Nathan Abebe

+1 (203) 994-2951 | nathan.abebe@yale.edu | nathanabebe.com | linkedin.com/in/nathan5563 | github.com/Nathan5563

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 doubled 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, I^2C, TDMA, CSMA, CRC