

Keynote Speech II

10:00–11:00, Tuesday, March 30, 2021

Design Methodologies for Scalable and Energy-Efficient Neuromorphic Computing

Prof. Anup Das
Drexel University, USA

Abstract

Hardware implementation of neuromorphic computing can significantly improve energy efficiency, thanks to their event-driven nature of activations, low-power designs of hardware components, and distributed implementation of in-place computation and synaptic storage using Non-Volatile Memory (NVM). Modern neuromorphic architectures present several challenges, both on the hardware and on the software front. From the hardware perspective, there is a clear limitation on the scalability of neuromorphic architectures. In fact, as the complexity of these architectures increases, data communication becomes the critical performance and energy bottleneck. From the software perspective, executing a machine learning program on a computer involves several steps: compilation, resource allocation, and run-time mapping. Although apparent for mainstream von-Neumann computers, these steps are not well defined for neuromorphic architectures. This talk will introduce the energy and scalability problems in neuromorphic computing with NVM and our hardware and software-based solutions to these problems.