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 sensing and robotics applications for agriculture and sustainability through innovative and practical solutions. I am looking for opportunities to leverage and expand my expertise 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
- **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

HONORS

IEEE Eta Kappa Nu (HKN)
Carbon Fund Research Award recipient
EFI Frontiers Fellowship recipient
Graduate Student Researcher funding, University of California, Santa Cruz

PROFESSIONAL EXPERIENCE

Teaching Assistant Santa Cruz, CA
University of California, Santa Cruz 2024 - Present

- Assisting students in developing embedded projects using various sensor technologies, including ping sensors, IMUs, and resistive sensors.
- Tutoring students on fundamental issues in sensing of temperature, motion, sound, light, position, etc.

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.
- Creating Ultrawideband-based RF sensing systems with advanced signal processing methods.
- Developing real-time sensing systems on a Linux platform.

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.

PROJECTS

UAV Simulation for Drones UCSC
quadrotor-vtol Github
Control and UAV Theory, Python
- Developed a custom physics-based simulation modeling the dynamics and aerodynamics of a quadrotor drone.
- Designed a modular platform for inputting and simulating various drones as needed.

Convex Optimization for Signal Denoising UCSC
Enhancing Backscatter Localization Using Convex Total Variation Report
Convex Optimization Theory, Python
- 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
Machine Learning, Robotic Manipulation Kinematics, Python
- 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
Embedded C, State Machines, Sensor Programming
- 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
Embedded C, Mechatronics, State Machines
- An autonomous robot capable of autonomously traversing a field an 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.

SKILLS

Languages: MATLAB (Proficient), C (Proficient), ROS (Experienced), Python (Experienced), Linux (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, RF Hardware

General: Capable of working well both individually and in groups; Comfortable with technical writing.

ACADEMIA

Improving Low-Cost In-Ground Soil Moisture Sensing System Using Backscatter Tags for Sustainable Agriculture Santa Cruz, CA
Honors Thesis Read Thesis