Nate Murphy

UC San Diego
Expected Graduation: June 2029

B.S. in Computer Science
B.S. in Mathematics

Experience

First Robotics Competition

- 2021 - 25
- **Team founder and lead programmer.**
- The team won the 2021 San Francisco Regionals and ranked in the 86% percentile for overall performance by 2025.
- **Skills**:
    - The Java language for robotics system design
    - Computer vision for robot localization
    - Dynamic path generation for autonomous routines
    - Controls engineering for robotics (PID, FF, Motion profiling, etc)

Java / Robotics Workshop Leader

- 2024 Summer
- **Designed and taught** a 20 hour curriculum spanning 2 weeks **introducing high school students to the Java programming language**.
- Additionally lead twice weekly zoom meetings to introduce interested students into more involved software design, the WPILib framework, and mathematical concepts in controls engineering.
- **Skills:**
    - Curriculum design for introductory programming workshops

Dual Enrolled Math Coursework

- 2023 - 25
- Dual enrolled in high school and Santa Ana College maintaining a 4.0 college GPA over 1.5 years, finding application in image processing and controls.
- **Classes / Credits:**
    - Calculus II
    - Multivariable Calculus
    - Vector Calculus
    - Linear Algebra
    - Differential Equations

Projects

Raspberry Pi Environment Mapping and Localization (Vision)

- Aug - Sep 2025
- **Used Robot Operating System (ROS) and the ORB_SLAM3 library to localize a serial Arducam.**
- Wrote nodes in rospy and roscpp to communicate with an SPI camera.
- Built virtual devices for testing on development laptops
- **Skills:**
    - Linux (Ubuntu 20.04) configuration for ROS and Docker
    - The ROS framework (rospy and roscpp)
    - Implementing SLAM algorithms in ROS
    - Docker based build systems

Rocket Telemetry and Electrical System (Embedded)

- Jun 2025 - Ongoing
- Prototyped a system consisting of an AVR micro-processor, LoRa transceivers, a 6-axis IMU, magnetometer and fuse to deploy a second stage.
- Wrote bare-metal-c drivers for:
    - SPI, I2C and UART communication for the AVR chip architecture.
    - Sensors (IMU/Magnetometer) and LoRa radio transceivers.
- Built an AVR SPI programmer with a Raspberry Pi and custom compiled Avrdude.
- **Skills:**
    - Bare metal C for writing drivers
    - Serial protocols (SPI, I2C, UART)
    - Sensor fusion for orientation
    - Power distribution and regulation for low power systems

Lightweight Combat Robotics (Electrical)

- April - May 2025
- **Managed electrical and software on a 1lbs plastic combat robot as a high school senior project.**
- Developed software for the ESP32 using Arduino IDE.
- Presented to peers, family, and faculty, winning an honors award.

- May 2025 (continued after graduation)
- **Used KiCad to fit electrical systems on a custom-made printed circuit board.**
- Re-specced electrical systems to be more powerful.
- **Skills:**
    - Bluetooth in Arduino CPP and Python
    - ESP32 for robotics system
    - KiCad for PCB design