ILR07

Name: Aman Agarwal
Team E: Wholesome Robotics
Teammates: Aaditya Saraiya, Hillel Hochsztein, Dung-han Lee, John Macdonald
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Individual Progress

Map Builder

Created a rospy node to record GPS positions according to user input via Joystick. This helps in creating a map of the field which is used by the planner and trajectory visualizer. The map builder works by subscribing to the RTK GPS node and the joystick. The map builder works by updating 3 values in the callback function. The x-position, y-position and the button state. Every time the button state is high, the positions are collected and added to a list. The state variable is set to low and is updated when the button on the joystick is pressed the next time. Finally, the list containing the positions is saved as a npy file.

This map builder will be used only once per field every season. The user will move the robot through the field and store the start and end positions via joystick command. This map file is later used to define a frame at the starting point of the first row and with the x-axis along the first row.

Further, the planner makes use of the set of points stored, to build a map of the field. Then it uses this map to create a coverage map and this map is used by the controller for going through the entire field without going to a row twice.

Robotanist Repair

During the last field visit before we could collect data, the robot started making weird noises which were later identified as sparks, soon we could smell that something was burning inside the robot. Thus, we had to abort the field visit at that time in order to avoid any further damage to the robot and had to bring it back. Since the robot was not built by us, this was a major risk as repairing/debugging the robot could take a significant amount of time.

Hillel and I opened the robot later and noticed that the cable connecting the battery to the system was partially exposed and the insulation present there was damaged (see figure 1).

Figure 1 Damaged Battery Cable

We used electric insulating tape to cover up the wire and that seems to have solved the issue we were facing. We tested the robot by driving it around campus for a long time subjecting it to similar acceleration and deceleration cycles that it would get in the field.

Challenges

Unreliable RTK GPS system
During the last field visit we spent a significant amount of time in setting up the RTK Base station. However, after almost an hour of effort we focused on just data collection. Since our navigation stack is solely based on RTK GPS now, an unreliable RTK GPS is a major risk.
The current system is old, and the cables seem to be out of shape.
To mitigate the risk, we are replacing the cables and testing the system. We are also working with the Field Robotics Lab who own the equipment to ensure that we have a working RTK GPS system. Further, if this system does not work for by the end of the week, we might replace the current RTK GPS system and get a newer more reliable one for the project.

Teamwork

Aaditya:
Evaluated methods for exposure handling and helped integrate the ros-bag parser with the visualizer.

Dung-han Lee:
Iterated on different strategies for predicting severity of disease. Evaluated the performance for four kinds of brassica.

Hillel:
Purchased cables for the robot and handled integration of the visualizer with remaining monitoring pipeline.

John:
Wrote functions to transform the GPS position from the top of the robot to the base and published it to the same topic where previous localization was publishing, thus requiring no change in remaining navigation stack.

Future Plans

Team:
- Add user requested features into the visualizer
- Fabricate the initial version of plant guards
- Solve integration issues of visualization and inference pipeline
- Attempt alternative methods for binary classification
- Evaluate methods of foilage depth estimation
- Fix lateral movement issues with RTK Localisation

Individual:

- Test Map builder and integrate it into the planner
- Set up parameter server for remaining parameters after integrating map builder into navigation