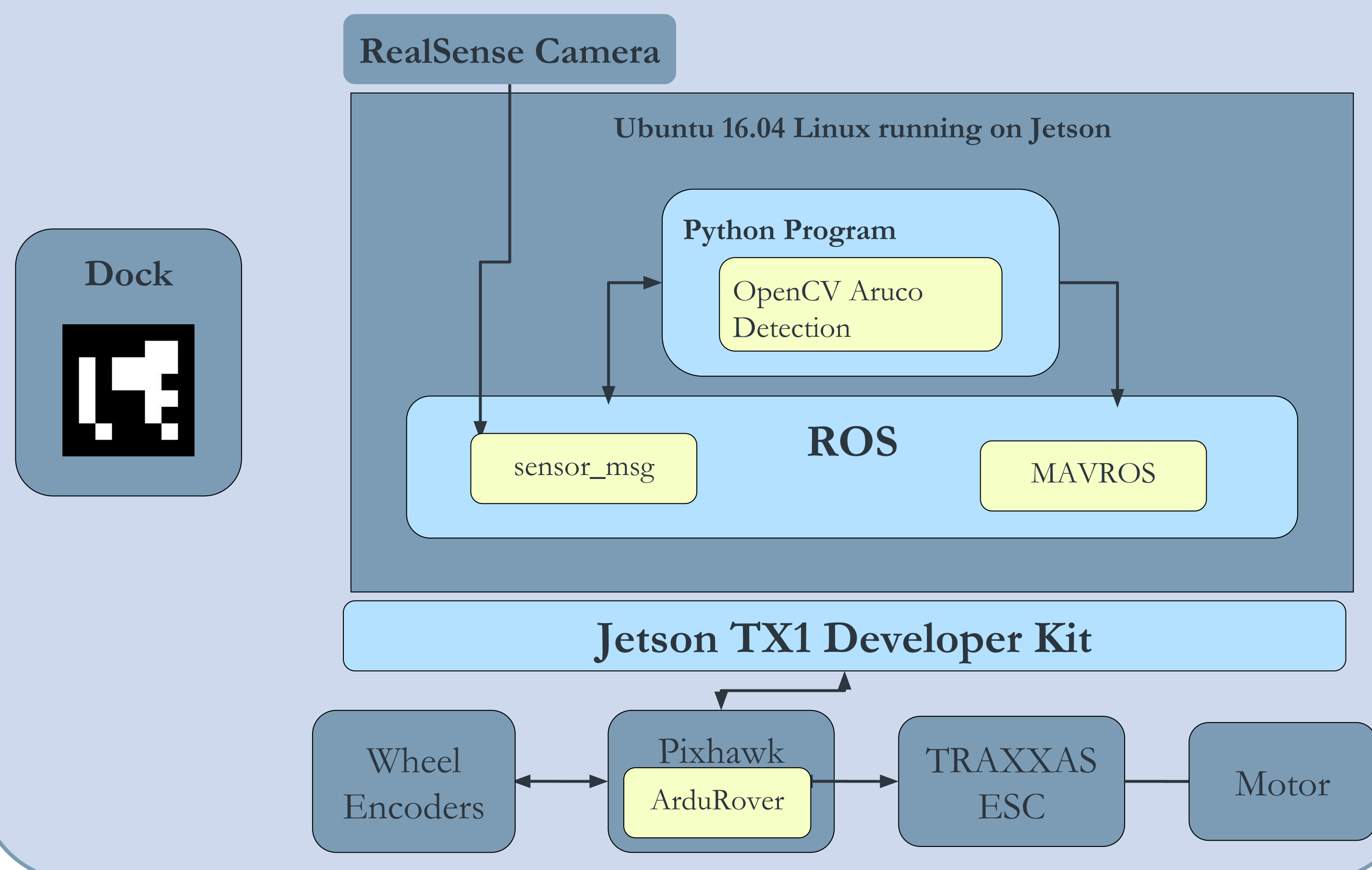


Project Objective

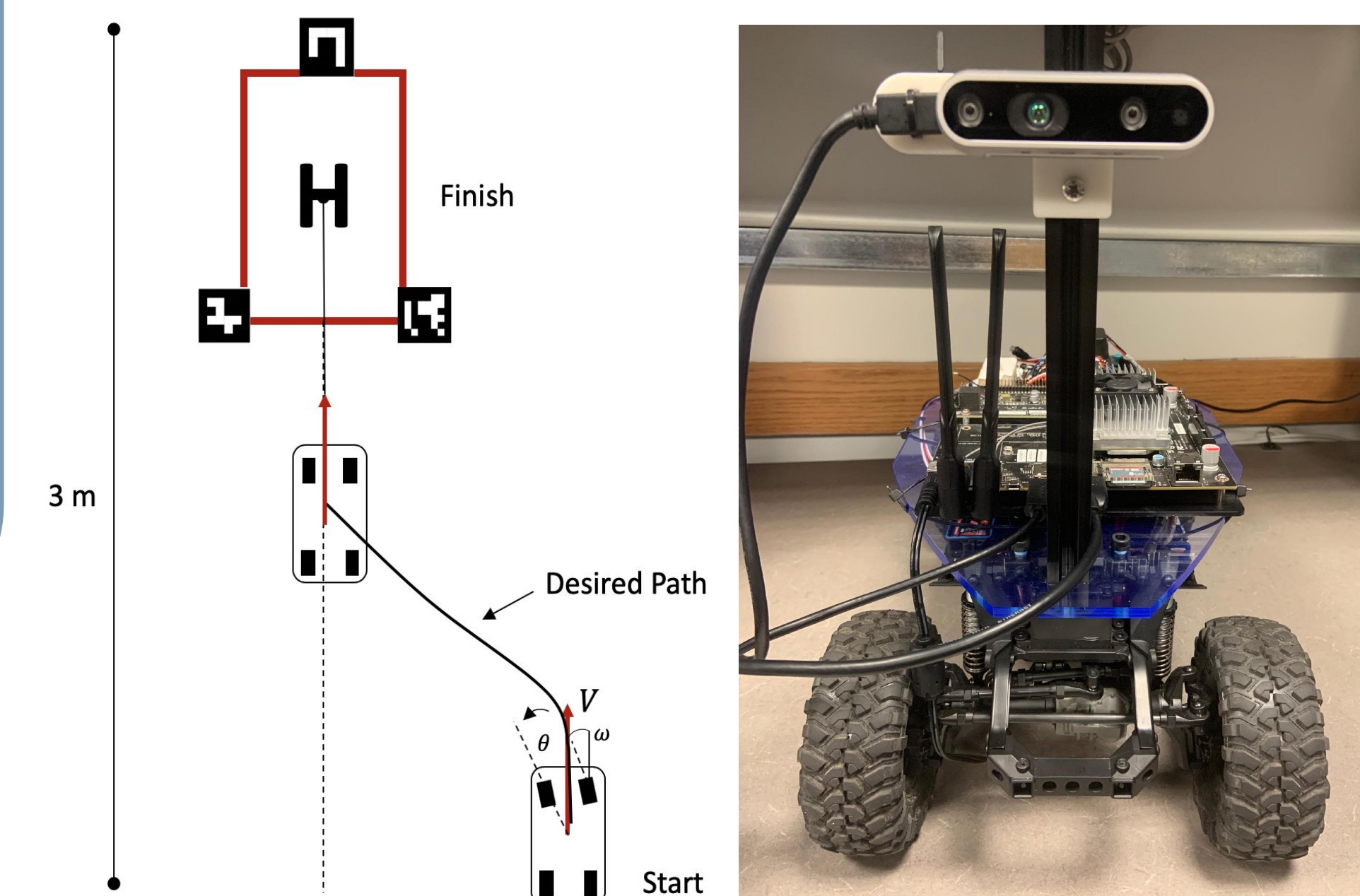
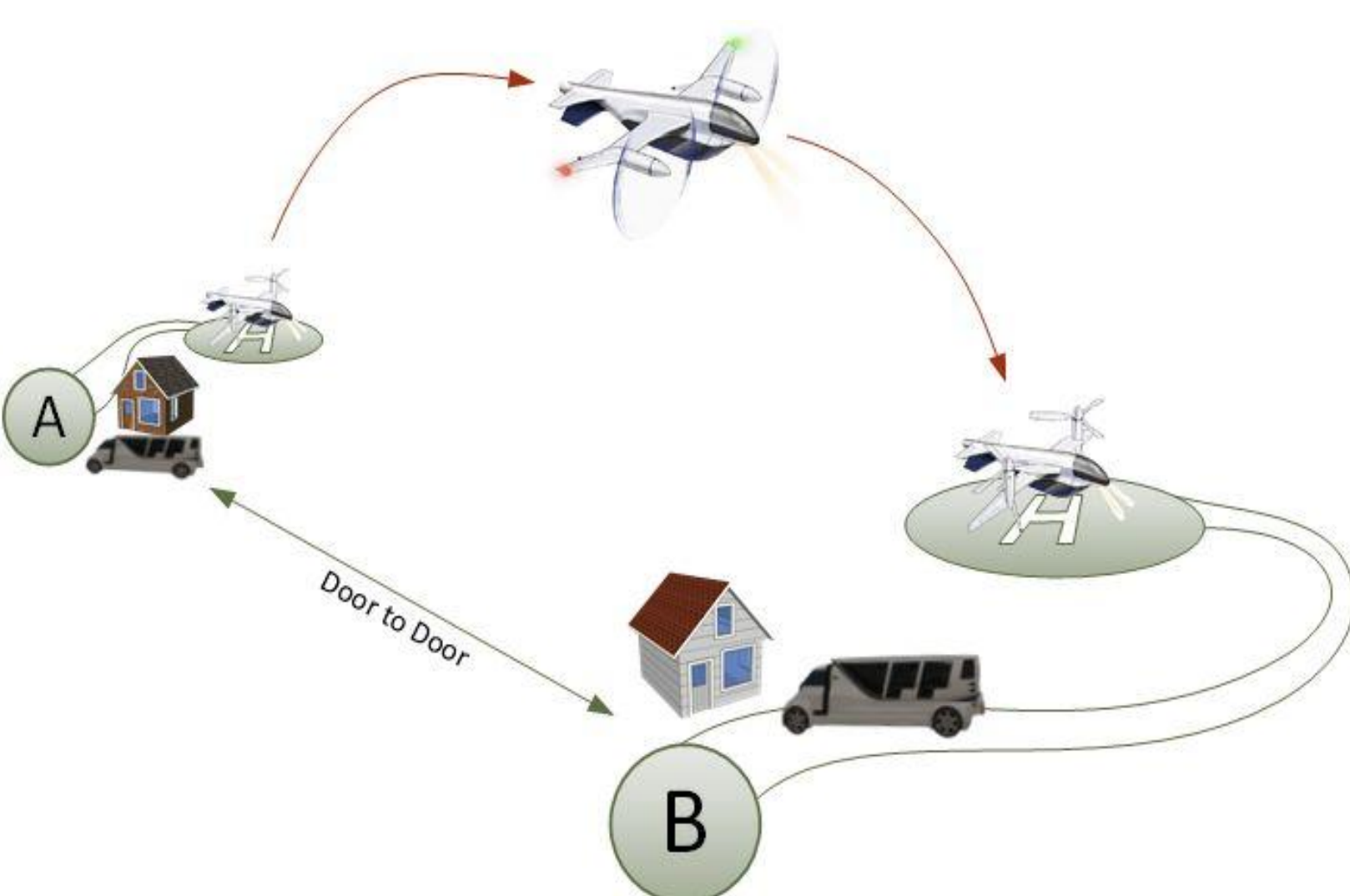
Design and build a 1/10th scale computer vision guided autonomous docking rover that can work in GPS denied areas.

System Engineering Diagram



Challenges

- Deciding how to find the dock
 - Determining type of sensor and algorithm
- Combining the OpenCV python program with ROS and sending messages to the rover motors was a time consuming process
- Lack of communication from sponsor while the company was experiencing financial trouble
- Losing our sponsor half way through the project



Background

Terrafugia currently uses an RTK GPS system to align the rover with their aircrafts for docking. The RTK system can achieve cm accuracy. However, there are scenarios where GPS will be unavailable at vertiports.

Process

1. Intel RealSense camera captures surrounding features
2. Video feed is manipulated using OpenCV to acquire position and depth of rover in relation to the ArUco Markers that indicate the dock
3. Velocity and direction of the rover are determined based on its position and distance to the dock
4. Nvidia Jetson sends motor commands to Pixhawk
5. Pixhawk determines velocity of the motor and the rotation of the wheels using sensory information

Key Takeaways

- It is risky to work for a new company as a contractor. The lack of communication from the company is a red flag.
- Integrating hardware and software technologies can take even longer than coming up with a solution to the problem

