

CprE / SE / EE – sddec26-11

CyFlyBot: Collaborative CyBot and UAV System for Faster Missions

Status Report 1

August 24 2026 – September 6 2026

Client: Dr. Rover and Dr. Jones

Faculty Advisor: Dr. Rover and Dr. Jones

Team Members:

Daniel Bieber

John Brittain

Jake Nickel

Caleb Sanchez

Tu Reh

Ping Wu

Mitchell Fowler

Weekly Summary

Week 1: With the start of the semester after a long summer, the goal was to become fully oriented, so by week 2, our team could work at full speed. A scheduling poll was used to find that 2pm on Tuesday was the only time with all team members available. This became the general meeting time. This however did not work with Dr. Rover and Dr. Jones, so correspondence continued for another week. General goals were decided with Hardware having a functional UGV and UAV ready for ROS2 commands by early October, and Software having said ROS2 commands ready by the same time. This way, October and November could be used for testing and fine tuning. Various tasks were completed to “shake off the rust” like relearning ROS2, the new UGV, and more

Week 2: Correspondence continued with Dr. Rover and Dr. Jones for another week until 3:45pm Thursday, September 10th was decided as the first meeting time. Each team had their goals as well as each individual. Progress is detailed below. Achievements include Navigation and Mapping progress with toolbox implementation, secondary simulation progress, documentation improvement for presentation purposes, and new UGV

implementation progress involving 3d printed landing pad, LiDAR attachment, and node integration.

Past Weeks Accomplishments

- Whole Team
 - Primed for upcoming semester
 - Goals clearly outlined for current Scrum Sprint
 - Repository updated for semester
- Software
 - Caleb – implemented slam toolbox to map environment using lidar, implemented nav to map paths, and implemented explorer class to automatically map out environment, Reviewed and Updated Repository
 - Jake – Further Researched WeBots simulation software. Managed to get ground robot with camera feedback. Will report to Faculty on utility vs. Gazebo.
 - Ping – ROS2 functional on home computer(issues with mac caused major delays), created updated state machine
 - Tu – ROS2 functional on home computer, Created Updated UI design in Figma, Created Endpoint Diagram per Issue Resolution
- Hardware
 - Daniel – 3D modeled sample landing pad attachment for UGV. Further refined model after discussions with rest of hardware team.
 - John – Acquired new UGV with LiDAR, wrote and implemented LiDAR code.
 - Mitch – Scheduling and Clerical Work, Researched ROS 2 integration between hardware and software. ROS2 functional on home computer, access

Individual Contributions:

NAME	Contributions	Bi-Weekly Hours	Total Hours	Attended General Meeting
John Brittain	Wrote and implemented D500 Lidar scanner into the groundbot	7	7	Yes

Daniel Bieber	Created initial prototype for landing pad and landing pad mount	8	8	Yes
Jake Nickel	Researched WeBots extensively and implemented on a basic level	8	8	Yes
Caleb Sanchez	implemented slam toolbox to map environment using lidar, implemented nav to map paths, and implemented explorer class to automatically map out environment, assisted Mitch with ROS2 setup	12	12	Yes
Tu Reh	Created Endpoint Diagram for codebase. Created updated UI design. Worked on ROS2 functionality for home computer	7	7	Yes
Ping Wu	Created updated State Machine for presentation purposes	7	7	Yes
Mitchell Fowler	Scheduling and clerical work, made progress on integrating hardware and software research(involved learning basics of ROS2 and topic publishing	11	11	Yes

General Meeting Review

Meeting 1: General Meeting over discord on Tuesday the 25th of August at 2pm. This meeting's purpose was to reorientate ourselves after the summer. We discussed what we need to relearn, what we need to do going forward, and how to do it. As it stands, Hardware is working on getting the new ground robot functional physically and with ROS2. Software is currently working on getting repeatable navigation and mapping per previously outlined goals

Meeting 2: General Meeting over discord on Tuesday the 1st of September at 2pm. This meeting's most pressing matter was finding time for the faculty meeting. A 7pm time on either Monday or Wednesday was decided upon. This information was delivered to the faculty after the meeting. The rest of the time was dedicated to finding tasks for the next week.

Summary of Weekly Advisor Meeting

Initially, conflicting schedules have led to delays to the weekly advisor meetings. Eventually, Thursday, September 10th was decided as the first available time for all team members and faculty members. Plans for it include discussing the eventual Instructor Review,

Extended Discussion

These two weeks were the warmup for our team. We unfortunately all had prior commitments over the summer and were unable to work on the project then. However, our team is now in the right headspace and is already up to speed for full production. The first week was a good orientation with the team relearning their tasks and necessary knowledge. This was the “stretching” before the sprint. The next week was all about using our mental muscles and starting to produce. It was the “warm-up” lap, so to speak. We are confident in the upcoming weeks work.

Pending Issues

- Issues Board
 - [Development](#)
- Bill of Materials finalization
- Instructor Review Prep
- Implementing Faculty Improvements

Plans for Coming Weeks

- Whole Team
 - Have first meeting with Dr. Rover and Dr. Jones
 - Discuss Instructor Review meeting
 - Make reasonable progress according to scrum goals
- Software
 - Continue Navigation and Mapping programming
 - UGV
 - UAV
 - model
 - Research Sonar Toolboxes
 - Start Programming UI
- Hardware
 - 3D print updated Landing Pad, Test
 - Fully implement and test LiDAR
 - Get functional ROS2 integration node

Resources and Documentation

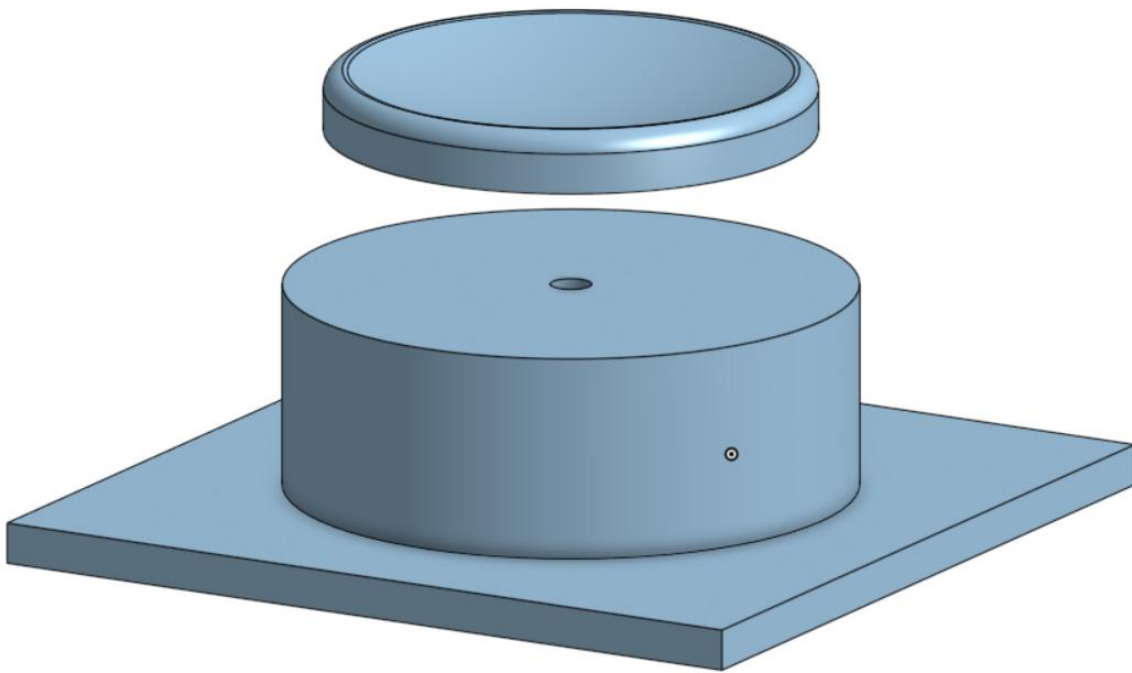


Figure 1: Initial Landing Pad Prototype

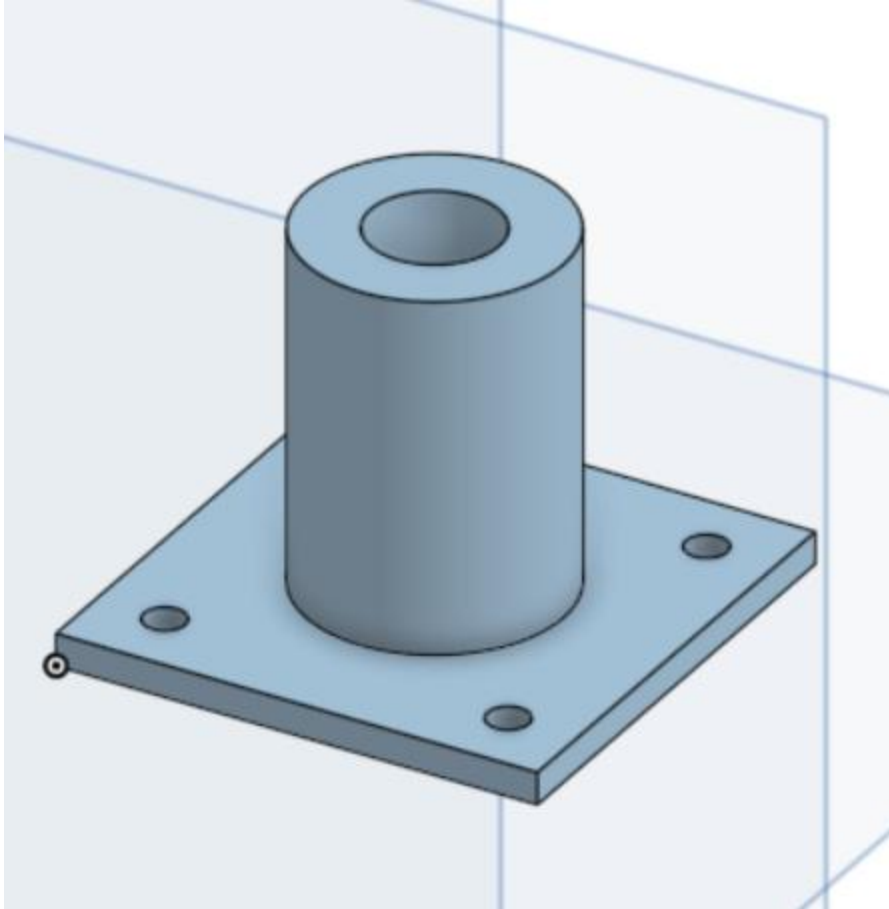


Figure 2: Landing Pad Mk.2 Mount

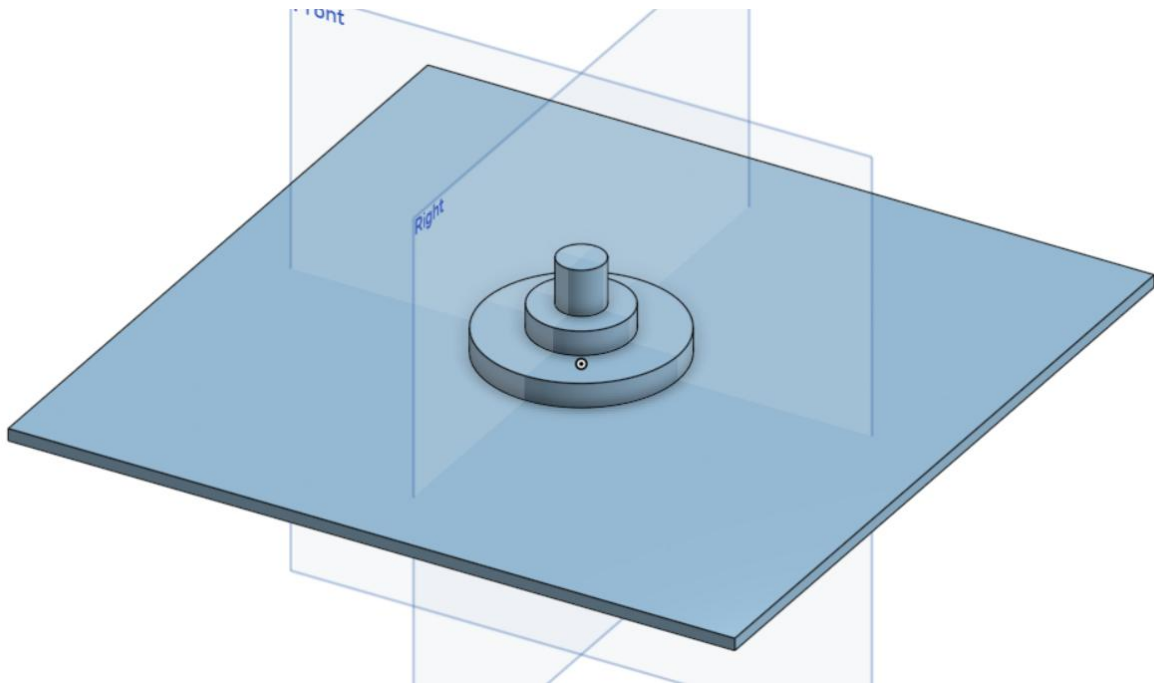


Figure 3: Landing Pad mk.2 Pad

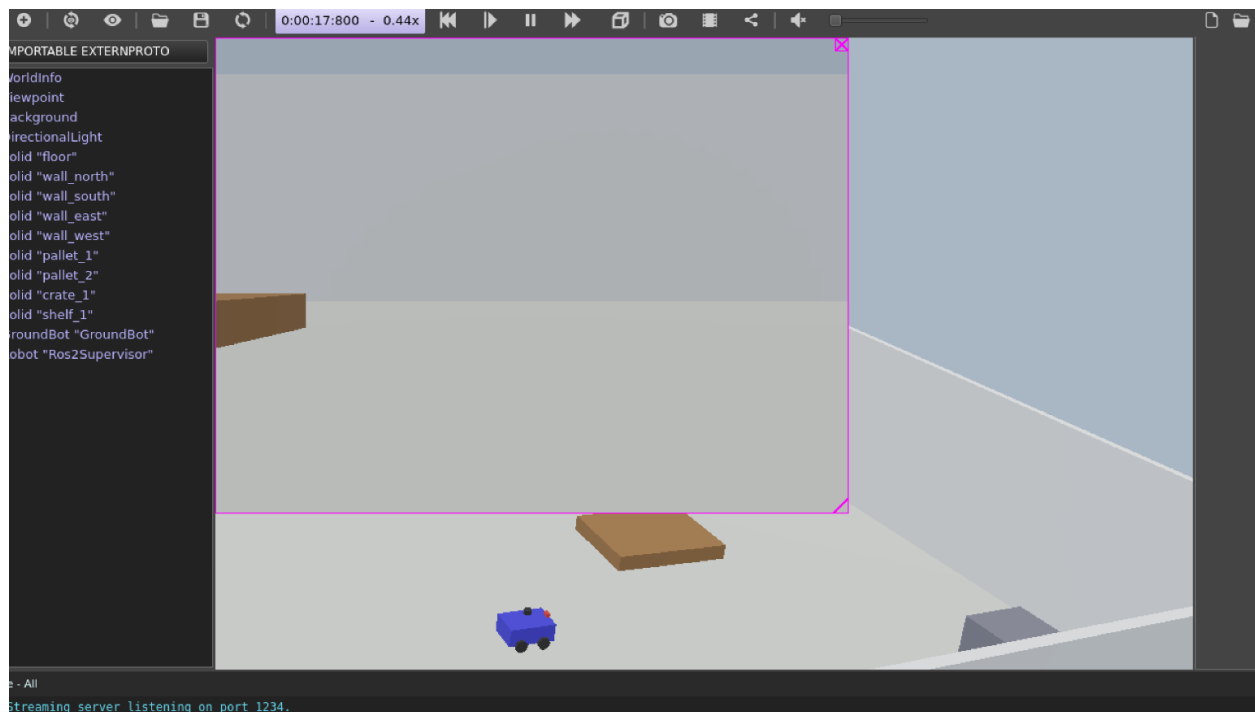


Figure 4: WeBots simulation progress 1

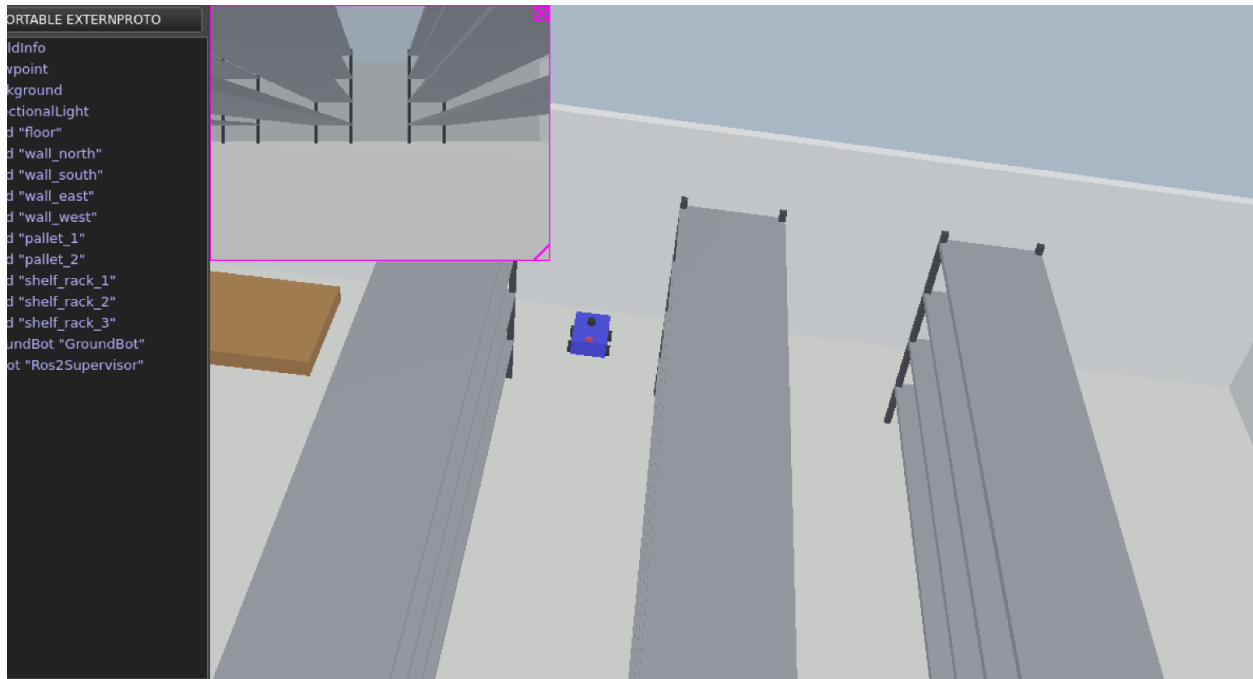


Figure 5: WeBots Simulation progress 2

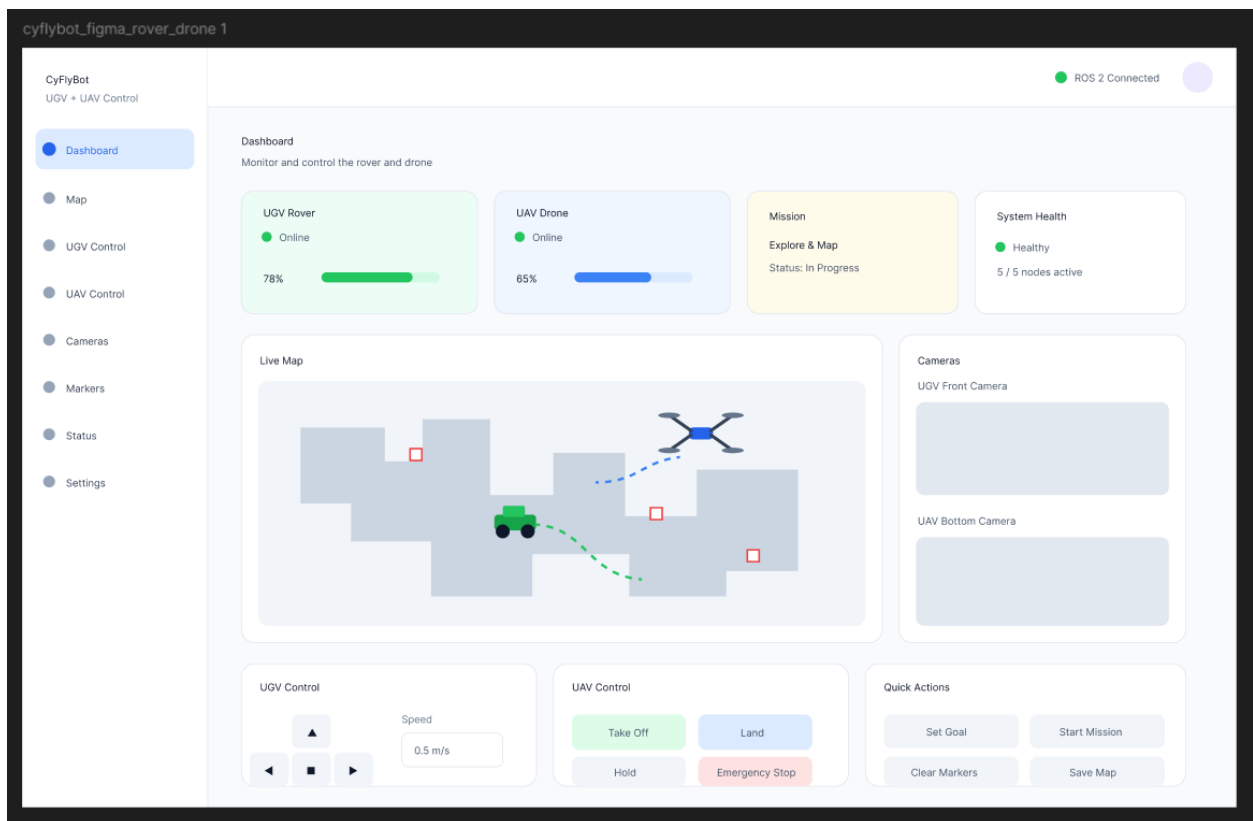


Figure 6: Updated UI

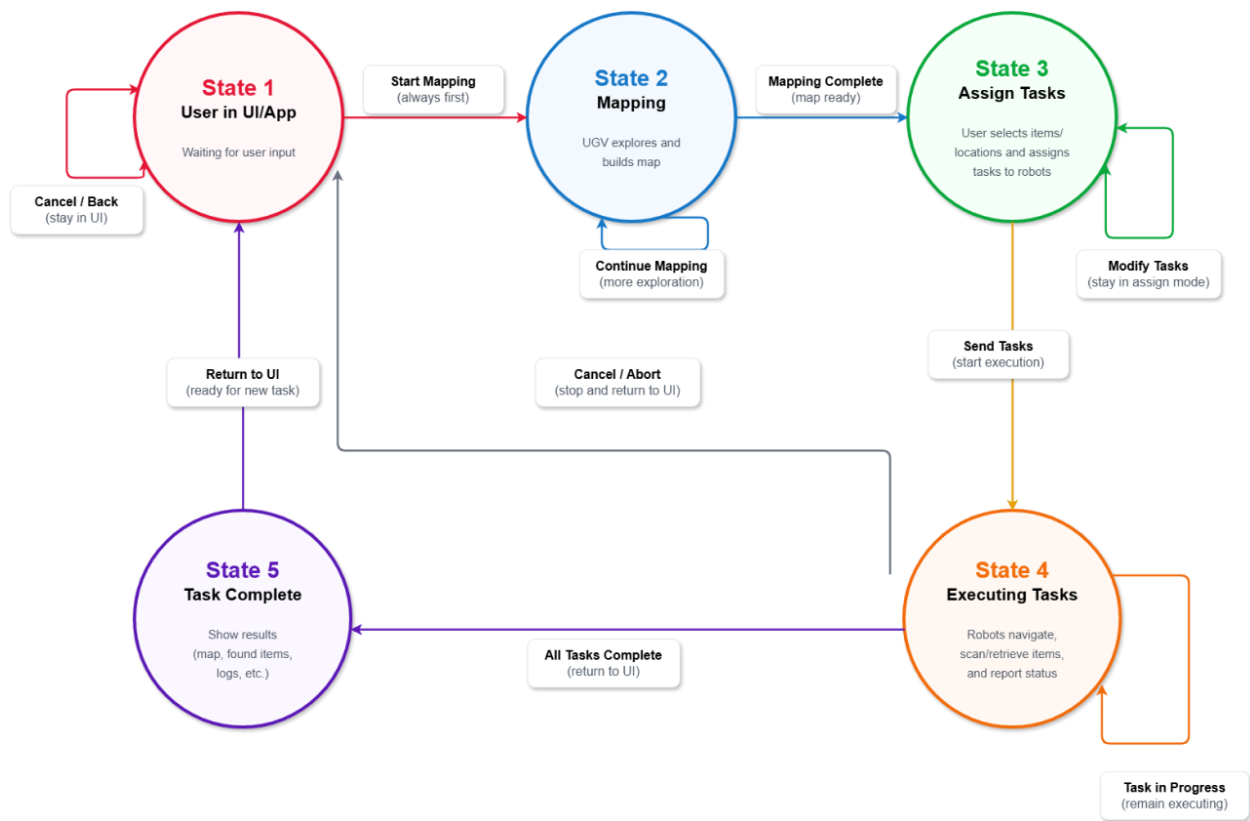


Figure 7: Updated State Diagram

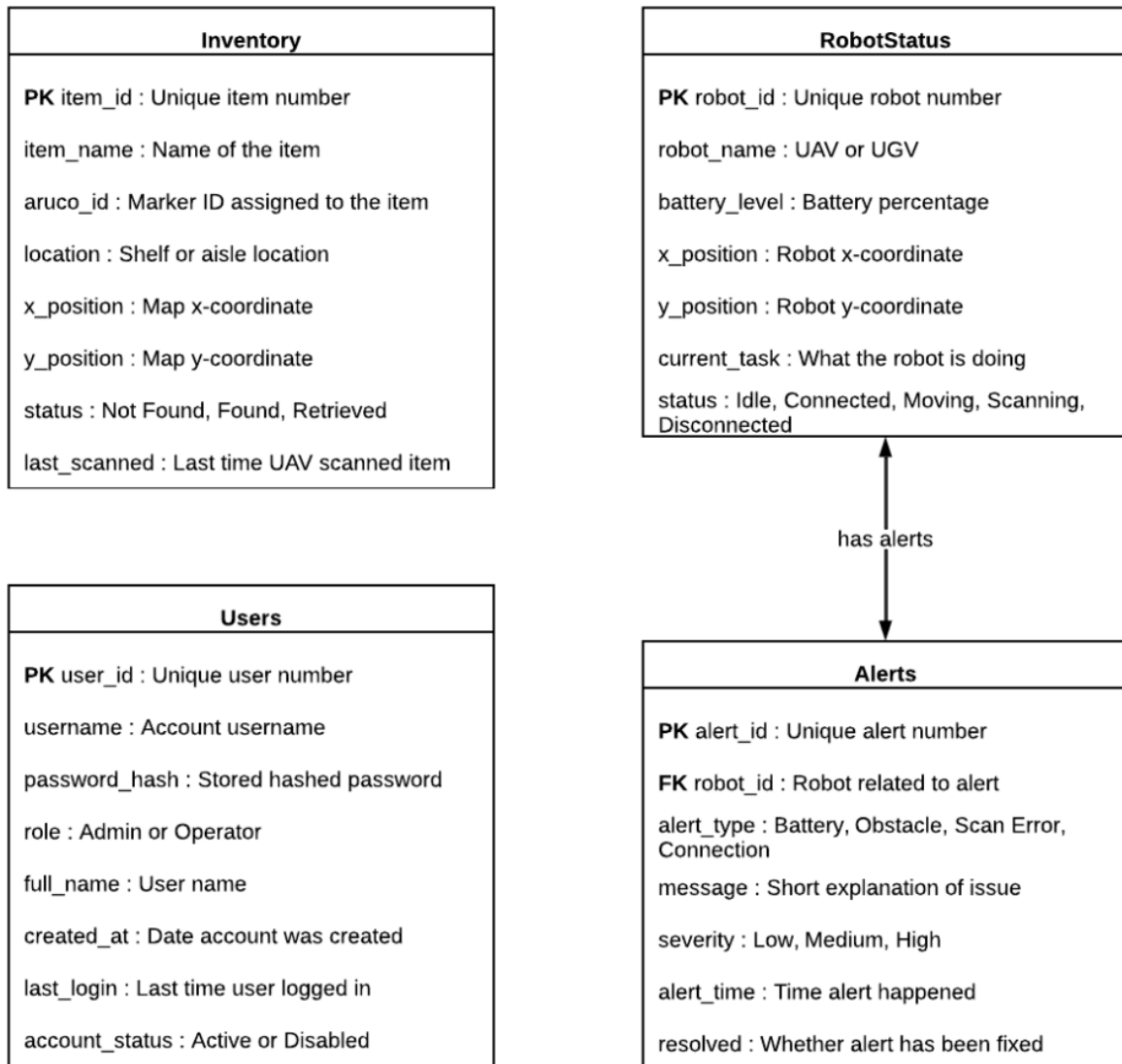


Figure 8: Updated Nodes

ROS 2 Endpoints in the Codebase

(Total: 24 endpoints)

#	Endpoint	Type	Message/Action/Service Type	Description
1	/scan	Topic	sensor_msgs/LaserScan	LiDAR scan data (ground robot)
2	/cmd_vel	Topic	geometry_msgs/Twist	Velocity commands for ground robot
3	/odom	Topic	nav_msgs/Odometry	Ground robot odometry
4	/map	Topic	nav_msgs/OccupancyGrid	2D map of the environment
5	/frontiers	Topic	visualization_msgs/MarkerArray	Frontier points for exploration
6	/navigate_to_pose	Action	nav2_msgs/NavigateToPose	Send a goal to Nav2 for autonomous navigation
7	/ground_bot/camera/image_raw	Topic	sensor_msgs/Image	Ground robot front camera image
8	/ground_bot/camera/camera_info	Topic	sensor_msgs/CameraInfo	Ground robot front camera info
9	/ground_bot/aruco/image	Topic	sensor_msgs/Image	Ground robot ArUco debug image
10	/ground_bot/aruco/poses	Topic	geometry_msgs/PoseArray	Ground robot ArUco marker poses
11	/ground_bot/aruco/detections	Topic	cyfly_interfaces/MarkerDetectionArray	Ground robot ArUco detections
12	/markers/known	Topic	cyfly_interfaces/MarkerDetectionArray	List of known markers (combined map)
13	/markers/viz	Topic	visualization_msgs/MarkerArray	Visualization of markers (for RViz)
14	/cyfly_drone/bottom/image_raw	Topic	sensor_msgs/Image	Drone bottom camera image
15	/cyfly_drone/bottom/camera_info	Topic	sensor_msgs/CameraInfo	Drone bottom camera info
16	/cyfly_drone/aruco/image	Topic	sensor_msgs/Image	Drone ArUco debug image
17	/cyfly_drone/aruco/poses	Topic	geometry_msgs/PoseArray	Drone ArUco marker poses
18	/cyfly_drone/aruco/detections	Topic	cyfly_interfaces/MarkerDetectionArray	Drone ArUco detections
19	/cyfly_drone/cmd_vel	Topic	geometry_msgs/Twist	Control drone movement
20	/cyfly_drone/takeoff	Topic	std_msgs/Empty	Command drone to take off
21	/cyfly_drone/land	Topic	std_msgs/Empty	Command drone to land
22	/robot_description	Topic	std_msgs/String	Ground robot model description (URDF)
23	/cyfly_drone/robot_description	Topic	std_msgs/String	Drone model description (URDF)
24	/drone_description	Topic	std_msgs/String	Alternate drone model description (used in drone.launch.py)

Notes:

- These are all endpoints (topics, actions, and services) that are defined or used in the provided codebase.
- This list only includes application-specific endpoints (not built-in ROS 2 infrastructure like `/tf`, `/tf_static`, `/parameter_events`, etc.).

Figure 9: Endpoint Diagram for Repository