Progress Review 4

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Team B / Auto Pirates

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1. Individual Progress

1. Field Test
Our team did field test on 17th Nov. This field test was for collecting sensor data, radar, IMU, and GPS. Our test started at around 7:00 AM in the South shore riverfront park.

1) Collecting GPS and IMU data.
I worked on collecting GPS data with Tushar. GPS was important for path planning part because it decided our boat's localization. I made ROS bag files saving the GPS data, specifically, latitude, longitude, and orientation. We could use this GPS data and find the boat's location in the Open street map. I checked the ROS bag file containing GPS and IMU sensor data. It showed streams of sensor data on the console. I think that this sensor data would be used in visualizing the boat localization on the Occupancy Grid Map.

Figure 1. Our boat for the first field test.

2) Testing GUI program.
We tested the basic boat control program with GUI navigation program made by NREC. It had simple boat's trajectory on the screen without map information and control status on the left part. When we tested it, although it looked like working well at first, the boat turned at some point. We thought that it was not advanced path planning software but basic PID control for waypoint so it couldn't get to the waypoint.

2. Compiling the SBPL Lattice Planner package.
I worked on compiling the SBPL lattice planner package which was the interface between SBPL and navigation package. Several navigation packages used the default path planning package, the Navfn package using Dijkstra's algorithm. For that reason, we needed to change it into SBPL Lattice Planner package. As it had some compile errors with regards to the compatible issues, I was trying to compile it reading some QA postings in bulletin boards. After that, I grasped how to change the path planning package. I should use the plugin way for that issue.

2. Challenges

When I compiled the SBPL Lattice Planner package, there were some compile errors. It was related to old maintenance and compatible version of the ROS. Specifically it was maintained by the ROS hydro version. Since there were not enough support and Q/A posting in the ROS community, it required me to spend a lot of time. As I could find a couple of the unofficial SBPL lattice planner source code repositories maintained by some private developers and robotics research team. I successfully compiled the SBPL lattice planner package and uploaded them into our source code repository in the Github.

For the field test, I worked on the basic waypoint navigation program made by the NREC. As the program has some problems, we couldn't work on waypoint navigation. We guessed that there were some state machines in the VCU and we needed to find how it did work. Although we couldn't figure out what the mechanism was, we should prepare the navigation test next time. Because it was allowed to test it when the engine was operated, I guessed that we should need to manage to test it within limited test time.

3. Teamwork

1) Shiyu Dong: Shiyu worked on plotting the GPS coordinate on Occupied Grid Map in the RVIZ program.

2) Bikram Hanzra: Bikram worked upon writing the code to display the radar data on the occupancy grid map using the OpenCV library.

3) William Seto: William worked on preparing for the field test and creating the map in QGIS.

4) Tushar Chugh: Tushar added feature to add waypoints in the GUI, ran path planner on Occupancy Grid Map with SBPL library, and soldered PCB.

4. Future Plans

First, our team plans to prepare the Fall Validation Experiment (FVE) next week. I'll work on the path planning simulation jobs with Tushar.

Second, I plan to work on the navigation simulation on the Occupancy Grid Map for the FVE. As we have the Occupancy Grid Map of the river in Pittsburgh, we need to implement the real simulation and test and visualize it.

Lastly, I'll be trying to upload the documentations on our Github site for other team mates. Because it was the end of semester, it'll help other team members to catch up my progress so that they could understand my work.