INDIVIDUAL LAB REPORT 4

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John Macdonald

Wholesome Robotics, Team E

Teammates:
Aman Agarwal
Aaditya Saraiya
Hillel Hochsztein
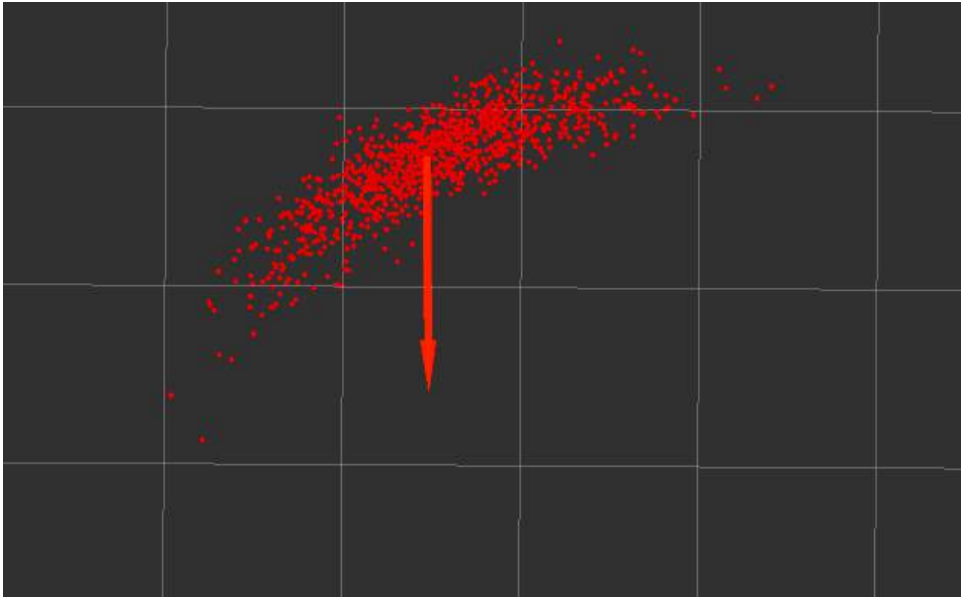Dung-Han Lee

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Figure 1: Particle filter running in rviz.

0.1 INDIVIDUAL PROGRESS

The past two weeks have been focused for me mostly on testing integration. I worked on integrating the additional Zotac computer with the current NUC computer (the Zotac is required because the ZED requires a GPU for visual odometry) on the robot and integrating the ZED camera for visual odometry. I also worked on separating my row detector out of the previous particle filter, and making it a standalone ROS node which publishes row detection messages. I spent a lot of time collaborating with my teammates and helping them work with the robot. We additionally visited the site where we were previously planning to do SVD, Phipps Conservatory, which will be expanded upon in the Challenges section.

0.2 CHALLENGES

We attempted a field test at Phipps. However, we ran into many challenges. For one, the plants at Phipps are very young and therefore they are very difficult to see in the laser. Additionally, the soil was in face mulch and was very loose. This lead to a lot of bulldozing, which negatively affected trajectory tracking performance. We also had issues with the RTK GPS, which we were not able to resolve. The base station logical connection to the robot did not work properly.

Figure 2: The test site at Phipps. Note that the kale plants are very young.

Based on this experience, we have decided to do SVD indoors with an artificial plant setup. We have ordered artificial plants and we are looking forward to testing with the new setup.

0.3 TEAMWORK

The current breakdown of work is:

1. Hillel: Electrical system wiring

2. Aman: Sensor mounts, planning controls

3. John: Row detection

4. Aaditya: Sensor fusion

5. Dung-Han Lee: Plant health perception

I helped Aman tune the gains on the controller and integrate his planning and controls code into ROS. I also worked with Aaditya to combine his motion model with the particle filter I had previously wrote. I also discussed how to improve the plant health model with Dung-Han Lee, potentially by using a regression model to predict severity from the bounding box outputs of Mask RCNN.

0.4 PLANS

We are currently working on the measurement model for the particle filter which will finally complete our navigation system. We hope to complete this and construct our test setup.