

DANIEL HALLORAN

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Robotics Engineering and Financial Technology double major who builds real-time systems end to end, from schematic capture through firmware to the control loop. Designed a 214-component mixed-signal board by hand, wrote the stack for a robot that won its class competition, and run an automated trading system that executes live. Most of the work has been proving which of my own results were real.

EDUCATION

Worcester Polytechnic Institute

B.S. Robotics Engineering & B.S. Financial Technology (double major)

M.S. Robotics Engineering (combined B.S./M.S. track)

Worcester, MA

Expected May 2029

Expected 2030

GPA 3.8 · junior standing in year two · Coursework: Artificial Intelligence, Algorithms & Data Structures, Data Science, Linear Algebra, Calculus I–IV, Physics I–II, Unified Robotics I, Blockchain, CAD.

PROJECTS

Handwriting-Recognition Smart Pen — Mixed-Signal Hardware Design

2026

Independent · in development · KiCad 9 · schematic complete, PCB layout underway, boards expected late 2026

- **Captured a 214-component schematic across 11 hierarchical sheets** in KiCad for a pen-form device that converts handwriting motion to text on-device. Drawn by hand rather than generated.
- **Architected the sensor stack** — two LSM6DSO32 IMUs at tip and tail to maximize the rotational baseline, an IIS2MDC magnetometer for 9-DOF orientation, and an OV5640 camera on 2-lane MIPI CSI-2 to cross-check uncertain characters.
- **Designed the full power tree**: USB-C charge and protection, buck-boost to 3.3 V, and dedicated 1.8 V / 1.0 V rails for an SG2002 RISC-V SoC with an on-die NPU, plus load switches gating the camera and sensor domains. Wrote netlist checkers to catch unconnected pins.

Automated Equity Trading System — Undergraduate Research (IQP)

2025 – Present

Worcester Polytechnic Institute · Advisor: Prof. Eugene Okyere-Yeboah · executing live through Interactive Brokers

- **Built an end-to-end decision system** scanning ~3,000 equities at ~1,000 async requests/second off nanosecond-resolution trade data, with a seven-source news pipeline, LLM catalyst classification, gradient-boosted ranking, and live order routing. Runs unattended.
- **Validated by falsification** — shuffled-label controls showed the ranking model's edge was statistically indistinguishable from scrambled data, so I documented it and reduced the system to rules rather than ship an unvalidated model.
- **Set kill criteria before the forward test** and honored them: a 40% minimum on a key universe constraint, measured at 17%, recorded as killed. Built a survivorship-bias-free dataset of 6.68M daily bars across 13,022 active and 23,260 delisted tickers.

Autonomous Competition Robot — RBE 1001

Feb 2026

Worcester Polytechnic Institute · first place in class competition

- **Wrote the full autonomous and teleoperated stack** for a VEX V5 robot in a timed retrieval-and-deposit game: ramp ascent, line-following navigation, target acquisition, and scoring across a 61-state sequence.
- **Implemented sensor-driven navigation** — inertial heading hold, dual reflectance sensors, ultrasonic edge-sweep-and-bisect aiming, and torque-stall lift homing. Documented the platform in a 998-line reference covering 15 tested failure modes.

Underwater ROV Control System

2024 – 2025

Independent project · proposed and funded by my high school teacher, David Webster

- **Designed a multi-microcontroller control system** for a custom ROV: four-motor cross propulsion, a Python host driving Arduino Nano nodes over a custom serial protocol, depth/pressure/temperature telemetry, DC ballast buoyancy control, and a live dashboard. Built to a hard budget that drove the design.

Vision-Guided Tracking Pipeline — Low-Latency Object Detection & Control

2026

Independent project · complete · tested on video-game input · transfers to any low-latency tracking on minimal hardware

- **Built a two-machine detection-to-actuation pipeline**: 240 Hz capture and ROI encode on one host, remote-GPU YOLO inference over a custom pipelined TCP protocol, corrections executed by a Raspberry Pi. ~20 ms end to end, camera to actuation.
- **Cut overshoot from ~100% to 18%** with a Smith-predictor-style delay line that subtracts in-flight commands from measured error; the controller ends its blind window on evidence (a frame timestamped after the command), so the machines never need synchronized clocks.
- **Distilled a smaller, faster student model from a YOLO teacher** at similar accuracy (mAP50 0.92, mAP50-95 0.81) on self-collected data; Lucas-Kanade optical flow carries tracks through fast, blurred pans.

TECHNICAL SKILLS

Languages: Python, C++, C (embedded), SQL, Solidity, JavaScript/TypeScript

Hardware & embedded: KiCad schematic capture, mixed-signal and power-tree design, I2C/SPI/UART/MIPI CSI-2, sensor fusion, IMUs, Arduino, Raspberry Pi Pico, USB-HID firmware, real-time control loops, PID and dead-time compensation

ML & AI: PyTorch, YOLO/Ultralytics, TensorRT, QLoRA/PEFT fine-tuning, LightGBM, XGBoost, CatBoost, scikit-learn; Anthropic API in production, MCP servers, agent workflows

Systems & data: Linux, Git, Docker, SLURM on a multi-GPU HPC cluster, asyncio at ~1,000 req/s, custom TCP protocols, Parquet, pandas, NumPy, Next.js/React

Validation: shuffled-label controls, preregistered acceptance criteria, walk-forward testing, survivorship-bias control, decision logging for offline scoring

AI-assisted engineering: I direct LLM tooling to implement systems I specify and test. What I own is the problem definition, the verification, and the call on what to discard.

WORK & SERVICE

Adaptive Ski & Sports Coach — New England Disabled Sports 2021 – Present

- Coach participants ages 5 to 80 with a wide range of physical and cognitive disabilities, including veterans, in skiing, biking, kayaking, and golf. Several hundred volunteer hours; promoted to full Adaptive Coach at 18, the program's youngest.

Personal Care Aide — Lakes Region Community Services 2022 – 2024

- Daily support, transportation, and recreational programming for an adult client during a long-term recovery.

Busser — Gordi's Fish & Steak House, Lincoln, NH Summer 2025

- A full summer of high-volume dinner service through peak tourist season.

AWARDS

- **Secretary, WPI Investing Association** — exec board of a ~300-member student organization; also a member of the WPI Student Investment Fund.
- **Eagle Scout at age 14** — youngest in Franklin, MA history (2021). Salutatorian and NH Scholar, Lin-Wood Class of 2025.