Weekly Progress Report

Dronalyser: A drone based Crop Analysis System

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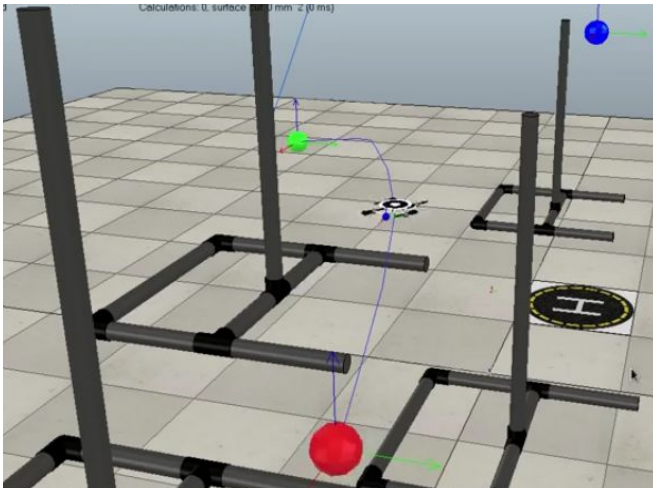
1. **Building the Drone:** We have figured out the cheapest alternative to make a drone. The components we have finalised are-
    - 450mm X-quadcopter chassis
    - 4X1400kV Brushless DC Motors
    - 4X ESC BLDC Motor Drivers
    - APM Controller- Having external GPS Support and Motion Planning Possibilities. It can also be connected via RF control using Telemetry modules or RF Receivers.
    - Propellers and Propeller Guards (8cm Propellers)
    - 2200 mAh Lipo batteries
2. **Communication and Path Planning for the Drone:** For the communication and Path Planning Part, we have studied two different approaches. We have tested the former and would be testing the latter further. They are:
    - **Using VREP:** V-REP is a simulation platform, open sourced in its student edition, which contains libraries like OMPL (Open Motion Planning Library) which takes up coordinates of two points and make the most optimum possible path for the drone to traverse. We can use this as an intermediary for path planning where the needed GPS coordinates are fed to V-REP after conversion to its frame of reference, based on which it returns a path array of points to be traversed by the drone. These points can be again converted back to real GPS coordinates frame of reference and fed to the Controller for PID tuning and waypoint navigation. We have also discovered that we can do the PID tuning and waypoint navigation through a laptop and a python script which performs all the computation. It's advantage is that it can further reduce the price to an arduino and a communication module for setting the Yaw, Pitch, Roll and Throttle Values of the drone (⅛ th of the cost) however, it will significantly reduce the range of operation due to very small area of coverage of Wireless communication using laptop.



- **Using Mission Planner-** The APM Flight Controller can be burned via a software known as mission planner (Ardupilot) which removes all dependence of the drone on any external factor after the path points have been given to it at the time of launching it. The Mission Planner software has a polygon draw feature which lets us select the points we want to cover and make a polygon around it. It then automatically generates a grid which contains the points to cover so that the drone can capture the entire field efficiently. It has the benefit of reduced interdependency and no manual filling up of GPS points corner points for each path as in V-REP OMPL.

3. **<u>Data Acquisition and Processing-</u>** We have found an alternative to find Normalized Difference Vegetation Index using a normal Pi-Cam and a NoIR Pi-Cam connected to the CSI Ports for data acquisition. We are working on a code for acquisition of dataframes at certain time intervals, storing the images and performing NDVI calculation using comparison of colour reflectance indices from both cameras.