

Caleb Mitchell

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EDUCATION

University of California, Santa Cruz
B.S. Electrical Engineering

Expected June 2028

Santa Cruz, CA
GPA: 3.44

RELEVANT COURSEWORK

Circuit Analysis • Robot Automation & Control Theory • Kinematics • Electromagnetism • Computer Systems & C • Assembly Language • Linear Algebra • Ordinary Differential Equations • Vector Calculus • Statistics

EXPERIENCE

UCSC Rocketry Club — Thrust Vector Control

Sept 2025 – June 2026

Electrical Engineer

- Designed the avionics architecture for a vertical takeoff and landing (VTVL) vehicle using a **Teensy 4.1**, IMU, GPS, lidar, barometric sensor, and nRF24L01+ wireless telemetry
- Designed PCB schematics and board layouts in **KiCad**, integrating sensors, power distribution, motor controllers, and communication interfaces using **I²C**, **SPI**, **UART**, and **PWM**
- Developed embedded firmware for sensor acquisition, actuator control, telemetry, and non-blocking task scheduling with update rates up to **200 Hz**
- Performed system integration, hardware bring-up, and subsystem testing while validating power requirements, communication interfaces, and sensor operation

PROJECTS

Autonomous Tracking Turret — Personal

Feb 2026 – Mar 2026

- Designed a two-axis electromechanical tracking platform using **YOLOv8**, **OpenCV**, **Kalman filtering**, and embedded **PID motor control**, achieving **60 FPS** object tracking with **< 50 ms** detection latency
- Developed embedded firmware on a **Teensy 4.1** for low-latency actuator control with **< 10 ms** command latency
- Implemented sensor homing and motion stabilization algorithms for accurate real-time target tracking
- Built a Flask-based control dashboard for live PID tuning, operating mode selection, and system monitoring

USB-C Power Meter — Personal

Feb 2026

- Designed and assembled a custom **2-layer PCB** in KiCad for a USB-C power monitoring device using an Arduino Nano, INA219 current sensor, and SSD1306 OLED display
- Developed embedded firmware to measure and display real-time voltage, current, and power over **I²C**
- Measured USB device power consumption from **0–5 V** and up to **630 mA**, validating results with oscilloscopes and multimeters
- Designed USB-C CC configuration, precision current sensing, and display interface circuitry

Sentinel AI — NVIDIA x ASUS Hack-a-Claw

May 2026

- Built a multi-agent cloud security platform that generated AI incident summaries in under 30 seconds
- Implemented autonomous agent orchestration using NVIDIA Nemotron, FastAPI, Docker, Next.js, and Supabase
- Developed distributed AI workflows for threat classification, cloud event analysis, and automated report generation
- Built and deployed the full-stack application in under 24 hours during the NVIDIA x ASUS Hack-a-Claw competition

SKILLS

Programming: Python, C, C++, MATLAB, TypeScript

Embedded Systems: STM32, Teensy 4.1, Arduino, Firmware Development, I²C, SPI, UART, PID Control

Hardware: KiCad, PCB Design, Schematic Capture, Onshape, Oscilloscopes, Multimeters

Software: OpenCV, YOLOv8, Docker, FastAPI, Git, Next.js, Flask