Tyrone Marhguy

Computer Engineering @ University of Pennsylvania | Discrete Hardware Systems & Embedded Design
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Education

University of Pennsylvania Philadelphia, PA
Bachelor of Science in Computer Engineering Expected May 2028
Coursework: Digital Logic Design, Computer Architecture, Embedded Systems, Circuits & Electronics, Signals & Systems

Technical Skills

Hardware Design: RTL (Verilog, SystemVerilog, VHDL), Instruction Set Architecture (ISA), FPGA (Vivado, ModelSim), PCB Layout (KiCad), Transistor-Level Circuit Design
Verification & Validation: UVM, Functional Simulation, Testbench Development, Timing Characterization, Signal Integrity Analysis
Embedded Systems: Microcontroller Integration (Arduino), Custom Bus Protocols, Hardware–Software Interface Development
EDA Tools & Scripting: LTspice, Logisim, Oscilloscope, Logic Analyzer, Linux, Python, Bash, TCL
Prototyping: Breadboard Prototyping, Soldering, Hardware Bring-up, Debugging

Projects

8-Bit Transistor CPU – Discrete Transistors, Python Assembler **Project Link**
- Designed an 8-bit CPU from **700+ discrete transistors**, implementing a custom 12-instruction ISA with load/store, ALU, and branching
- Created a Python-powered assembler and verification framework, executing 20+ machine-code programs and measuring gate propagation delays with a logic analyzer

16-Bit Transistor Memory Module – Discrete Latches, Microcontroller Interface **Project Link**
- Engineered a 16-bit addressable memory from **350 discrete transistors** using D-flip-flop latch arrays, supporting read/write through custom bus control signals
- Integrated with an Arduino microcontroller for sequenced addressing and data verification, achieving stable operation over **1,000+ access cycles**

Precision Clock Oscillator – Multivibrator, Frequency Measurement **Project Link**
- Designed RC multivibrator delivering 1 kHz clock (<1% drift) and tuned for stable duty cycle and temperature resilience

Transistor-Logic Calculator – Full-Adder, Seven-Segment Display **Project Link**
- Designed and assembled a four-function calculator using ripple-carry adders and a custom 7-segment decoder
- Integrated power-management circuitry and verified all 16-bit operand operations, achieving <5 ns propagation latency

Experience

Teaching Assistant, CIS 1100 (Intro Programming) July 2025 – Present
University of Pennsylvania *Philadelphia, PA*
- Led weekly recitations for **300+ students**, improving code quality and reducing runtime failures by **40%**
- Developed 50+ Pytest autograder suites using GitHub Classroom, reducing grading time to **<24 hours**

Computer Science Intern May 2025 – August 2025
Heag Pain Management *Greensboro, NC*
- Deployed EHR-linked FastAPI + PostgreSQL platform (JWT, HIPAA), digitizing **10+ intake forms** and improving staff adoption to **90%**
- Automated reporting pipeline, cutting prep time from **72 to 4 hours** and boosting data accuracy by **30%**

Computer Science Instructor February 2025 – May 2025
Fife Academy, University of Pennsylvania *Philadelphia, PA*
- Delivered 10-week Python curriculum to **16+ students** (Grades 3–5), boosting engagement by **25%** and reducing error rates by **40%**

Leadership & Activities

Google Developer Groups @ Penn & Penn Aerospace Club Sept 2024 – Present
Prototyped microcontroller systems, shared IoT/FPGA best practices, and built Python ML pipelines for weather forecasting dashboards used by 20+ members

ColorStack @ Penn & National Society of Black Engineers Sept 2024 – Present
Engaged in mentorship, professional development, and technical workshops supporting underrepresented engineers