

UAV Replenishment

ADCS Dynamics

Overview

- UAV Replenishment task
- Overseen by Triton AI
- Competing in RobotX Maritime Challenge
- Why?



Project Objectives

1. UAV (drone) launches from USV (boat)
2. UAV locates helipad
3. UAV collects colored tin can
4. UAV delivers can to another platform
5. UAV returns to USV

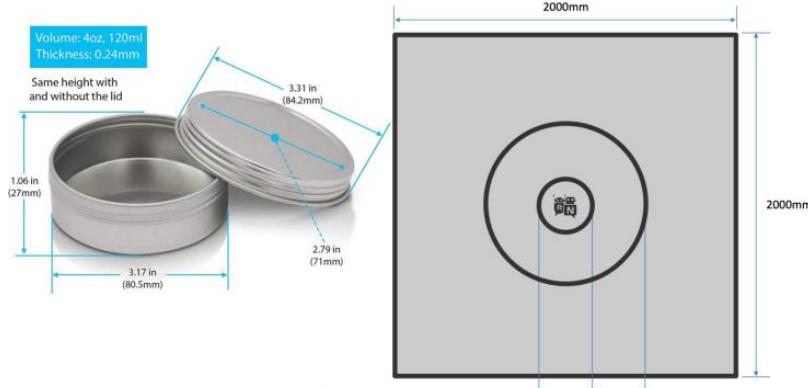


Figure 12: Colored Disk and Preliminary Helipad



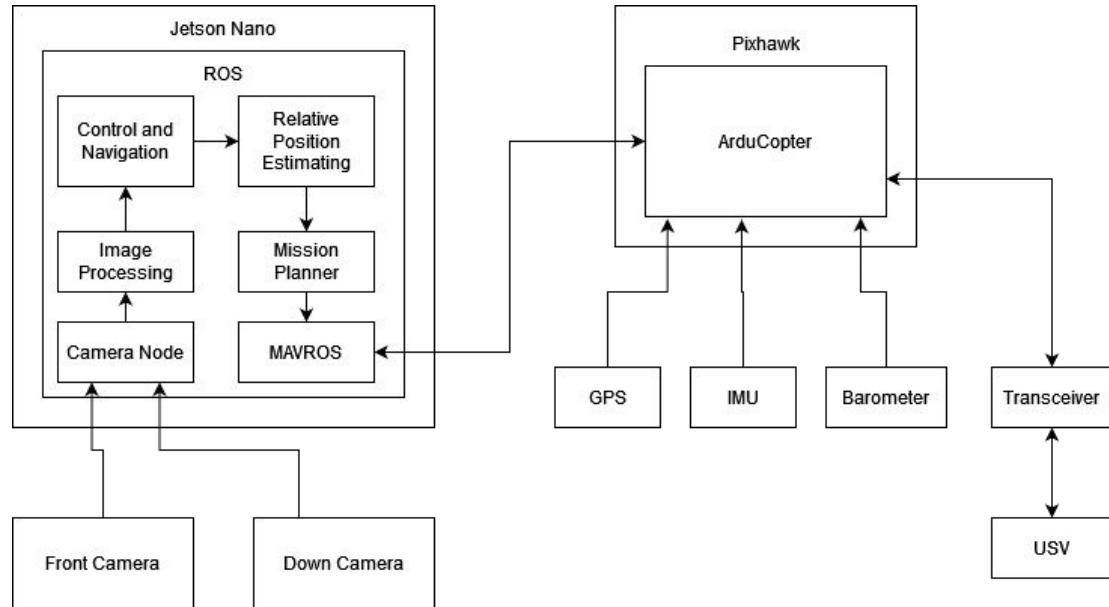
Embedded Software

Jetson Nano:

- Runs ROS2 Humble
- Handles high level control

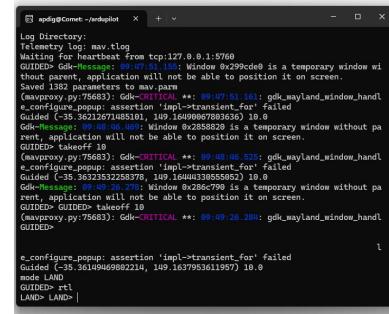
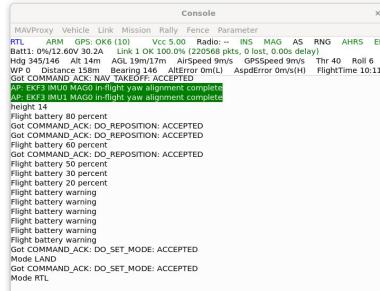
Pixhawk flight controller:

- Runs ArduCopter flight control software
- Handles low level control



Simulator Progress

- Basic control with high-level commands with ArduCopter's built-in SITL simulator.
 - Next steps:
 - Running quadcopter in Gazebo
 - Creating model with simulated cameras
 - Recording 3D visualization of simulation



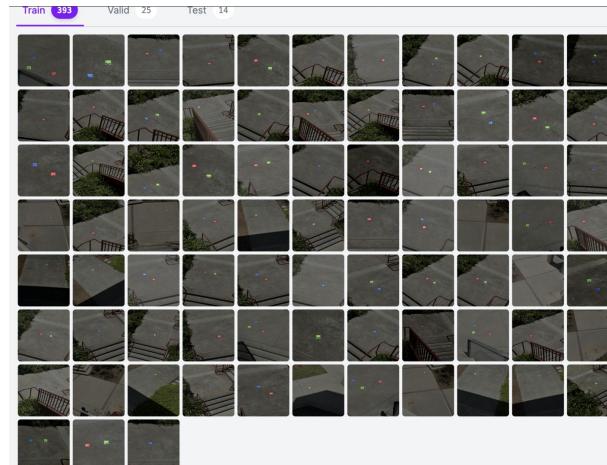
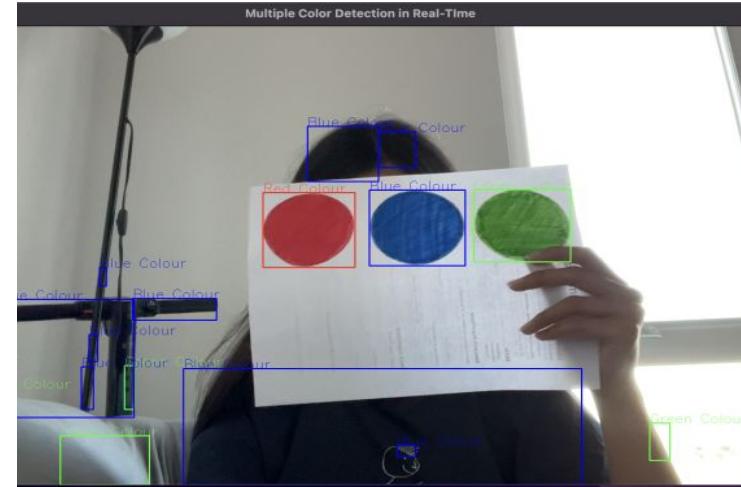
Hardware Accomplishments

- Completed drone build
- Re-did drone build to handle hardware issues
- Next step: Calibration and pre-flight testing



Object Detection: CV task

- OpenCV object/color detection
- Dataset building
- Training YOLO
- Testing with ArduCam
- Target localization

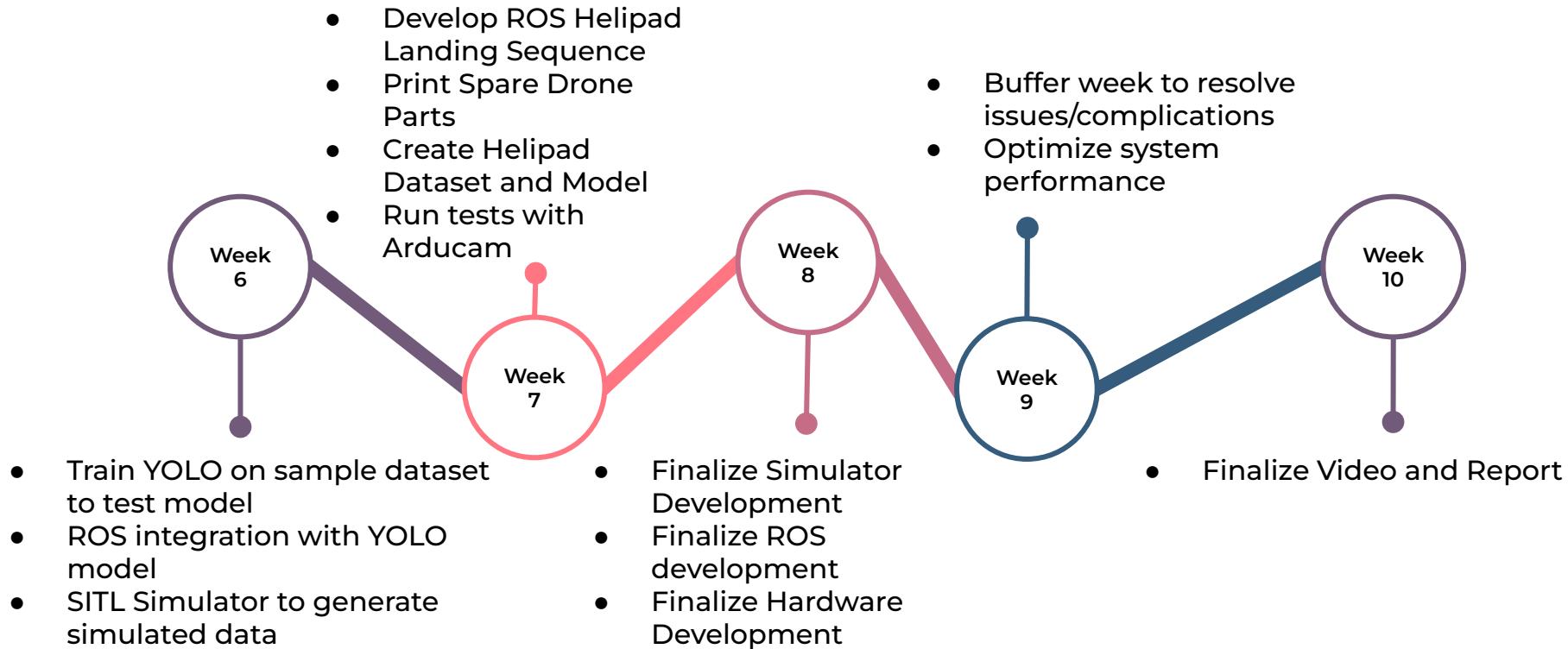


YOLO training batch





Timeline



Summary

Completed Milestones

- Completed drone assembly, hardware integration
- Gathered data, performed initial CV model training

In-Progress Tasks

- Software development
 - Object Detection: Training YOLO for tin can
 - ROS2/Pixhawk: Integrate control logic with flight controller
 - Simulation: Begin initial drone flight testing

Upcoming Milestone

- Live drone flight during next Inspiration Lab meeting
- Performing target detection using ArduCam

