphic Systems to See, to Think, to Create
SPEAKER	:	Dr. Jason K. Eshraghian University of Michigan
DATE	:	Wednesday, 5 August 2020
TIME	:	10.00AM to 11.00AM
WEBINAR	:	Join Zoom Meeting https://nus-sg.zoom.us/j/4156763801?pwd=cUdJUkFBZC85eVI5OEEd5aHhrSDhNUT09 Meeting ID: 415 676 3801 Password: 335166

ABSTRACT

With artificial neural networks becoming ubiquitous in modern life, how can hardware keep up with an exponentially increasing amount of data in need of processing? One solution is to reverse-engineer the biological nervous system to build circuits that take inspiration from the brain's cognitive capabilities. This paradigm is known as neuromorphic computing. It seeks to emulate the way neurons compute, thus linking the seemingly disparate fields of devices, electronics and neuroscience in order to build highly-parallel, ultra-low power sensors and systems. It turns out that neuromorphic hardware can be implemented using the most recent developments in non-volatile memory technology, namely RRAM, which can parallelize a huge number of simple operations. This is precisely what is needed in the implementation of deep neural network accelerators with billions of parameters, making RRAM processing of neural networks superior over classical digital computers. This presentation will explore the opportunities and challenges of using hybrid RRAM-CMOS integrated circuits for retina-inspired image processing and brain-driven computation. The powerful capabilities of these neuromorphic processors are applied to real-world challenges in data-driven healthcare, neurostimulation, and in AI-generated artwork, as we make a profound shift away from the sequential processing of Von Neumann machines towards parallel, interconnected neural-inspired structures.

BIOGRAPHY

Jason K. Eshraghian is a Post-Doctoral Researcher at the Department of Electrical Engineering and Computer Science, University of Michigan in Ann Arbor. He received the Bachelor of Engineering (Electrical & Electronic) and the Bachelor of Laws degrees from The University of Western Australia, Perth, WA, Australia in 2016, where he also completed his Ph.D Degree. From 2015 to 2016, he was a Research Assistant at Chungbuk National University, South Korea. Since 2019, he has been heavily involved with the AI-healthcare industry as the CTO of iDataMap Corporation, and an Analog Design Engineer with HummTech. He is also a member of the IEEE Neural Systems and Applications Technical Committee. His current research interests include neuromorphic computing and RRAM-based in-memory processing. Jason was awarded the 2019 IEEE Very Large Scale Integration Systems Best Paper Award, and the Best Paper Award at the 2019 IEEE Artificial Intelligence Circuits and Systems Conference for his work in neuromorphic vision.

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