

Research Interests

I am broadly interested in programming languages, verification, and building languages, abstractions, and frameworks for reliable systems. My previous and current research work revolves around using Datalog style languages to build easily verifiable and performant systems.

Education

Massachusetts Institute of Technology (Sep 2025 - Present)
 Doctor of Philosophy in Electrical Engineering and Computer Science GPA: 5.0/5.0

Cornell University (Jan 2023 - Dec 2024)
 Master of Science in Computer Science GPA: 4.14/4.3
 Minor in Linguistics

Cornell University (Aug 2019 - Dec 2022)
 Bachelor of Science in Computer Science GPA: 4.09/4.3
 Minor in Linguistics and Materials Science Engineering

Research Experience

Verified and Efficient Datalog Compiler (Sep 2025 - Present)
Prof. Adam Chlipala, MIT

- Developing a verified Datalog compiler targeting a custom dataflow architecture
- Worked on maximizing parallelization of Datalog using static analysis and integer linear programming to allocate computational resources
- Formalized and verified a distributed dataflow architecture model for Datalog

Proofs for Deductive Databases (Thesis) (Jan 2023 - Dec 2024)
Prof. Nate Foster, Cornell University

- Created an elegant and extensible proof system $P_{\equiv}$ for the egglog language
- Programmed a verified $P_{\equiv}$ proof checker mechanized in Rocq
- Completed a Master's thesis on $P_{\equiv}$ and its applications including a case study on optimizing NetKAT programs using egglog

Machine Learning with Humans in the Loop (NSF funded REU) (May 2022 - Aug 2022)
Prof. Chien-Ju Ho, Washington University in St. Louis

- Used reinforcement learning to develop AI agents optimized for human cooperative environments
- Trained agents on a custom designed markov decision process environment using value iteration
- Developed human models incorporating human cognitive bias and level-k game theoretic reasoning to be used as test models for evaluating the AI agents

SARA: Integrating Materials Theory, Experiment, and Computation (Feb 2020 - May 2022)
Prof. R.B. van Dover and Prof. Michael Thompson, Cornell University

- Project focused on integrating materials science and computer science methods to accelerate the discovery and development of new materials
- Used hyperspectral imaging and transfer matrix method to determine the optical depth of various amorphous and crystalline thin films and predict their composition
- Investigated how compositional variations in thin films influence both the resulting crystalline phases and their electrical behavior when heated

Teaching & Mentorship Experience

Graduate Application Assistance Program (GAAP) Mentor (Sep 2025 - Present)

- Supported 4 under-represented graduate student applicants throughout their application journey and provided **feedback** on application materials

Teaching Assistant

Served as a TA for the following courses where I have earned **6 teaching excellence awards**:

- CS2800: Mathematical Foundations of Computing (300+ students) Instructor: *Prof. Matthew Eichhorn* (2024)
- CS4110: Programming Languages and Logics (~100 students) Instructor: *Prof. Adrian Sampson* (2024)

- CS2800: Discrete Structures (300+ students) Instructor: *Prof. Matthew Eichhorn, Noah Stephens-Davidowitz* (2023)
- CS2800: Discrete Structures (300+ students) Instructor: *Prof. Anke van Zuylen* (2023)
- CS4820: Introduction to Analysis of Algorithms (300+ students) Instructor: *Prof. Anke van Zuylen* (2022)
- CS2800: Discrete Structures (300+ students) Instructor: *Prof. Anke van Zuylen* (2022)
- CS3110: Data Structures and Functional Programming (300+ students) Instructor: *Prof. Michael Clarkson* (2021)
- CS2800: Discrete Structures (300+ students) Instructor: *Prof. Anke van Zuylen* (2021)
- MSE1140: Materials: The Future of Energy (50+ students) Instructor: *Prof. R.B. van Dover* (2020)

Responsibilities included creating **exams, rubrics and problem sets**, leading **discussion sections**, creating **solution videos**, and holding **4+** hours of office-hours weekly.

Professional Experience

Member of Technical Staff I

(Apr 2025 - Aug 2025)

Qumulo, Seattle

Full Time

- Worked on Qumulo's core distributed file system, improving **performance, cost**, and **reliability** in the cloud product
- Developed **metrics** for analyzing read and write cache performance and ensured cache **persistence** and eviction **fairness**

Software Engineering Intern

(May 2024 - Aug 2024)

Amazon AWS Directory Service, Seattle

Internship

- Designed and implemented a **new centralized GDPR compliance system** for AWS Directory Service which was scalable to **tens of thousands of events per minute**
- Ensured that the new system was **extensible** and easily usable across all subteams in Directory Service
- Tested the implementation with a full suite of unit tests, integration tests, and canaries

Materials Process and Engineering Intern

(Apr 2021 - Aug 2021)

Viasat, Carlsbad

Internship

- Drafted material test plans for research and development of carbon fiber composite aerospace structures
- Wrote MATLAB scripts for **automation** of flight testing for various mechanical structures

Selected Academic Projects

Eta Language Compiler

(Jan 2023 - May 2023)

Prof. Andrew Myers, Cornell University

CS5120: Introduction to Compilers

- Designed and implemented a compiler for the imperative Eta programming language in Kotlin which **ranked among the top four compilers in the class**
- The compiler targeted x86 and implemented optimizations such as **copy propagation, constant folding, dead code removal, register allocation**, and **conditional constant propagation**

Selected Courses Undertaken

Programming Languages: Introduction to Compilers[§], Advanced Programming Languages, Introduction to Kleene Algebra, Formal Reasoning About Programs[†], Formal Verification, Data Structures and Functional Programming, Programming Languages Seminar

Computer Science: Introduction to Analysis of Algorithms, Cryptography, Secure Hardware Design[†], Operating Systems[§], Natural Language Processing[§], Computer System Organization, Computational Linguistics I

Materials Science: Thermodynamics of Condensed Systems[§], Atomic and Mole Structure of Matter, Materials Chemistry, Mechanical Properties of Materials[§], Materials for the Electronic Age[§]

Linguistics: Phonology I, Pragmatics, Language Typology, Semantics I

[†]MIT courses [§]along with a lab component

Technical Skills

Languages Java, Python, C, Kotlin, OCaml, Rocq, x86, Rust

Software Git, L^AT_EX, Vim, JetBrains

Other Skills

Languages English (Native), French (Intermediate), Vietnamese (Conversational)

Hobbies Chinese Yo-Yo, Lion Dancing, Climbing