

Nathan Abebe

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EDUCATION

Yale University

New Haven, CT

B.S. Computer Science, B.S. Electrical Engineering (ABET)

May 2028

- GPA: 3.84/4.00
- Relevant Coursework: Computer Networks, Operating Systems, Computer Systems, Building Game Engines

EXPERIENCE

Yale Efficient Computing Lab

Jun 2025 – Present

Research Assistant (advised by Prof. Lin Zhong)

New Haven, CT

- Accomplished 80% reduction in development time by engineering a virtual file system for multi-FPGA control, validated by DECONET/HELIOS, a production-grade distributed quantum error code decoder.
- Developed distributed network for server-FPGA communication with custom UDP/TCP protocols, achieving 100% critical packet delivery and less than 1 minute end-to-end time for FPGA configuration.
- Scaled multi-FPGA parallelism by designing a file system architecture supporting millions of FPGA nodes for high-throughput quantum error code decoding experiments.
- Simplified user experience by developing 5+ Bash scripts, reducing project setup to 1-2 commands per FPGA.

Yale Computer Graphics Group

Jul 2025 – Present

Researcher (advised by Prof. Mike Shah)

Part-time, New Haven, CT

- Implemented threaded .obj parser with SIMD instructions, outperforming industry-standard parser speeds by 7x.
- Delivered 500× speedup over baseline by profiling and optimizing critical code paths over month-long period.
- Engineered an extensible test suite for multiple parsers and inputs, using repeated measurements and median absolute deviation-based outlier filtering for consistent performance metrics.

Yale School of Engineering and Applied Science

Aug 2025 – Present

Teaching Assistant (Computer Systems)

Part-time, New Haven, CT

- Improved student comprehension by leading review sessions and creating supplemental study resources, resulting in higher course engagement as measured by 2x lecture and review session attendance.
- Supported 120+ undergraduate students by holding weekly office hours on systems programming fundamentals.
- Ensured fair and efficient grading of student work, delivering actionable feedback to reinforce key course material.

PROJECTS

Yale Project Liquid: Flight Computer | Rust, Real-Time Systems, Radio Protocols

Aug 2025 – Present

- Building PCB integrating Teensy 4.1 and sensors to enable onboard sequencing and rocket recovery.
- Designed time-division multiplexed radio protocol with CRCs & ACKs achieving sub-100ms end-to-end latency.
- Offloaded non-critical compute to coprocessor, reducing comms latency by 30% and improving system reliability.

Yale Project Liquid: EGSE | C++, Sensor Integration, LTspice, HIL Testing

Oct 2024 – Sep 2025

- Programmed Teensy 4.1 firmware for GPIO valve control to remotely actuate 10+ ethane and nitrous valves.
- Developed C++ drivers for NAT 8252 pressure sensors with 1% error rate on psi values.
- Simulated 20+ circuits in LTspice to verify signal integrity and fail-safes, reducing hardware faults during testing.
- Executed HIL validation tests with 99.9% uptime during hotfire campaigns, ensuring robustness in real conditions.

NES Emulator | Rust, Computer Architecture, Debugging

Mar 2025 – Jul 2025

- Built 5K+ LoC cycle-accurate NES emulator with full CPU and PPU timing support for precise game emulation.
- Implemented egui debugger with live stepping and visualization to accelerate development and debugging.

TECHNICAL SKILLS

Languages: Rust, C, C++, Dlang, Python, Golang, x86 Assembly, TypeScript, JavaScript, C#, SystemVerilog

Embedded: STM32, RTOS, Linux, Yocto, bare-metal, PCB design, FPGA design

Tools: Git, GDB, Valgrind, Altium Designer, LTspice, Vivado Design Suite, Oscilloscope

Protocols: UDP, TCP, UART, SPI, I²C, TDMA, CSMA, CRC