William Liu

(608) 886-3074 // me@williamliu.me // www.williamliu.me

Bio

I am a software engineer, as well as a computer scientist and cognitive scientist.
I find that I am broadly interested in high performance computing, domain-specific compilers, reconfigurable architectures, theoretical neuroscience, deep learning, and teaching.
For a shorter overview, please check out my resume at: williamliu.me/Rez_U_May.pdf

Updated: Mar 26, 2021

Education

The University of Texas at Austin // Austin, Texas
M.S. Computer Science — May 2023 (Expected)

Carnegie Mellon University // Pittsburgh, Pennsylvania
B.S. Cognitive Science, Minor in Computer Science — May 2020
Alpha Epsilon Pi Fraternity
Research Advisor: Saugata Ghose

University of Wisconsin—Madison // Madison, Wisconsin
High School Dual Enrollment in Applied Mathematics and Engineering Physics — May 2016

Professional Experience

SambaNova Systems // Palo Alto, California
Software Engineer — June 2020 — Present
- Designed and optimized architecture-specific high-throughput convolution operators
- Built optimizing compiler for machine learning and high-performance computing applications, and desgined and implemented dataflow graph optimizations algorithms

Nvidia // Santa Clara, California
Deep Learning Software Intern — May 2019 — August 2019
- Machine learning model compression for custom embedded processor

Uber // Pittsburgh, Pennsylvania
Software Engineering Intern — May 2018 — August 2018
- Message passing protocols in a distributed operating system

Skills

Programming Languages:
C, C++, Python, SML, TypeScript, JavaScript, MATLAB, Octave, R, OCaml

Machine Learning:
Tensorflow, Keras, High-Resolution Image Processing, Semantic Segmentation

Frameworks and Tools:
LLVM, Cuda, OpenMP, Open MPI, Unix, Git, Perforce

Web Development:
GraphQL, React, MySQL, PostgreSQL, NextJS, Urql, TypeORM, AWS, DigitalOcean, Vercel, Express, MongoDB

Design:
InDesign, Photoshop, Illustrator, Adobe XD, Sketch, AutoCAD, SolidWorks, User Research

Languages:
Mandarin Chinese (Basic Professional Proficiency)

Miscellaneous:
LaTeX, Gantt Charts, Agile Software Development, Asana, JIRA

Research Experience

Computer Architecture Lab at Carnegie Mellon // Pittsburgh, Pennsylvania
Research Assistant December 2016 — May 2020
Research Areas: Operating Systems and Memory Architecture
Research Advisor: Saugata Ghose

CMU Articulab // Pittsburgh, Pennsylvania
Research Intern August 2017 — December 2017
Research Areas: Rapport Modeling and Human-AI Interaction
Research Advisors: Michael Madaio and Justine Cassell

Peer-Reviewed Publications

S Ghose, A G Yağlıkçı, R Gupta, D Lee, K Kudrolli, **W X. Liu**, H Hassan, K K. Chang, N Chatterjee, A Agrawal, M O'Connor, O Mutlu
"What Your DRAM Power Models Are Not Telling You: Lessons from a Detailed Experimental Study"
in Proc. of the ACM SIGMETRICS Conference, Irvine, CA, June 2018
in Proc. of the ACM on Measurement and Analysis of Computing Systems (POMACS), Vol. 2, No. 3, December 2018

Other Publications

M. Emani, V. Vishwanath, C. Adams, M. E. Papka, R. Stevens, L. Florescu, S. Jairath, **W. Liu**, T. Nama, and A. Sujeeth
"Accelerating Scientific Applications With SambaNova Reconfigurable Dataflow Architecture"
in Computing in Science & Engineering, Vol. 23, No. 2, pp. 114-119, March 2021

Teaching Experience

15-418 Parallel Computer Architecture and Programming // Carnegie Mellon University
Teaching Assistant *(Rating: 5.0/5)* Spring 2020
15-418 "provides a deep understanding of [...] the fundamental principles and engineering trade-offs involved in designing modern parallel computing systems as well as teaches parallel programming techniques necessary to effectively utilize these machines"

85-310 Research Methods in Cognitive Psychology // Carnegie Mellon University Spring 2020
Head Teaching Assistant *(Rating: 4.5/5)*
85-310 teaches students how to conduct independent research in cognitive science by designing, running, and evaluating a novel research project and writing up an extensive report

15-110 Principles of Computing // Carnegie Mellon University — Fall 2019
Teaching Assistant *(Rating: 4.8/5)* — Fall 2018
Teaching Assistant *(Rating: 5.0/5)* — Spring 2018
Teaching Assistant *(Rating: 4.6/5)* — Fall 2017
Teaching Assistant *(Rating: 3.5/5)*
15-110 is a fast-paced and broad introduction to the field of computer science from basic theory to programming techniques

Projects

Detailed descriptions for all projects can be found at: ***https://williamliu.me/categories/project/***

Reducing Cache Pollution at Compile Time // Course Project, May 2020
Reduced cache pollution in large memory streaming applications by inserting non-temporal memory instructions through multiple compiler passes

Improving CNN Interpretability // Course Project, May 2019
Improve CNN kernel interpretability by guiding and extracting kernel gradient convergence results using part-templates

Parallel Galaxy Simulation // Course Project, May 2019
Built and optimized parallel galaxy simulator with a lock-free quadtree and experimented with different parallel numerical integration methods

Simon // PennApps XVIII Hackathon, September 2018
Train a robot to do a simple mechanical task by doing it yourself and the robot will mimic your actions
Top 30 Hack

Modware // PennApps XVII Hackathon, January 2018
Prototype with basic modular hardware components by controlling the "wiring" through software
2nd Place Overall, Best Hardware Hack, Hacker's Choice Award, and Best IoT Prize

Facebook Discourse // Facebook Global Hackathon Finals, November 2017
Digitize and organize political debates in real time to streamline political media
Grand Prize out of 14 finalists from 11 different countries

ResistAR // TartanHacks 2017 Hackathon, February 2017
Augmented reality app that visualizes the voltage across and current through each component in a circuit
Grand Prize

Autonomous Ground Support Equipment // NASA's Centennial Challenge, April 2016
Autonomous robotics system to support a rocket launch carrying payload
2nd Place as the only high school team in this college competition

Select Coursework

Mathematics and CS Theory:
Topics in Deep Learning, Topology and Modal Logic, Parallel Algorithms, Functional Programming, Machine Learning, Computational Perception, Numerical Analysis and Algebra, Theoretical Computer Science

Systems:
Optimizing Compilers, Parallel Computer Architecture, Advanced Operating Systems

Psychology:
Consciousness, Adaptive Neural Decision Making, Systems Neuroscience, Human Experience in Design, Neural Foundations of Behavior

Organization Involvement

CMU Tricking Club I highly encourage you to look up Tricking if you like gymnastics or parkour :)
Member — January 2020 — May 2020
Co-Founder and President — December 2016 — January 2020

Cognitive Science Student Advisory Board
Treasurer — August 2018 — May 2020
Board Member — January 2018 — August 2018

Scotch'n'Soda Theatre
Assistant Director for *RENT* — January 2020 — March 2020
Production Manager for *The House of Yes* — January 2018 — February 2018
Stage Manager for *Young Frankenstein* — August 2017 — October 2017
Stage Manager for *Heathers: The Musical* — January 2017 — April 2017
Assistant Stage Manager for *Rosencrantz and Guildenstern are Dead* — January 2018 — February 2020
Hair and Makeup Artist for *Murder Ballad* — September 2018 — October 2016

St. Mary's Hospital
Inpatient Volunteer — July 2013 — May 2015

Professional Affiliations

IEEE, IEEE TCuARCH, IEEE TCCA, ACM, ACM SIGARCH

Interests

Photography, Filmmaking, League of Legends, Music, Anime/Animation, Weight Lifting, Pokémon