2 Undergraduate Research Assistant Positions
Reconfigurable Computing Laboratory
University of Arizona

Performance Period: Fall 2019- Spring 2020

Workload: 10-15 hours/week

Application Deadline: July 15, 2019, 5:00pm

Project Background: In 2017 we started a project funded by Raytheon tailored for undergraduate students to conduct research in the field of neuromorphic computing, and prepare each student for a research and development oriented career. We are interested in exploring the neuromorphic computing architectures with a focus on the TrueNorth chip. Seven undergraduate students have participated in this project. Accomplishments to date:

- We emulated the TrueNorth architecture with 150 cores on the Xilinx Virtex-7 series Field Programmable Gate Array (FPGA) and verified its functionality.
- We extended our implementation to streaming enabled TrueNorth emulation based on Zynq UltaScale MPSoC platform.
- We verified one-to-one spiking behavior with FPGA emulation for 10,000 MNIST testing images. We validated our emulation platform in collaboration with researchers form the Air Force Research Laboratory with a one-to-one match to IBM’s Compass TrueNorth programming and simulation environment) outputs.

Current State and Expectations: Recently we implemented the Vector Matrix Multiplication (VMM) on the TrueNorth and conducted functional verification against the Compass based implementation of the VMM. Current VMM implementation requires non-scalable workarounds due to the fixed nature of the TrueNorth chip. Additionally, there are a number of design decisions, which are not inherent to the hardware: the number of weights a neuron can have, the number of neurons in a core, and the number of cores a neuron can communicate with. During the 2019-2020 cycle, the team will investigate architectural modifications to the TrueNorth on the scalability of mapping VMM to TrueNorth. The undergraduate students will work collectively, participate in weekly meetings with graduate students, be involved in writing technical papers as a lead author or co-author.

Contact Dr. Akoglu (akoglu@ece.arizona.edu) with the subject line “neuromorphic research position” and include your resume that highlights your relevant course projects and programming experience.

Preferred Background: Programming with FPGAs and Python/C