PROGRESS REVIEW #9

INDIVIDUAL LAB REPORT [ILR08]

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INDIVIDUAL PROGRESS

Since the last progress review, I sorted GPS related hardware issue for Tae-Hyung, helped Shiyu with adding the 'arrow' marker and updated the project website

a. Getting data from GPS in NMEA format

Tae-hyung, from past three weeks has been trying to make the ROS navigation package work for the boat. It requires the input as GPS data in the form of standard NMEA 0183 format. The GPS mounted on the boat is connected to the low-level controller which publishes the data as the ROS topics to the local network of the boat. As this data is not published on serial port with NMEA 0183 format and we don't have access to the raw data from the GPS, we had to order a separate GPS. Tae-Hyung ordered Garmin 18x GPS receiver model.

This garmin model (shown in *Figure 1 left*) doesn't has a USB interface and Tae-Hyung asked me to interface this with laptop.

I used USB serial converter (with Prolific 2303 chip), 1 DB 9 connector and a USB cable (for power) to interface with the laptop. Now, this new interface has two USB's: one for power and one for serial data (as USB-Serial adaptor doesn't has a Vcc connection). We tested it on his system and it is working perfectly. Figure 2, shows GPS ready to be connected with laptop.

Figure 1: Garmin 18x GPS (Modified version on right)

b. Adding 'arrow' marker

In order to analyze how the boat and the path planner are behaving in some cases, our team decided to indicate the orientation of the first waypoint (start) with arrow marker.

I helped Shiyu with adding the marker and in converting the Euler angle from quaternions using ROS tf package. We were able to add this marker fairy quickly as the entire code is modularized and there is a separate *class* created for marker as well.

c. ***Updating Project Website***

I updated the project website for the check that was scheduled on Feb, 19 2016. The updates included the description of the work that we have done during the spring semester. Following section were updates: Implementation, Test Plan, ILR documents, Project Management, Risk Management, Schedule and performance. I have also included a video (created by William) of the last field test in the implementation section. The feedback from the last website has also been incorporated.

CHALLENGES

a. **Field Test**

I had some features to test related to the continuous re-planning. But the boat is under repair and it will be available after 28th February for the field test. The performance and the reliability of the planning part will be accessed during the field test. Now, the weather seems to be getting better and the forecast for next week seems favorable. We are thinking of having 2-3 field test (1-2 during spring break) to make sure that the mandatory requirements of the system are met and the system is robust (no exceptions in the code, perception and path planning are behaving as expected and the performance (speed) is not a concern).

TEAM WORK

At present, we are making tweaks which can make the performance of the system better. So, the major focus is on the upcoming field test.

a. **Shiyu Dong:** Shiyu added a couple of new feature to the simulator including the arrow marker (we worked together) and sending the waypoints generated by the planner as the start location instead of using the bag file (recoded data).
b. **Bikram Hanzra:** Bikram made the dynamic fake obstacles code more robust and added it to the simulator.
c. **Tae-Hyung Kim:** Tae-hyung invested his efforts on making the navigation stack of ROS work with the GPS.
d. **William Seto:** William made the perception part more robust by using the 'octomap' package of ROS. His efforts focusing on filtering of radar data in a better way would be very fruitful in improving the performance of the system.

FUTURE WORK

As we weren't able to go for the field test last week, most of the improvements I had planned to work on, have been parked for now. Hope fully we would be able to go for a field test next week and I can work on the improving the code of the planner after that:

a. Testing during next field test

- Testing continuous re-planning with one parameter at a time and identifying the areas of improvement.

b. Making planner more stable

- Fixing the bugs that would be identifies in the field test.
- There are couple of more improvements that I need to work on. There are related to the way I am adding and removing the obstacles to the environment. I want to access the functionality of the present method during the field test before making the modifications in it.