



PROGRESS REVIEW #12


INDIVIDUAL LAB REPORT [ILR11]

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TUSHAR CHUGH

TEAM B-AUTOPIRATES

SHIYU DONG, BIKRAMJOT HANZRA, TAE-HYUNG KIM, WILLIAM SETO



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INDIVIDUAL PROGRESS

This week I worked on the bugs which I mentioned in the last ILR related to ‘number of waypoints to be missed’ and to indicate when boat has reached the goal. Here is the summary:

a. Number of waypoints to be missed:

Problem: As explained in the earlier ILR’s, we have to miss the first few way-points given by the planner. The reason for this is the planner takes time to plan the new path and the initial way-points which it gives lies behind the location of the boat (as boat is no longer at the same position). Now, as we have added the new costs in the map, sometimes it even take 5-12 seconds to plan the path. In these cases, 1 or 2 new way-points are located behind the boat and because of this, the boat takes a U-turn to reach them.

Solution: Figure 1, shows the problem wherein the initial waypoints lie behind the boat. (Note: there was a time delay in taking the screen shot, so boat was not that far away as shown in figure). To solve this problem I did the following:

- Got the new location of the boat
- Calculated the distance from the start to the waypoints
- Got the minima from the collection of the distances calculated in step b. Figure 2, shows the distances and the minima is marked with red arrow.
- Cleared the waypoints which were appended before the minima. In this case, the number of waypoints to be missed is 8.



Figure 1: Visualization showing path which starts from the behind the location of boat

```
/home/wseto/recboat-ros/src/launch/launch/autopirates.launch ✕
planning succeeded
Distance from start to end boat location in pixels is 16.3337
Distance from start to waypoint 1 in pixels is 10.4884
Distance from start to waypoint 2 in pixels is 9.80084
Distance from start to waypoint 3 in pixels is 9.17101
Distance from start to waypoint 4 in pixels is 8.61152
Distance from start to waypoint 5 in pixels is 8.1369
Distance from start to waypoint 6 in pixels is 7.76274
Distance from start to waypoint 7 in pixels is 7.50406
Distance from start to waypoint 8 in pixels is 7.37305
Distance from start to waypoint 9 in pixels is 7.3765
Distance from start to waypoint 10 in pixels is 7.51423
Distance from start to waypoint 11 in pixels is 7.77911
Distance from start to waypoint 12 in pixels is 8.15877
Distance from start to waypoint 13 in pixels is 8.63808
Distance from start to waypoint 14 in pixels is 9.20149
Distance from start to waypoint 15 in pixels is 9.83454
Distance from start to waypoint 16 in pixels is 10.5247
Distance from start to waypoint 17 in pixels is 11.2614
Distance from start to waypoint 18 in pixels is 12.0362
Distance from start to waypoint 19 in pixels is 12.8422
Distance from start to waypoint 20 in pixels is 19.5861
Distance from start to waypoint 21 in pixels is 24.7542
Distance from start to waypoint 22 in pixels is 30.5276
Distance from start to waypoint 23 in pixels is 36.6209
Distance from start to waypoint 24 in pixels is 42.8981
Distance from start to waypoint 25 in pixels is 45.0182
Distance from start to waypoint 26 in pixels is 47.1489
Distance from start to waypoint 27 in pixels is 53.5927
```

Figure 2: Distance from new start location to waypoints

We would be testing this feature during the field test tomorrow. Testing U-turns and turns around the fountain (near PNC park) would be very critical.

b. Notify when the boat arrives at the goal:

For this I just had to calculate the distance between the start and the goal locations. If the distance computed is less than our decided threshold (15 meters) then the message is published that boat has reached the goal. Also, a message is sent to the low level controller to make the boat stop.

c. Website Update

I also updated project website which included following: ILR's of all team members uploaded, standards & regulations presentation uploaded, Spring Validation Experiments (SVE) test plan

1-page version uploaded, schedule updated, Issues Log & Risk Chart updated, Media page updated showing latest videos.

CHALLENGES

a. Number of way-points to be missed

Before I could implement the solution, I had to deal with the issue that our system is single threaded. Callbacks are processed at the end of each planning loop so in order to get the latest location of the boat, we have to process the `span_pose` callback before checking for waypoint skipping. After I did this, I had to check to make sure this didn't cause any problems with things being updated in the middle of the loop.

TEAM WORK

All of us went for the field test and other than that our team worked on the following:

- a. **Shiyu Dong:** Shiyu worked on adding a velocity display to the GUI and routes for the destinations. He also integrated GUI with planner.
- b. **Bikram Hanzra:** Bikram worked on adding synthesized voice messages to the GUI in order to improve the user experience.
- c. **Tae-Hyung Kim:** Tae-hyung worked on analyzing stored data received from Novotel Span INS sensor and testing ROS package using rosbag file.
- d. **William Seto:** William worked on improving the inflation of the obstacle costs, by inflating them in an elliptical shape. He also helped me in debugging the 'number of waypoints to be missed' feature

FUTURE WORK

a. Testing the features

- I have to test both 'number of waypoints to be missed' and 'notify when the boat arrives at the goal' features.

b. Field Test 7

- We would be having our next field test on 14th April 2016. This would also be the dress rehearsal for the SVE and hence it is very important for this field test to be successfully. I will have to fix the bug coming in the planner/ruled of the road/waypoints related features that we might encounter during the field test.

c. Website Check:

- I also have to update the website for the final website check which is scheduled at the end of this month.