Rosan Tommy Sandanasamy

825-461-4163 | rosan@ualberta.ca | linkedin.com/in/tommy-sand/ | github.com/Tommy-sand

Education

University of Alberta September 2020 – May 2025

Bachelor of Science in Computing Science, Specialization in Software Practice *Edmonton, Alberta*

- Relevant Coursework: Compiler Design, GPU Programming, Computer Systems and Architecture, Operating Systems, Parallel and Distributed Systems, Numerical Methods, Software Quality

Cumulative GPA: 3.7

Work Experience

Firmware Development Intern May 2023 – September 2024

AU-Zone Technologies *Calgary, Alberta*

- Responsible for designing, developing, testing, maintaining, and improving 6 applications to run on embedded hardware units and desktops running Linux.
- Engineered 3 Rust applications to support the deployment of a CV model to detect debris in the ocean. These applications logged predictions to an SQLite DB, uploaded prediction data to servers through REST APIs, and displayed current status of the unit.
- Optimized throughput of data sent to servers by 50% through systematic instrumentation and algorithm refinement, resulting in significantly improved throughput on embedded systems.
- Developed a specialized Rust application that processed and synchronized multiple MCAP files, with filtering options, and integrated with AU-Zone's proprietary annotation platform to enhance dataset generation workflows. Through asynchronous programming achieved a throughput of 20 samples per second.
- Ensured continuous operation of embedded systems in production by providing troubleshooting support and developing comprehensive technical documentation for all 6 programs which reduced setup time and improved team knowledge transfer.

Teaching Assistant January 2023 – April 2023

University of Alberta *Edmonton, Alberta*

- Teaching assistant for CMPUT201 - Practical Programming Methodology.
- Evaluated understanding of C, Git, and Linux, through weekly lab sessions and assignments for 30 students.

Projects

Gazprea Compiler | *C++, ANTLR, MLIR, LLVM* October 2024 - December 2024

- Collaborated in a team of 4 to create a compiler, Gazprea, an imperative programming language. This language included functions, dynamic 2D arrays, structs, IO, and types.
- Completed frontend compiler passes to verify the semantics of Gazprea, such as defining symbols and performing static type analysis.
- Wrote backend code generation for performing IO, creating dynamic matrices and vectors, and applying their associated operations, in MLIR. The MLIR was lowered to LLVM in order to compile and output Gazprea code into LLVM.

JPEG Decoder | *C* November 2023 - August 2024

- Implemented a JPEG decoder capable of decoding JPEG images in C handling all aspects of decompression including Huffman coding, quantization, and supporting multiple color space conversion into RGB.
- Researched and coded an optimized Fast Discrete Cosine Transform algorithm based on academic papers, achieving a 6x speed up in image decompression compared to the original Discrete Cosine Transform.
- Created an image viewer using OpenGL to display the decoded JPEG image to the user.

WebAssembly Interpreter | *Rust* In Progress

- Developing an Interpreter for WebAssembly (WASM) in Rust. Currently implementing the verification phase to validate the WASM.

Technical Skills

Languages: Rust, C, CUDA C, C++, Python, Java, SQL, Javascript
Libraries: Pthreads, ANTLR, MLIR, LLVM, SDL2, Hyper, Tokio Tracing, Boto3
Technologies: Linux, Git, Docker, CI/CD Pipelines, Jira, Valgrind, GDB, Make, GNSS/GPSD, REST API