Arael A. Anaya

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EDUCATION

Colorado School of Mines, Golden, CO **May 2027**
Masters: Master of Science in Robotics Engineering GPA: 4.0
Major: Bachelor of Science in Mechanical Engineering; Focus: Automation & Control GPA: 3.7
Minor: Robotics and Intelligent Systems

WORK EXPERIENCE

MPALA Lab, Research Assistant **Jan 2025 - Present**

- Developed a ROS-integrated aerial swarm platform using Crazyflie drones and OptiTrack motion capture to study distributed consensus algorithms in real-world networks.
- Implemented resilient consensus algorithms (W-MSR), tuned Kalman filters, and system dynamics to improve stability, localization accuracy, and robustness under adversarial interference.
- Bridged theory and practice by translating consensus models into real-time experiments, conducting flight tests, and performing real-time debugging.
- Collaborated in agile development workflows, contributing high-quality C++ & Python code to the research team.

MIRROR Lab, Research Assistant **Aug 2024 - Aug 2025**

- Integrated multiple laboratory robots using ROS and upgraded DIARC-based multi-teleop interfaces with new features by incorporating study feedback to improve user experience.
- Designed an AI-facilitated "Robotics Assistant" for a NASA-funded project, applying machine learning to improve robot adaptability and decision-making in high-stress environments.
- Performed software debugging/validation using Linux/Bash scripts and ROS packages, strengthening reliability.

RELEVANT PROJECT EXPERIENCE

Crank Generator (Human-Powered Device) **2025**

- Designed and prototyped pedal-crank generator capable of charging electronics in low-resource environments.
- Applied SolidWorks for structural design, performed FEA to validate strength, and optimized manufacturability.
- Directed team efforts across fabrication and testing, streamlining task allocation and confirming design feasibility under real-world conditions.

Quadcopter Altitude Control System **2025**

- Built and simulated an altitude controller in MATLAB/Simulink, testing response to step and sinusoidal inputs.
- Evaluated system performance using rise time, settling time, overshoot, and steady-state error, maximizing control effort and robustness to disturbances, increasing performance by 20%.
- Developed a systematic workflow for tuning gains and validating performance against engineered metrics.
- Implemented software testing scripts and structured code review processes to validate model outputs.

Rescue Drone **2024**

- Designed and constructed quadcopter equipped with a claw mechanism and custom-built controller to assist in delivering supplies in search and rescue (SAR) environments.
- Programmed and integrated multiple microcontrollers using multi-processor systems to enhance operational functionality and efficiency.
- Assembled and wired drone entirely from scratch, demonstrating expertise in 3D modeling, additive manufacturing, electrical soldering, and higher level project management.
- Extended controller firmware in C++ and tested real-time software for responsiveness and reliability.

ENGINEERING AND TECHNICAL SKILL

- **Programming**: Python, C++, MATLAB, Java, JavaSwing, JavaScript, LabVIEW, EES, HTML, CSS, Mathcad
- **Tools/Platforms**: ROS, Linux, Prompting, Latex, Agile development, Git, Docker, CMake, catkin build system
- **Hardware & Electronics**: Microcontroller Programming, Electrical Soldering, Additive Manufacturing, Lidar
- **CAD & Fabrication**: SolidWorks (CSWP, Weldments and CSWP-Simulation Certified), CNC, Drill Press, Lathe
- **Soft Skills**: Fluent in English and Spanish, Team Leadership, Project Management, Effective communication

AWARDS AND PUBLICATIONS

- SPIRSE Travel Grant - $3,000 award by IEEE to attend CASE - Recognized for robotics research potential **2025**
- SURF 2025 Scholar - Summer Undergraduate Research Fellowship **2025**
- MURF 2026 Scholar - Undergraduate Research Fellowship **2025**
- [PENDING PAPER] Understanding Human Operator Needs in Multi-Robot Tasking Interfaces **2025**