Neuromorphic Hardware Architectures for Energy-Efficient and Fault-Tolerant Embedded AI

Liam FRIEL
TIMA

Abstract

The rise of artificial intelligence and embedded systems requires new hardware approaches capable of combining high performance, energy efficiency, and robustness. Neuromorphic architectures, inspired by the functioning of the human brain, represent a promising path to overcome the limitations of conventional (Von Neumann) computing architectures. By reproducing the principles of parallel, asynchronous, and distributed processing found in biological neurons, these circuits enable systems that can perform local data processing, adaptive learning, and resilience to hardware faults.

This talk will present recent research directions toward the design, modeling, and evaluation of neuromorphic circuits that achieve low energy consumption and high fault tolerance. Focusing on embedded AI and sensory signal processing applications, it will discuss how hardware neural modeling, network topology optimization, and emerging implementation technologies can be combined to build robust and efficient neuromorphic systems.