

Tyrone Marhguy

Computer Engineering @ University of Pennsylvania | Embedded Systems & FPGA/ASIC Integration
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Education

University of Pennsylvania

Philadelphia, PA

Bachelor of Science in Computer Engineering

Expected May 2028

Coursework: Embedded Systems, Digital Logic Design, Computer Architecture, Circuits & Electronics, Signals & Systems, Machine Learning for Engineers

Technical Skills

Embedded & Low-Level: C, C++, Python, Rust, RTL (Verilog, SystemVerilog, VHDL), Device Drivers, RTOS Concepts, Hardware-Software Co-Design

FPGA/ASIC Integration: FPGA Synthesis (Vivado, ModelSim), ASIC Prototyping, Timing Optimization, Low-Latency Pipeline Design

AI/ML Deployment: Edge AI Model Integration, In-Memory Computing Concepts, Performance Tuning for AI Inference

Verification & Debug: Functional Simulation, Post-Silicon Validation, Signal Integrity Analysis, Power Optimization, Profiling, Debugging

Tools: Oscilloscope, Logic Analyzer, LTspice, KiCad, Bash, Tcl, Linux Development Environments

Projects

8-Bit Transistor CPU — Embedded-FPGA Verification

[Project Link](#)

- Implemented a custom 12-instruction ISA on **700+ discrete MOSFETs**, validated through FPGA-based simulation and Python-driven assembler
- Profiled execution timing to identify low-level optimizations for instruction throughput and power efficiency

16-Bit Transistor Memory Module — MCU Driver Integration

[Project Link](#)

- Built an addressable memory array from **350 discrete transistors** with synchronous bus control, integrated with Arduino firmware for automated testing
- Conducted post-silicon validation over **1,000+ read/write cycles**, tuning for stability under variable loads

Precision Clock Oscillator — Timing Source for Embedded Systems

[Project Link](#)

- Developed a temperature-resilient RC multivibrator clock with **<1% drift**, used as a timing source for FPGA/MCU-driven prototypes

Transistor-Logic Calculator — Embedded Hardware Interface

[Project Link](#)

- Designed a four-function calculator with discrete ripple-carry adders and a custom 7-segment decoder, tested with microcontroller-driven I/O routines
- Measured propagation delays under various power states to evaluate performance-efficiency tradeoffs

Experience

Teaching Assistant, CIS 1100 (Intro Programming)

Jul 2025 – Present

University of Pennsylvania

Philadelphia, PA

- Facilitated weekly labs for **300+ students**, guiding optimization of code structure and runtime performance
- Produced 50+ automated grading suites in Python/Pytest, streamlining evaluation turnaround to **<24 hours**

Computer Science Intern

May 2025 – Aug 2025

Heag Pain Management

Greensboro, NC

- Delivered HIPAA-compliant FastAPI + PostgreSQL backend for embedded EHR systems, digitizing **10+ forms** and integrating secure device communication
- Automated data processing pipelines, reducing latency in reporting workflows by **94%**

Leadership & Activities

Google Developer Groups @ Penn & Penn Aerospace Club

Sept 2024 – Present

Developed microcontroller-FPGA integrated systems, deployed edge inference prototypes, and optimized sensor data pipelines

ColorStack @ Penn & National Society of Black Engineers

Sept 2024 – Present

Participated in technical mentorship, hardware/software integration workshops, and embedded development challenges