

# ERIC DAVID VETHA

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## OBJECTIVE

I am a robotics engineer with a strong foundation in the interdisciplinary fields of electrical engineering, mechanical engineering, and computer science, combined with hands-on experience in machine learning, autonomous systems, and sustainable agriculture technology. My passion is advancing robotics applications for agriculture and sustainability through innovative and practical solutions. I am looking for opportunities to leverage and expand my expertise in applied robotics in a research-oriented role.

## EDUCATION

### University of California, Santa Cruz, MS.

Santa Cruz, CA

Electrical and Computer Engineering

2024 - Present

- Concentration in Robotics, Control, and Cyberphysical Systems
- Member of IEEE Eta Kappa Nu (HKN)
- **Coursework:** Models of Robotic Manipulation, Linear Dynamical Systems, Convex Optimization, Small-Scale UAV Theory and Practice

### University of California, Santa Cruz, BS.

Santa Cruz, CA

Robotics Engineering

2020 - 2024

- GPA: 3.81, Cum Laude Honors
- **Coursework:** Logic Design, Data Structures and Algorithms, Embedded Systems and C Programming, Signals and Systems, Mechatronics, Microcontroller System Design, Feedback Control Systems, Sensors and Sensing Technology

## PROFESSIONAL EXPERIENCE

### Graduate Student Researcher

Santa Cruz, CA

University of California, Santa Cruz

2024 - Present

- Developing a low-cost in-ground soil moisture sensing system using custom PCB RF components.
- Integrating a quadruped robot as a communication network for sensing system, leveraging ROS for advanced robotic control.

### Undergraduate Student Researcher

Santa Cruz, CA

University of California, Santa Cruz

2023 - 2024

- Developed a low-cost in-ground soil moisture sensing system using ultrawideband radar and backscatter tags for sustainable agriculture.
- Designed a sophisticated automated peak detection algorithm, streamlining data processing.
- Conducted research in a laboratory setting, contributing to advancements in agricultural technology through hands-on experimentation.

### Computer Engineering Tutor

Santa Cruz, CA

University of California, Santa Cruz

2022

- Tutored students on computer systems and C Programming from an embedded paradigm.
- Assisted students in completing programming assignments on a 32-bit embedded microcontroller (Microchip PIC32.)

## PROJECTS

### Convex Optimization for Signal Denoising

UCSC

Enhancing Backscatter Localization Using Convex Total Variation Denoising in Ultrawideband Radar Systems

Report

- Successfully demonstrated the application of convex optimization in signal denoising.
- Achieved an 8.5% improvement in soil moisture measurement accuracy with minimal preprocessing time.

## Imitation Learning in Robotic Manipulations

UCSC

Grab-o-Matic 3000

Demo [Github](#)

- A robotic system for ball-catching tasks, employing imitation learning and inverse kinematics.
- Uses imitation learning to imitate expert-like ball-catching actions based on visual observations.
- Automatically uses inverse kinematics calculations to determine optimal joint velocities for the robotic arm to intercept projected ball trajectories smoothly.

## Sensor Based Instrumental Gloves

UCSC

Slug Symphony

Demo [Github](#)

- Gloves that emulate the saxophone, guitar, drums, piano, and trumpet.
- Flex and 9-DOF sensors integrated with UNO 32 microcontroller for accurate instrument replication.
- Uses state machines to transition between instruments, ensuring user-friendly interaction seamlessly.

## Autonomous Ball Shooting Robot

UCSC

Slug World Cup

Demo [Github](#)

- An autonomous robot capable of autonomously traversing a field and dispensing balls in a defended goal.
- Uses state machine architecture, ensuring the robot's precise navigation, goal detection, and autonomous scoring capabilities.
- Applied a Proportional-Integral-Derivative (PID) control strategy to enhance the robot's navigation precision, implementing a Proportional (P) component to minimize errors and ensure straight-line movement.

## FPGA Verilog Video Game

UCSC

Watch Your Step

- Developed the "Watch your Step" game on the BASYS3 board and VGA monitor, implementing player control, hole avoidance, and coin collection.

## Autonomous Driving Algorithms

UCSC

F1TENTH Autonomous Racing

[Github](#)

- Implemented Wall Following and Follow the Gap autonomous driving algorithms within the F1TENTH Simulator.

## SKILLS

- Languages:** MATLAB (Proficient), C (Proficient), ROS (Experienced), Python (Experienced), C++ (Moderately Experienced), BASH/Shell Scripting (Moderately Experienced), Java (Prior Experience).
- Technologies:** Experience with embedded C programming, simulation environments (Gazebo and Webots), creating imitation learning models and control systems, PCB design
- General:** Capable of working well both individually and in groups; Comfortable with technical writing.

## PUBLICATIONS

**Improving Low-Cost In-Ground Soil Moisture Sensing System Using Backscatter Tags for Sustainable Agriculture**

Santa Cruz, CA

Honors Thesis

[Read Thesis](#)

## HONORS

Graduate Student Researcher funding, University of California, Santa Cruz  
IEEE Eta Kappa Nu (HKN)

## INTERESTS

Strength sports, lifting, tech trends.