

KARMAN SINGH

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EDUCATION

University of California, Santa Cruz

Santa Cruz, CA

B.S. Robotics Engineering, Minor in Computer Engineering

March 2027 (Expected)

- Relevant Coursework: Microcontroller System Design, Robot Kinematics and Dynamics, Electronic Circuit Design, Introduction to Machine Learning, Data Structures and Algorithms, Signals and Systems.

EXPERIENCE

Undergraduate Robotics Researcher

Jan 2026 – Current

Tactile Manipulation Lab

Santa Cruz, CA

- Designing a **low-cost compliant robot arm** using stepper motors and custom control architecture.
- Implementing **nested PID control loops** with real-time current monitoring to achieve compliance.
- Researching **soft gel gripper** with embedded camera and **ML-based** contact recognition for tactile sensing.

Robotics Engineer Intern

June 2025 – Sept 2025

Ulysses Maritime Technologies

San Francisco, CA

- Designed and built a **custom UUV sensor module** measuring pH, ORP, and dissolved oxygen underwater.
- Performed UUV assembly, buoyancy testing, soldering, and electrical validation.
- Validated **12x** cheaper sensors as a viable alternative to existing sensor suites.
- Programmed firmware in **C++** for **ATmega328P** and **ATSAMD51** microcontrollers.
- Designed and printed **CAD models** in **OnShape** for Raspberry Pi mounts, cameras, and external sensors.

PCB Design Researcher

March 2025 – June 2025

Santa Cruz Institute for Particle Physics (SCIPP)

Santa Cruz, CA

- Designed and implemented **pixel detector PCBs** for the **ATLAS project** at **CERN** under Prof. Jason Nielsen.
- Reduced PCB footprint by **50%** through iterative design optimization in **KiCAD**, interfacing with a Raspberry Pi.
- Developed comprehensive **Bill of Materials** and executed soldering for production-ready boards.

Data Science Researcher

December 2024 – March 2025

University of California Santa Cruz

Santa Cruz, CA

- Replaced a **CNN** with a **SARIMA** statistical model — achieving equivalent accuracy at 15x lower compute cost.
- Implemented **time-series forecasting** techniques optimized for smaller computing environments.

PROJECTS

PTZ Camera Tracking System | YOLOv5n, Arduino, Raspberry Pi, OpenCV

May 2025

- Developed and trained a custom **YOLOv5n** image recognition model in **Docker** achieving **+90%** accuracy.
- Implemented a **PID servo controller** with **ATmega328P** to automatically center camera on detected targets.
- Designed **UART communication protocol** between Raspberry Pi and Arduino for real-time communication.

Cat Pantry Detector | ATmega328P, NRF24L01, Raspberry Pi, Python

Mar. 2025 – Apr. 2025

- Engineered wireless motion detection system with **ATmega328P** and **PIR sensor** to detect cat intrusions.
- Reduced power consumption by **72%** through sleep mode implementation for extended battery life.
- Designed wireless communication between **ATmega328P** transmitter node and **Raspberry Pi** receiver node.
- Created **Python** notification system using **Discord API** for real-time alerts.

Buck Converter PCB | Autodesk EAGLE, Soldering

Sept. 2023 – Dec. 2023

- Designed and implemented a **2-layer PCB** layout for a buck converter power supply using **Autodesk EAGLE**.
- Incorporated **H-bridge** driver circuit to enable **bidirectional** fan control with reverse functionality.
- Integrated **555 timer** circuit to generate **PWM signals** for variable speed control of the fan.

TECHNICAL SKILLS

Skills: KiCAD, OnShape, Git, MATLAB, Python, C/C++, Docker, Soldering, Oscilloscopes

Soft Skills: Cross-disciplinary collaboration, Iterative prototyping, Technical communication, Problem-solving