

# William Liu

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## 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](http://williamliu.me/Rez_U_May.pdf)

*Updated: Apr 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  
Alpha Epsilon Pi Fraternity  
Research Advisor: Saugata Ghose

May 2020

**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 designed 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

**Visual Informatics Group at UT Austin** // Austin, Texas

April 2020 – Present

### Research Assistant

Research Areas: AutoML, Neural Network Sparsity, Optimization

Research Advisor: Atlas Wang

**Computer Architecture Lab at Carnegie Mellon** // Pittsburgh, Pennsylvania

December 2016 – May 2020

### Research Assistant

Research Areas: Operating Systems and Memory Architecture

Research Advisor: Saugata Ghose

**CMU Articulab** // Pittsburgh, Pennsylvania

August 2017 – December 2017

### Research Intern

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

**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 an extensive report

## **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 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

Co-Founder and President

January 2020 – May 2020

December 2016 – January 2020

## Cognitive Science Student Advisory Board

Treasurer

Board Member

August 2018 – May 2020

January 2018 – August 2018

## Scotch'n'Soda Theatre

Assistant Director for *RENT*

Production Manager for *The House of Yes*

Stage Manager for *Young Frankenstein*

Stage Manager for *Heathers: The Musical*

Assistant Stage Manager for *Rosencrantz and Guildenstern are Dead*

Hair and Makeup Artist for *Murder Ballad*

January 2020 – March 2020

January 2018 – February 2018

August 2017 – October 2017

January 2017 – April 2017

January 2018 – February 2020

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

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