William Liu

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Bio

I am a software engineer, as well as a computer scientist and cognitive scientist.
I generally find myself working on problems in parallel systems/algorithms, domain-specific compilers, human-AI interaction, mixed reality, deep learning, (computational) linguistics, and applications of cognitive science.

For just the highlights of my work, please check out my resume at: williamliu.me/Rez_U_May.pdf

Updated: Nov 30, 2022

Education

Carnegie Mellon University // Pittsburgh, Pennsylvania
B.S. in Cognitive Science — Aug 2016 — May 2020
Minor in Computer Science

The University of Texas at Austin // Austin, Texas (Remote)
Graduate Coursework in Computer Science — Aug 2020 — Jul 2022

University of Wisconsin—Madison // Madison, Wisconsin
High School Dual Enrollment in Applied Mathematics, Engineering and Physics (AMEP) — Sep 2015 — Jun 2016

Professional Experience

Amazon // Palo Alto, CA
Sofware Development Engineer II — Sep 2022 — Present
- Tech Lead on the ML experimentation platform for Amazon.com's search rankers model development
- Designing and leading a complete infrastructure upgrade to increase scientist productivity on the platform

CoPilot // Pittsburgh, Pennsylvania (Remote)
Backend Systems Engineer — Aug 2021 — Sep 2022
- Led the design, development, and maintenance of the entire backend system as the primary backend engineer
- Performed business analytics for day-to-day operations as well as for fundraising rounds

SambaNova Systems // Palo Alto, California
Software Engineer — Jun 2020 — Aug 2021
- Led a small team to increase training speed of multiple 2D/3D computer-vision ML models by more than 10X
- Drove the design process of a new hardware-optimized convolution operator

Nvidia // Santa Clara, California
Deep Learning Software Intern — May 2019 — Aug 2019
- Improved ML model inference latency and memory usage through in-compiler weights compression

Uber // Pittsburgh, Pennsylvania
Software Engineering Intern — May 2018 — Aug 2018
- Surveyed, designed, and implemented multiple latency reduction algorithms in the autonomous vehicle distributed operating system's message-passing protocol

Skills

Programming Languages:
Python, TypeScript, JavaScript, C, C++, Dart, SML, OCaml

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

Frontend:
React, NextJS, Flutter

Backend:
Fastify, Flask, FastAPI, Express, GraphQL

Databases:
MongoDB, Firestore, PostreSQL, AWS DynamoDB

Infrastructure:
Firebase, AWS S3, AWS EC2, DigitalOcean, Heroku, Docker

Design:
Figma, Adobe InDesign, Adobe Photoshop, Adobe Illustrator

Project Management Tools:
JIRA, Asana, Git, Gantt Charts

Natural Languages:
English, Mandarin Chinese (Basic Professional Proficiency), Japanese (Very Basic)

Research Experience

The University of Texas at Austin // Austin, Texas (Remote)
Graduate Researcher Jan 2022 — Jul 2022
Research Areas: HCI, Conversational NLP, and Multimodal ML
Research Advisor: Amy Pavel

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

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

Scientific 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, Mar 2021

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, Dec 2018

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."
- Designed homework and exam questions, mentored and graded term projects, held office hours, and answered questions on Piazza

85-310 Research Methods in Cognitive Psychology // Carnegie Mellon University
Head Teaching Assistant *(Rating: 4.5/5)* Spring 2020
- 85-310 teaches students how to conduct independent research in cognitive science by designing, running, and evaluating a novel research project and writing up a report.
- Graded research reports, designed quizzes and exams, provided supplemental lectures on special topics, and held office hours

15-110 Principles of Computing // Carnegie Mellon University
Teaching Assistant *(Rating: 4.8/5)* Fall 2019
Teaching Assistant *(Rating: 5.0/5)* Fall 2018
Teaching Assistant *(Rating: 4.6/5)* Spring 2018
Teaching Assistant *(Rating: 3.5/5)* Fall 2017
- 15-110 is a fast-paced and broad introduction to the field of computer science that introduces basic CS theory and programming techniques.
- Lectured recitation sessions, graded homework and exams, and held office hours

Projects

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

Ice Hockey Agent // Course Project, Dec 2021
Designed and implemented an agent that plays ice hockey in a MarioKart-esque game environment. Used PyTorch to design a fully-convolutional model for detecting game features and reinforcement learning to act.

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 which can be used to interpret model convergence behavior

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, Sep 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, Jan 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, Nov 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, Feb 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, Apr 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

CS Theory:
Neural Network Design, Topics in Deep Learning, , Parallel Algorithms, Functional Programming, Machine Learning, Computational Perception, Theoretical Computer Science

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

Mathematics:
Topology, Modal Logic, Numerical Analysis, Algebra, Combinatorics

Psychology:
Consciousness, Adaptive Neural Decision Making, Systems Neuroscience, Human Factors 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 — Jan 2020 — May 2020
Co-Founder and President — Dec 2016 — Jan 2020

Cognitive Science Student Advisory Board
Treasurer — Aug 2018 — May 2020
Board Member — Jan 2018 — Aug 2018

Scotch'n'Soda Theatre
Assistant Director for *RENT* — Feb 2020 — Mar 2020
Production Manager for *The House of Yes* — Jan 2018 — Feb 2018
Stage Manager for *Young Frankenstein* — Aug 2017 — Oct 2017
Stage Manager for *Heathers: The Musical* — Feb 2017 — Apr 2017
Assistant Stage Manager for *Rosencrantz and Guildenstern are Dead* — Jan 2017 — Feb 2017
Hair and Makeup Artist for *Murder Ballad* — Sep 2016 — Oct 2016

Volunteering

Amazon Technical Academy
Project Buddy — Oct 2022 — Present

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

Interests

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