Ritvik Ellendula

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Education

University of Pennsylvania — Philadelphia, PA

B.S.E. in Electrical Engineering, Robotics Concentration | ***Minors:*** *Mathematics, Engineering Entrepreneurship* — May 2028

- **Coursework:** Circuit Analysis, Circuit Design, Electronic & Photonic Devices, Electromagnetics, Linear Algebra, Machine Learning, Embedded Systems, Computer Architecture, Microcontrollers Lab, Solid-State Physics
- **Awards:** Penn Innovation Award, Uber Hackathon Regional Finalist, 1st Place FAA STEM Competition

Skills

Electrical & Embedded: Circuit Design, Analog Electronics, Power Electronics, Embedded Systems/Programming, Circuit Simulation, Data Analysis, PCBAs, I2C, UART, PCB Design, KiCad, Altium, SPICE, ASIC, Oscilloscopes, FPGA/Digital Logic
Programming: C#, C++, SystemVerilog, Python, MATLAB, Assembly, SVA, Java, VHDL, LabVIEW, Perl, Tcl, Ruby
Tools & Other: Linux, Git, Embedded Firmware, Agile, Jira, CAN, SPI, Automated Testing, Electrical Architecture

Experience

Serpent Robotics — Philadelphia, PA

Robotics & Controls Intern | *President's Innovation Prize-Winning Startup ($500K+ in Grant Funding)* — Sep. 2026 – Present

- Develop SR-01 and SR-02, teleoperated rope-climbing robots designed to automate hazardous tree maintenance
- Modify 4-layer power and logic PCBs with 5–20 A fused circuits, DC-DC regulation, and RS-485/I2C interfaces
- Replaced PCB I2C isolators to restore bidirectional communication; verified via Teensy 4.1 scans, continuity, and oscilloscope
- Implement leader-follower servo teleoperation and develop CAN interfaces for RobStride 03/04 BLDC actuators

GRASP Laboratory — Philadelphia, PA

Robotics, Sensing, & Controls Research Intern | *ModLab & AddLab* — Aug. 2026 – Present

- Develop 360-degree UAV optical imaging and a 4-axis, 6-material 3D printer across GRASP's ModLab and AddLab
- Integrate TSL1401 sensors with Nordic nRF54L15 microcontrollers using Zephyr RTOS, ADC sampling, and GPIOs
- Develop encoder-based stepper position control using AS5600 feedback, NEMA 17 motors, and PID regulation

Brainchild Engineering — Novi, MI

Hardware Engineering Intern | *Product Design Firm* — May 2026 – Aug. 2026

- Built Vend-A-Shoe, a 4-lane electromechanical vending system for remote, web-triggered product dispensing
- Integrated 4 MG996R servos, 8 LEDs, Raspberry Pi, and active cooling across 40+ perfboard connections
- Developed Raspberry Pi actuator control software with 1 Hz Supabase polling; debugged GPIO and power faults

Quantum Opus — Plymouth, MI

Electrical & Photonics Engineering Lab Assistant | *NASA Artemis II Optical Communications Supplier* — May 2026 – Aug. 2026

- Characterized superconducting nanowire single-photon detectors (SNSPDs) for quantum sensing and optical links
- Measured photon arrival timing using a TimeTagger and 1 GHz fiber laser; analyzed pulses with a 500 MHz oscilloscope
- Diagnosed detector saturation from excessive photons/pulse through optical attenuation testing and waveform analysis

Delia AI — Remote

AI Engineering Intern | *Penn Innovation Award-Winning Startup* — Apr. 2026 – Jun. 2026

- Developed real-time agentic AI pipeline for workforce evaluation using WebRTC, LLM inference, and avatar rendering
- Debugged WebRTC race conditions across avatar, LLM, and TTS services, reducing startup latency by 77% (30 s to 7 s)

Engineering Projects

Penn ADAPT Bionic Arm | *Altium, STM32, ADS1291, Mixed-Signal PCB Design*

- Co-design EMG sensor PCBs for an 8-channel architecture using ADS1291 analog front-ends and STM32
- Design differential EMG inputs with analog filtering and protection to reject common-mode interference
- Develop buck-LDO regulation with decoupling capacitors to suppress noise and preserve EMG signal fidelity

Penn RoboRacer | *ROS 2, Python, LiDAR, NVIDIA Jetson, PD Control*

- Developed autonomous ROS 2 wall-following controller using 360-degree LiDAR scans and PD steering feedback
- Estimated lateral distance and heading error from LiDAR range data to generate steering and throttle commands
- Validated closed-loop navigation in AutoDRIVE, tuning controller gains, lookahead distance, and speed constraints

Penn Electric Racing Design Challenge | *CircuitLab, Analog Circuits, Power Electronics*

- Designed and simulated analog fault detection circuitry for simultaneous brake and power-sensor faults
- Implemented 3.205 V and 2.50 V comparator thresholds with resistive dividers and a 0.5 s RC fault delay
- Selected LMR33630 buck regulator for 12–17 V to 5 V conversion based on current capacity and load margin

C Compiler | *OCaml, x86-64, Systems Programming*

- Developed multi-pass C compiler with recursive-descent parsing, AST generation, and TACKY IR lowering
- Generated executable x86-64 assembly with pseudoregister allocation and memory-to-memory instruction fixups