

Vishal Canumalla

vishalc@cs.washington.edu — 425-444-2510 — [vcanumalla](#) — [vishal-canumalla](#)

Education

University of Washington

Seattle, WA

Bachelor of Science in Computer Science | GPA: 3.8

Expected Graduation: June 2024

- Research Areas: Software Engineering, Programming Languages, Compilers
- Relevant Coursework: Data Structures, Systems Programming, Programming Languages, Algorithms, Databases

Experience

Software Engineering Intern

Plano, TX (June 2022 – August 2022)

Toyota Connected North America, Inc.

- Interned on Driveline, a product improving telematic services for crash notifications, emergency alerts, and stolen vehicle trackers on over 10 million Toyota and Lexus vehicles.
- Upgraded Java Spring dependencies in microservice applications, deploying them to Azure Kubernetes service.
- Designed a new publisher-subscriber communication architecture for Driveline over the MQTT protocol in collaboration with other engineers, utilizing AWS core as a broker.
- Upgraded command-line tool in Go for simulation of crash notifications to be compatible with the MQTT protocol while ensuring backwards compatibility with Toyota vehicles communicating over HTTP.

Software Engineering Research Intern

Seattle, WA (March 2022 – June 2022)

Certora Inc.

- Upgraded the Certora Prover, a product that verifies Ethereum protocols to guarantee customer transaction security.
- Engineered a robustness checker for the Certora Prover by building a mutation testing library in Kotlin and Python that generates buggy programs to be caught by the prover, exposing vulnerabilities when unsafe programs are accepted.
- Automated generation of 90% of bugs previously written manually by Certora security engineers.
- Launched tool into production that is used by the security team and clients and will be open-sourced in the future.

Undergraduate Researcher

Seattle, WA (April 2021 – Present)

Programming Languages and Software Engineering Lab

- Contributed to the 3LA methodology, a project aimed at finding more correct, accessible, and efficient compiler workflows for developing specialized hardware for machine learning workloads.
- Verified robustness of hardware in the compiler workflow by creating C++ fragments of low-level hardware instructions.
- Advanced the Glenside language to interpret more machine learning operators such as Conv2D and Conv3D, allowing for more precise Glenside and TVM Relay code generation.
- Leveraged non-destructive term rewriting to optimize high-level machine learning code of varied granularity, leading to upwards of 30% greater operator offloading to specialized hardware on MLPerf benchmarks.

Publications

1. (Pre-print) Huang, B.-Y.*, Lyubomirsky, S.*, Li, Y., He, M., Tambe, T., Smith, G. H., Gaonkar, A., **Canumalla, V.**, Wei, G.-Y., Gupta, A., Tatlock, Z., & Malik, S. (2022). Specialized Accelerators and Compiler Flows: Replacing Accelerator APIs with a Formal Software/Hardware Interface. [arXiv link](#). (*: Equal Contribution)

Personal Projects

No Wrong Turns

July 2022 – July 2022

Toyota SWARM Hackathon

- Built React front-end and UI elements for a full-stack application for pre-emptive detection of drunk driving.
- 1 of 3 runner-ups in the drunk driving category of the global, company-wide Toyota SWARM hackathon.

Chemistry Domain Specific Language

June 2022 – June 2022

Workshop Project

- Programmed a domain specific language for molecular properties that finds chemical reaction mechanisms using term rewriting and extracts the most energy efficient mechanism.
- Derived semantics for chemical reactions and compounds to build equivalence relations in an e-graph, allowing complete and saturated exploration of equivalent reaction mechanisms.

Skills

Programming Languages: Java, C++, Rust, Kotlin, Python, OCaml, Racket, HTML/CSS, Javascript, \LaTeX

Technologies: TVM Relay, Java Spring, Git, React.js