IOWA STATE UNIVERSITY

SDMAY21-27

Department of Electrical and Computer Engineering

MicroCART: Microprocessor-Controlled Aerial Robotics Team

Overview / Purpose

The Electrical and Computer Engineering department's CPRE 488 class desires a mini programmable quadcopter to enhance students' learning of embedded systems and controls. This project's goal is to provide the necessary components for the class's labs. It will include a programmable mini quadcopter, a test station to measure rotational data while keeping the drone secure, and a ground control program for user interaction with the drone via WiFi.

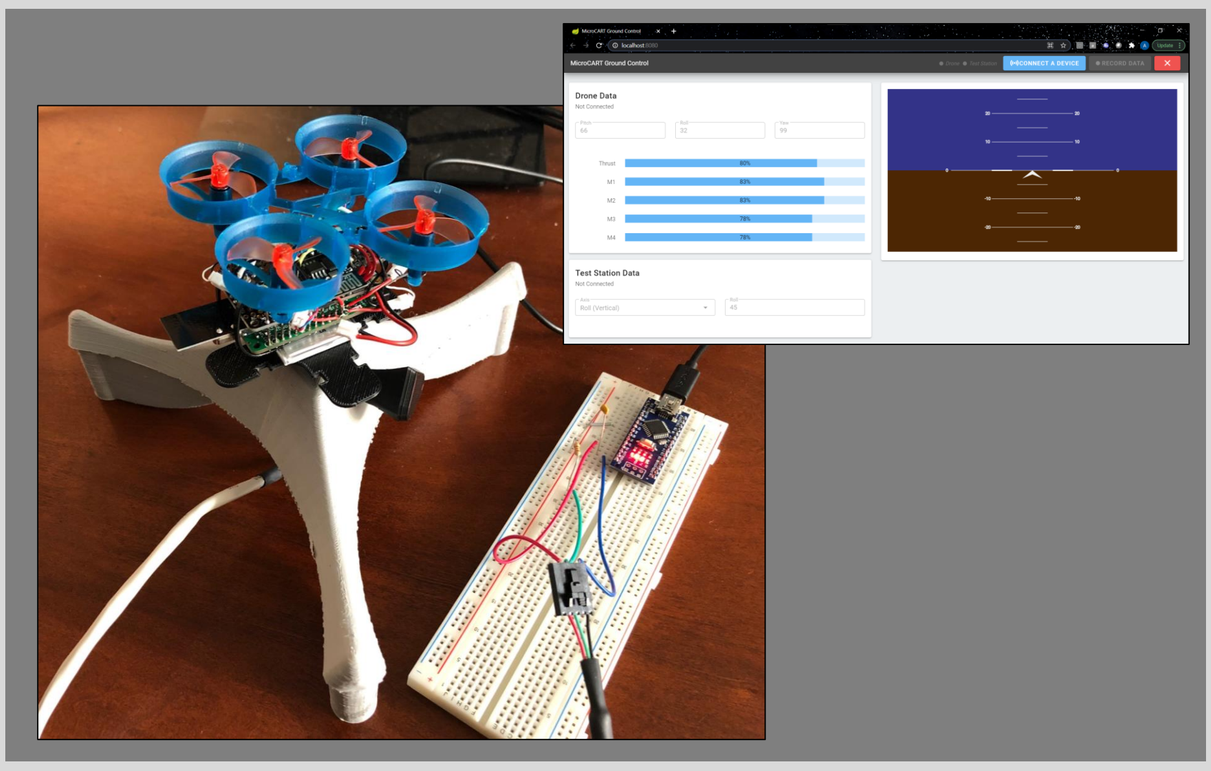
Requirements

Functional:

- Drone can communicate via WiFi and RF
- Drone can receive user input and respond accordingly
- Drone has a PID controller that can maintain stable flight
- Test Station can capture rotational data
- Ground Control can interact with the drone and test station based on user input and log received sensor data

Non-Functional:

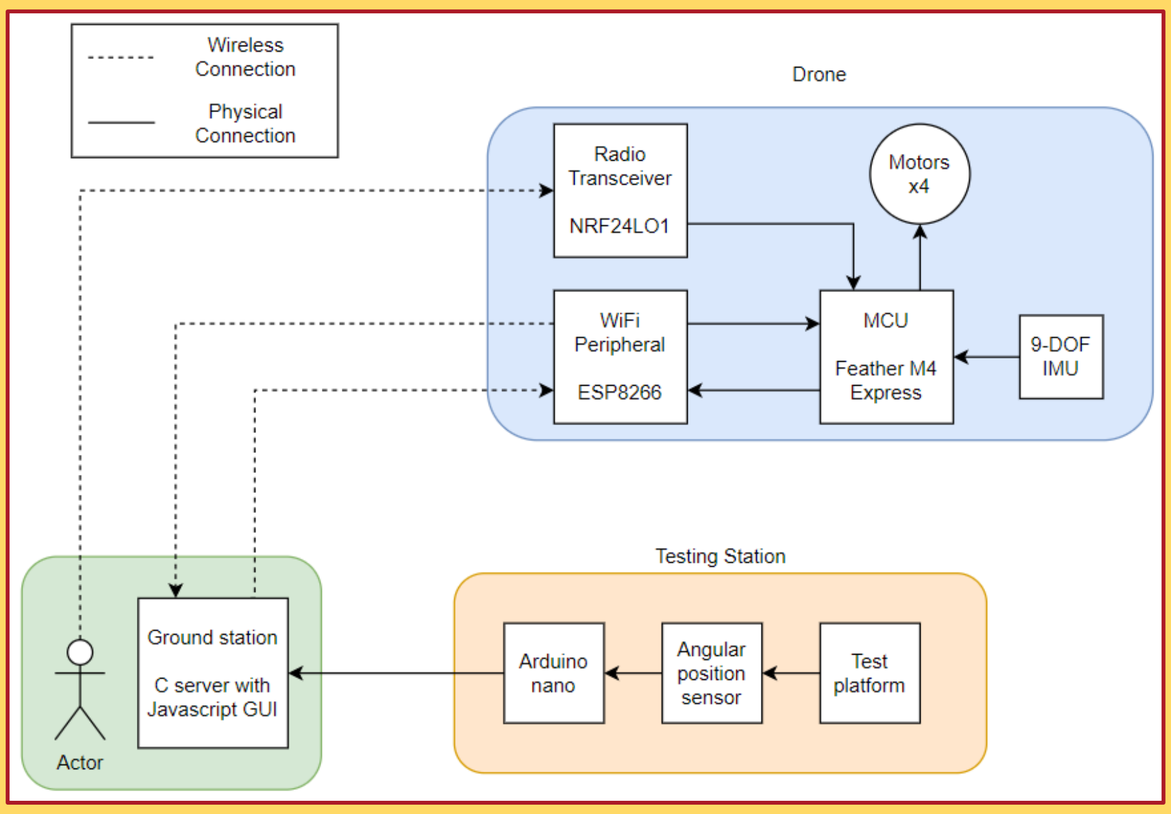
- Drone size is no larger than 4.5 x 4.5 inches
- Drone flight time is at least 10 minutes
- Test Station can support various designs



Testing and Evaluation

WiFi Communication – local tests, ran as expected
Wiring Verification – breadboard analysis
Flight Testing - too heavy
Test Station Sensor Data – interpreted successfully
IMU Testing – orientation captured successfully
UART Testing – successful PuTTY communication
PWM Testing – Verified on Oscilloscope

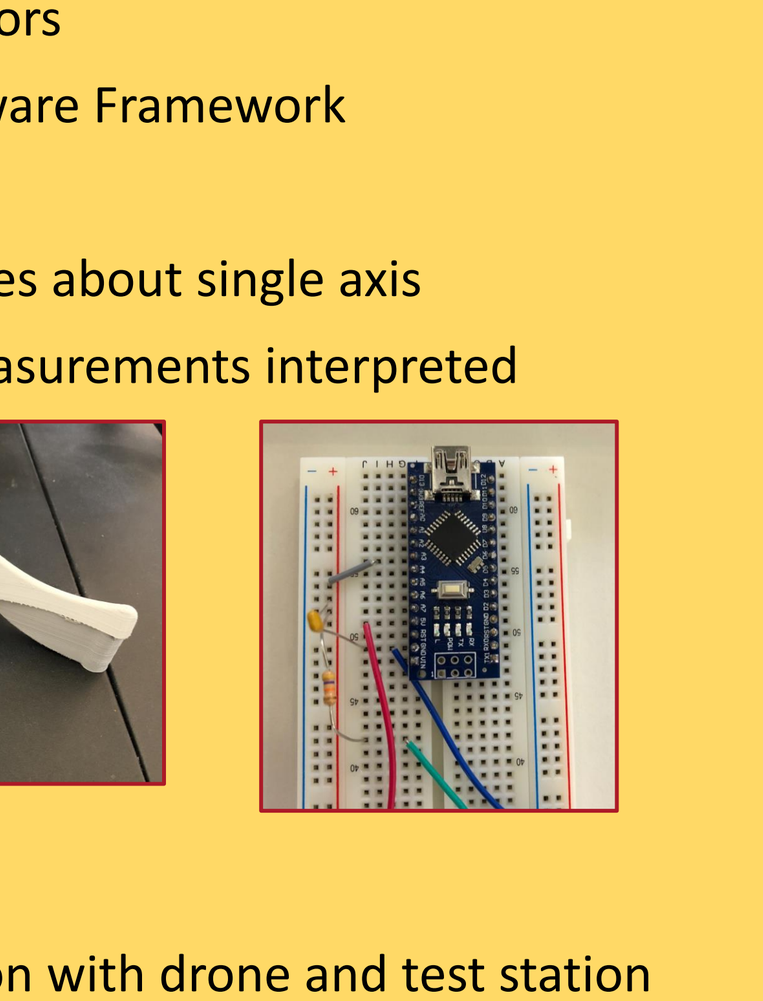
System Diagram



Design Components

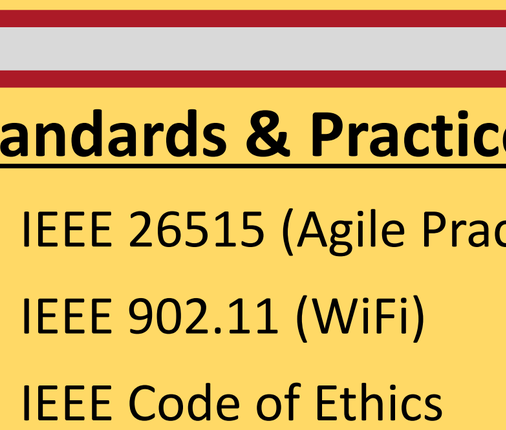
Drone

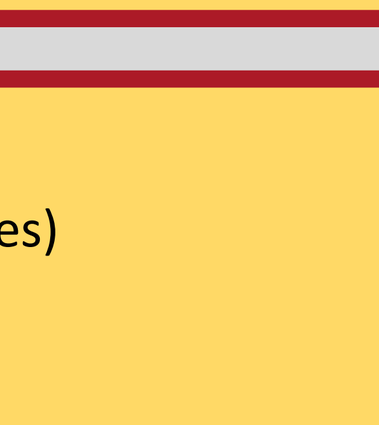
- MCU
- IMU
- WiFi
- RF
- Battery
- Brushless Motors
- Modular Software Framework



Test Station

- Platform rotates about single axis
- Rotational measurements interpreted





Ground Control

- User interaction with drone and test station
- Capture and log device data
- C server for main controls and command-line interface
- JavaScript UI as a GUI option

Standards & Practices

- IEEE 26515 (Agile Practices)
- IEEE 902.11 (WiFi)
- IEEE Code of Ethics

Advisor / Client

Dr. Phillip Jones

Team Members

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