

EDUCATION

Stanford University

M.S. ELECTRICAL ENGINEERING (FOCUS: SOFTWARE AND HARDWARE SYSTEMS)

September 2024 - December 2026

GPA: 3.83

- Selected Courses: Formal Methods for Computer Systems, Compilers, Programming Languages

University of Washington

B.S. COMPUTER SCIENCE (FOCUS: FORMAL METHODS AND AUTOMATED REASONING)

September 2020 - June 2024

GPA: 3.87

- Selected Courses: Operating Systems, Distributed Systems, Database Management

EXPERIENCE

Stanford Computer Architecture & Security Lab

RESEARCH ASSISTANT

March 2025 - Present

Stanford, CA

- Implemented custom LLVM compiler passes in C++ to enforce hardware side-channel security during program execution.
- Developed binary instrumentation tools to profile performance overhead, finding a 10% increase in executed instructions.
- Designed a unit test-suite for systematically verifying generated code, finding 3 previously unknown bugs in the compiler.

Adobe

SOFTWARE ENGINEERING INTERN

June 2024 - September 2024

Seattle, WA

- Built a symbolic performance profiler in C++ for Halide kernels to predict runtime behavior without program execution.
- Implemented compiler analyses to predict bandwidth and compute intensity of HPC optimizations such as vectorization.
- Prototype correctly computed runtime performance metrics for 2 real-world graphics kernels across arbitrary input sizes.

UW Programming Languages & Software Engineering Lab

RESEARCH ASSISTANT

May 2022 - June 2024

Seattle, WA

- Designed backend-agnostic FPGA compiler templates in Racket to map arithmetic-heavy hardware designs to DSPs.
- Built automated infrastructure in Python to benchmark tool on 1200 microbenchmarks against 4 hardware compilers.
- Published an open-source tool that reduces resource usage by up to 20% compared to state-of-the-art FPGA toolchains.
- Final research contributed to publication at ASPLOS 2024 and 3rd place in the ICFP Student Research Competition.

UW Machine Learning Systems Lab

RESEARCH ASSISTANT

June 2021 - May 2022

Seattle, WA

- Improved TVM code generation to custom accelerator targets as part of an end-to-end compiler flow in Rust and C++.
- Developed e-graph rewrite rules in Rust using the im2col algorithm to lower convolutions to GEMM for target backends.
- Final compiler framework increased accelerator utilization by 30% on MLPerf benchmarks across 3 hardware targets.

Toyota Connected

SOFTWARE ENGINEERING INTERN

June 2022 - September 2022

- Upgraded Java Spring dependencies in microservice applications, deploying them to Azure Kubernetes Service.
- Updated developer CLI tools in Go to be compatible with the MQTT messaging protocol for new generation vehicles.

Certora

SOFTWARE ENGINEERING INTERN

March 2022 - June 2022

Seattle, WA

- Engineered a Solidity smart contract mutation framework in Kotlin to test robustness of the Certora security prover.
- Created mutations targeting arithmetic operator nodes, reproducing 90% of sample bugs from industry contracts.

PUBLICATIONS

FPGA Technology Mapping Using Sketch-Guided Program Synthesis

ASPLOS 2024

Gus Henry Smith, Ben Kushigian, **Vishal Canumalla**, Andrew Cheung, Steven Lyubomirsky, Sorawee Porncharoenwase, René Just, Gilbert Louis Bernstein, Zachary Tatlock.

SKILLS

Languages: C++, Java, Python, Racket, Kotlin, Coq, Rust

Frameworks: LLVM, Halide, Git, TVM, Rosette