

AMANDA LIU

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A. L.

EDUCATION

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Cambridge, MA
2020 – 2026

DOCTOR OF PHILOSOPHY

5.0/5.0 GPA

Electrical Engineering and Computer Science (EECS) department; advised by Prof. Jonathan Ragan-Kelley and Prof. Adam Chlipala; thesis title: “Verified Compute-Storage Optimizations for High-Performance Tensor Programs”

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Cambridge, MA
2020 – 2022

MASTER OF SCIENCE

5.0/5.0 GPA

Electrical Engineering and Computer Science (EECS) department; advised by Prof. Jonathan Ragan-Kelley and Prof. Adam Chlipala; thesis title: “Verified Scheduling Via High-Level Scheduling Rewrites”

COLUMBIA UNIVERSITY

New York, NY
2016 – 2020

BACHELOR OF SCIENCE

3.97/4.0 GPA (DEAN’S LIST, MAGNA CUM LAUDE)

Computer Science major (Software Systems) and Math minor; School of Engineering and Applied Sciences

RESEARCH EXPERIENCE

NVIDIA

Remote
May 2025 – August 2025

Formalized the CuTe template system for generating CUDA kernel index expressions in Rocq; developed an abstract algebraic interface defining tensor layouts; proved soundness conditions relating CuTe layout compositions and loop transformations to retain functional equivalence and memory safety.

Mentors: Cris Cecka, Michael Garland

ADOBE RESEARCH

New York, NY
May 2024 – August 2024

Implemented a verified Rocq framework for abstractly representing and converting between sparse tensor formats in a compositional way; proved soundness of decompression routines for sparse abstractions; proved abstraction instances representing common sparse formats.

Mentors: Shoaib Kamil

MICROSOFT RESEARCH

Remote
June 2022 – August 2022

Developed automated formal methods in Z3 for verifying parallel safety properties for a novel hardware description language; explored and proved static analyses for deadlock-, race-, and livelock-freedom.

Mentors: Blake Pelton, Nikhil Swamy, Chris Hawblitzel, Jay Lorch

COLUMBIA UNIVERSITY

New York, NY
June 2019 – May 2020

Worked on language and semantic design of the DeepSEA blockchain language; partially implemented and verified DeepSEA -to-EVM bytecode compiler; implemented using OCaml and the Rocq proof assistant.

PI: Ronghui Gu

COLUMBIA UNIVERSITY

New York, NY
September 2018 – May 2019

Implemented memory-type inference algorithm for a Haskell to System Verilog hardware description language; leveraged Hindley-Milner type inference to perform type partitioning for memory storage level parallelization optimizations.

PI: Stephen Edwards

CARNEGIE MELLON UNIVERSITY

Pittsburgh, PA
May – September 2018

Developed software architecture description language for describing robust distributed systems; implemented automated generation of architecture implementations in the capability-safe language Wyvern.

PI: Jonathan Aldrich

PROFESSIONAL EXPERIENCE

GOOGLE

Remote
June – August 2020

GOOGLE BRAIN INTERN

Developed and designed a new DSL in Haskell targeting an ISA specific to a novel hardware architecture; work was specific to the domain of ML inference accelerators and hardware design.

GOOGLE

Sunnyvale, CA
May – August 2019

SOFTWARE ENGINEER INTERN

Worked on the JavaScript Closure Compiler in Core Developer Web team; augmented the type system to support bounded parametric polymorphic generic types and annotations; implemented static analysis and syntax-directed optimization transformations.

TEACHING AND MENTORING EXPERIENCE

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

September 2021 – Present

Research mentor for five undergraduate students as part of the MIT Undergraduate Research Opportunity Program (UROP) and two master's (MEng) students on work related to ATL and formal verification of high-performance tensor programs.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

January – May 2022

Teaching assistant for 6.512, *Formal Reasoning About Programs*. Graded weekly problem sets, wrote problem sets, held office hours, taught recitation, lectured class in absence of professor.

COLUMBIA UNIVERSITY

September – December 2019

Head teaching assistant for COMS4115, *Programming Languages and Translators*. Advised teams designing and developing a language and compiler for the final project, graded exams and problem sets, held office hours, taught recitation, made supplementary YouTube material.

COLUMBIA UNIVERSITY

September – December 2019

Teaching assistant for COMS4995, *Parallel Functional Programming*. Graded weekly problem sets, held office hours, taught recitation, advised teams weekly on developing a final project.

COLUMBIA UNIVERSITY

September 2019 – May 2020

Head teaching assistant for COMS3157, *Advanced Programming*. In addition to standard TA duties, managed the server where students worked on problem sets, organized weekly TA meetings, managed teaching team, maintained grading scripts, assisted in organizing a semesterly hackathon.

COLUMBIA UNIVERSITY

September 2018 – May 2020

Teaching assistant for COMS3157, *Advanced Programming*. Introductory systems programming class required of all undergraduate computer science majors. Graded weekly problem sets and exams, held office hours, taught recitation, wrote exam questions and rubrics.

PUBLICATIONS

ONWARD!

2025

Gaugin, Descartes, Bayes: A Diurnal Golem's Brain

Kartik Chandra, [Amanda Liu](#), Jonathan Ragan-Kelley, Joshua Tenenbaum.

PLDI

2024

A Verified Compiler for a Functional Tensor Language

[Amanda Liu](#), Gilbert Bernstein, Adam Chlipala, Jonathan Ragan-Kelley.

POPL

2022

Verified Tensor-Program Optimization Via High-level Scheduling Rewrites

[Amanda Liu](#), Gilbert Bernstein, Adam Chlipala, Jonathan Ragan-Kelley.

AWARDS AND HONORS

COLUMBIA UNIVERSITY

2020

ANDREW P. KOSORESOW MEMORIAL AWARD FOR EXCELLENCE IN TEACHING AND SERVICE

Awarded for outstanding contributions to teaching in the Department and exemplary service to the Department and its mission. Nominated based on evaluations by their supervising faculty and feedback from students.

NATIONAL SCIENCE FOUNDATION

2020

GRADUATE RESEARCH FELLOWSHIP

Awarded by the National Science Foundation funding five years of graduate studies to pursue research in the field of programming languages, formal methods, and programming systems.

**MASSACHUSETTS
INSTITUTE OF
TECHNOLOGY**
2020

**COLUMBIA
UNIVERSITY**
2018 – 2020

SPLASH
2018

NEPLS
November 2025

PPoSS
November 2025

**AMAZON WEB
SERVICES**
November 2025

**MASSACHUSETTS
INSTITUTE OF
TECHNOLOGY**
October 2025

**MASSACHUSETTS
INSTITUTE OF
TECHNOLOGY**
September 2025

META
April 2022

UC SANTA CRUZ
April 2022

**UNIVERSITY OF
WASHINGTON**
April 2022

ADA CENTER
April 2022

STANFORD
February 2022

GOOGLE
January 2022

**CONFERENCE
CHAIR**
2022-2025

**PROGRAM
COMMITTEE**
2025-2026

MERRILL LYNCH FELLOWSHIP

Awarded by the MIT EECS department faculty as part of as part of doctoral program admission offer; offered to strong candidates.

TAU BETA PI

Engineering honor society with membership based on academic performance and service; invited in junior year as a member of the top 8th of the class.

STUDENT RESEARCH COMPETITION SEMIFINALIST

Extended abstract reviewed and accepted as part of the undergraduate student research competition; attended and presented a poster at Systems, Programming, Languages, and Applications: Software for Humanity (SPLASH).

INVITED TALKS

Verified Scheduling for Optimizing High-Level Tensor Programs. *New England Programming Languages and Systems Symposium Series, Boston University*

Verified Dense and Sparse Tensor Compilation. *Principles and Practice of Scalable Systems Workshop. Intel Labs, Massachusetts Institute of Technology.*

Verified Tensor-Program Optimization Via Scheduling Rewrites. *Neuron Tech Talk, Amazon AWS.*

Deriving Fast Tensor Programs. *New England Systems Verification Day, Massachusetts Institute of Technology.*

Verified Compute-Storage Optimizations for High-Performance Tensor Programs. *Visual Computing Seminar, Massachusetts Institute of Technology.*

Verified Tensor-Programming Via High-Level Scheduling Rewrites. *Machine Learning Compilers Group, Meta.*

Verified Tensor-Programming Via High-Level Scheduling Rewrites. *Languages, Systems, and Data (LSD) Seminar, University of California, Santa Cruz.*

Verified Tensor-Programming Via High-Level Scheduling Rewrites. *System, Architecture, Machine learning, and Programming Language Group Meeting (SAMPL), University of Washington.*

Verified Tensor-Programming Via High-Level Scheduling Rewrites. *Liason Meeting, Applications Driving Architectures (ADA) Center.*

Verified Tensor-Programming Via High-Level Scheduling Rewrites. *EE380 Colloquium, Stanford University*

Verified Tensor-Programming Via High-Level Scheduling Rewrites. *Machine Learning and Compilers Reading Group, Google.*

SERVICE ACTIVITIES

MIT PROGRAMMING LANGUAGES REVIEW

Managed committee review timeline, finalized technical program, session scheduling, venue bookings, catering order and management, coordination with selected speakers and panelists, and publicization for call for participation.

MIT PROGRAMMING LANGUAGES REVIEW

Nominated and reviewed previously published, peer-reviewed papers and evaluated them for novelty, intellectual contribution, and potential high long-term impact.

**ARTIFACT
EVALUATION
COMMITTEE**
2023

**INTERNATIONAL CONFERENCE ON FUNCTIONAL
PROGRAMMING**

Reviewed software artifacts of accepted submissions to ICFP 2023 for availability, functionality, and reusability.

**STUDENT
VOLUNTEER**
2022

PRINCIPLES OF PROGRAMMING LANGUAGES

Managed Zoom room logistics for remote sessions including recording, Q&A coordination, Slack interaction, and AV debugging.

**STUDENT
VOLUNTEER**
2020

**PROGRAMMING LANGUAGES DESIGN AND
IMPLEMENTATION**

Assisted in session AV logistics, Q&A sessions, and day-of event registration.