



Distributed,
Intelligent, and
Scalable Computing



Lab

PhD Positions are available in the DISCO Lab at Drexel University to work on software engineering for neuromorphic computing. In particular, we are looking for candidates who is a good team player and have experience working with virtual machines, operating systems, compilers, and programming languages. Experience in SystemC/C++ is required for these positions. Some experience on Application Programming Interface (API) development is desired.

PhD candidates are expected to work with our key industrial collaborators in neuromorphic computing, both in the United States and in Europe. National and international internships during the summer will be possible during PhD duration.

Brief abstract of the project: Machine learning methods such as neural networks have been successfully used in real-time computer vision and signal processing areas. Neuromorphic systems, which mimic biological neurons and synapses, can be used to implement these neural networks in energy-constrained computing platforms. However, due to the absence of a user-friendly programming interface, the use of neuromorphic systems is currently limited to research. This project will develop such an interface, allowing for these systems to be more easily programmed and used by the broader science and engineering community within the U.S. The open-sourced programming tools will enable faster development and commercialization of neuromorphic systems in the U.S. and facilitate collaboration with other such communities worldwide.

Executing a program on a computer involves several steps: compilation, resource allocation, and run-time mapping. Although very well defined for mainstream computers, no prior work has investigated these steps in a systematic manner for neuromorphic systems. This project will develop compiler tool chains to translate a user's machine learning program to low-level languages that can be interpreted by neuromorphic systems. A key initiative is to develop a common representation across different platforms. Resource optimization strategies will be developed to improve program performance; as well as an Operating System like framework that will allow programmers to easily deploy their machine learning programs on neuromorphic systems.

Brief bio of the PI: Dr. Anup Das is an Assistant Professor at Drexel University. He received his PhD in Embedded Systems from National University of Singapore in 2014. Following his Ph.D., he was a post-doctoral fellow at University of Southampton, UK and a researcher at IMEC in Belgium/Netherlands. He is the recipient of NSF/DARPA Real-time Machine Learning (RTML) award and NSF Early Faculty CAREER award, both in the neuromorphic computing domain. His work has led to several best paper nominations in international conferences. His work on dependable neuromorphic computing was selected as a distinguished paper at the European Dependable Computing Conference (EDCC) in 2020. He is a senior member of the IEEE. <http://www.pages.drexel.edu/~ad3639/publications.html>

To apply: Please send a CV, transcript, and cover letter to anup.das@drexel.edu.