

Tri M. Nguyen

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EDUCATION	Princeton University , Princeton, NJ, USA Doctor of Philosophy (Ph.D.) in Electrical Engineering Adviser: Professor David Wentzlaff	Sep 2012 – Sep 2018
	University of Texas at Austin , Austin, TX, USA Bachelor of Science (B.S.) in Electrical and Computer Engineering Graduated with High Honors. Cumulative GPA: 3.93 / 4.00	Sep 2008 – May 2012
RESEARCH INTERESTS & EXPERTISE	Interests: neuroscience, computer architecture, deep learning Skills: architectural simulation, RTL design, deep learning frameworks, computing cluster admin Programming fluency: C, C++ 11, Python, Cython, Java, PyTorch, Tensorflow, Verilog	
RESEARCH EXPERIENCE	Harvard Medical School <i>Post-doctoral Research Associate</i> Cerebellum: Reconstructed a mouse cerebellum connectome at synapse resolution from electron microscopy (EM) data - we sought to understand how specific wirings can give rise to learning and memory. Analyzing >4k neurons and >150k synapses, we found the CNN-like feedforward network to contain structured redundancy that made generalize learning better to input variations. Neuron segmentation: Developed software frameworks for efficient processing of brain datasets, including <i>Daisy</i> (parallel computation), <i>Segway</i> (segmentation pipeline), and <i>MD-Seg</i> (Neuroglancer-based proofreading platform). Frameworks were successfully used on datasets of different imaging modalities including X-ray, transmission EM, and FIB-SEM. Built and maintained a local computing cluster for running segmentation. <i>PI: Dr. Wei-Chung Lee</i> (https://lee.hms.harvard.edu)	Sep 2018 – Present
	Princeton University <i>Research Assistant</i> Bandwidth compression: Investigated bandwidth starvation of manycore architectures (e.g., GPUs) and solutions including cache compression, link compression, HBM, and efficient memory layout. Work published in <i>MICRO'15</i> , <i>MICRO'18</i> . NVM: Studied nonvolatile memory as a DRAM replacement and novel high performance crash consistency. Work published in <i>MICRO'18</i> . OpenPITON manycore processor: Designed the cache system, cache-coherence protocol, network-on-chip protocol, and JTAG debug-port for PITON, a 25-core academic manycore processor. Verified the design with directed and randomized assembly tests. Synthesized the design with industrial tools (Synopsys) and taped out in IBM 32nm process. https://parallel.princeton.edu/piton PRIME open-source simulator: Developed a C++ distributed parallel and scalable manycore simulator. Added event-driven modeling to simulate bandwidth usage. Added SimPoint support for fast simulation. https://github.com/PrincetonUniversity/primesim <i>Advisor: Professor David Wentzlaff</i>	Sep 2012 – Sep 2018
	University of Texas at Austin <i>Research Assistant</i> Hardware accelerator: Conducted a feasibility study of accelerating drug discovery using FPGA, through studying molecular dynamic algorithm and analyzing the integer/floating point performance of FPGAs. GPU: Identify and optimize GPU workloads with dynamic compilation through similarity matrices. <i>Advisor: Professor VJ Reddi</i>	Sep 2011 – May 2012
WORK EXPERIENCE	NVIDIA Research , Redmond, WA, USA <i>Research Intern</i> Investigated and characterized the performance of cutting-edge GPU DNN machine learning algorithms including CNN and LSTM. Devised architectural improvements for future GPUs beyond Volta. Characterized GPU performance as a shared virtual GPU in the cloud. Contributed to the development of the internal GPU simulator widely used in company. <i>Mentor: Evgeny Bolotin</i>	Jun 2017 – Sep 2017

AMD Research, Boxborough, MA, USA

Jun 2016 – Sep 2016

Research Intern

Implemented state-of-the-art hardware compression algorithm for super-computing workloads and evaluated energy savings at the RTL/gate-level. Submitted a patent on a novel compression algorithm specifically designed to reduce data movement energy.

Manager: Greg Sadowski

NVIDIA, Santa Clara, CA, USA

May 2012 – Aug 2012

Intern

Wrote data extraction software for on-die oscilloscope and used it to analyze transient voltage spikes as a cause of failure. Improved voltage noise virus testing suite to increase fault coverage and decrease test time.

Manager: Apoorv Gupta

Samsung, Suwon, South Korea

May 2011 – Aug 2011

Intern

Investigated the feasibility and benefits of data compression for solid-state drives (SSD), including gzip/DEFLATE, fixed block-based compression, and fingerprinting for variable block-size compression.

Manager: Kyungho Kim

**TEACHING
EXPERIENCE**

DL@MBL: Deep Learning for Microscopy Image Analysis

September 2021

Course Facilitator

Taught bio students at the PhD and postdoc level in a 10-day intensive course at the Marine Biology Lab in Woods Hole on how to best integrate deep learning to their work. Worked with a talented team of course facilitators to guide students through the lab sessions and help them apply DL techniques on their own datasets.

Princeton ELE301 – Design of Real Systems

Fall 2013 & Fall 2017

Assistant Instructor

Developed lab portion of a new course where we taught Android programming and how to interface such software to microcontrollers. Led weekly lab sessions and designed microcontroller exercises.

**NEUROSCIENCE
PUBLICATIONS**

Tri Nguyen, Logan Thomas, Jeff Rhoades, Ilaria Ricchi, Cindy Yuan, Arlo Sheridan, David Hildebrand, Jan Funke, Wade Regehr, and Wei-chung Allen Lee. “*Structured connectivity in the cerebellum enables noise-resilient pattern separation.*” *bioRxiv preprint* (2021)

Jasper Phelps, David Grant Colburn Hildebrand, Brett J. Graham, Aaron T. Kuan, Logan A. Thomas, **Tri Nguyen**, Julia Buhmann et al. “*Reconstruction of motor control circuits in adult Drosophila using automated transmission electron microscopy.*” *Cell* (2021)

Julia Buhmann, Arlo Sheridan, Caroline Malin-Mayor, Philipp Schlegel, Stephan Gerhard, Tom Kazimiers, Renate Krause, **Tri Nguyen** et al. “*Automatic detection of synaptic partners in a whole-brain Drosophila electron microscopy data set.*” *Nature Methods* (2021)

Arlo Sheridan, **Tri Nguyen**, Diptodip Deb, Wei-Chung Allen Lee, Stephan Saalfeld, Srini Turaga, Uri Manor, and Jan Funke. “*Local shape descriptors for neuron segmentation.*” *bioRxiv preprint* (2021)

Aaron Kuan, Jasper S. Phelps, Logan A. Thomas, **Tri Nguyen**, Julie Han, Chiao-Lin Chen, Anthony W. Azevedo et al. “*Dense neuronal reconstruction through X-ray holographic nano-tomography.*” *Nature Neuroscience* (2020)

**COMPUTER
ARCHITECTURE
PUBLICATIONS**

Tri Nguyen, and David Wentzlaff, “*PiCL: a Software-Transparent, Persistent Cache Log for Nonvolatile Main Memory,*” *MICRO’18*

Tri Nguyen, Adi Fuchs, and David Wentzlaff, “*CABLE: Cache-based Link Compression for Manycore Architectures,*” *MICRO’18*

Tri Nguyen, and David Wentzlaff, “*MORC: Manycore-oriented Cache Compression,*” *MICRO’15*

Yaosheng Fu, **Tri Nguyen**, and David Wentzlaff, “*Coherence Domain Restriction on Massive Scale Systems,*” in *MICRO’15*

Michael McKeown, Yaosheng Fu, **Tri Nguyen**, Yanqi Zhou, Jonathan Balkind, Alexey Lavrov, Mohammad Shahradsad, Samuel Payne, Xiaohua Liang, Matthew Matl, and David Wentzlaff “*OpenPiton: An Open Source Manycore Research Framework,*” in *ASPLOS’16*

HONORS & AWARDS	The Edward R. and Anne G. Lefler Fellows , Harvard Medical School Supports from HMS for my postdoctoral study of the cerebellum.	2020 – 2022
	Student Travel Grant , MICRO'17, ASPLOS'16, ISCA'15, ISCA'14 Supports from ACM, NSF, SIGMICRO, and others.	
	University Honors , University of Texas at Austin	2008 – 2012
	Third place , Final Project EE345L, Embedded Systems Design, UT Austin Microcontroller as a gaming device with impressive 3D capability	Dec 2010
	First place in tank simulation AI competition. EE319K, Intro to Embedded Systems, UT Austin	Dec 2009
ACTIVITIES	Musical MelodEE , Princeton EE department <i>Organizer</i>	Mar 2017
	Eta Kappa Nu Honors Society , UT Austin <i>Member</i>	Sep 2010 – May 2012
	Shotokai Karate Club , UT Austin <i>Member then vice-president</i>	Sep 2008 – May 2010
	<i>Last updated: December 2021</i>	