

# MRSD Project

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Team G Robographer

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## **Individual progress**

### **Learning how to implement navigating function of turtlebot in gazebo**

The intent of creating the ROS node is to have a high level way to control turtlebot in gazebo world.

The goal is to make a position controller that make the turtlebot move to the given coordinate. Though there's some minor difference, the code working in gazebo world would also work on real turtlebots

### **Making the Package and Coding the Node**

I need to find the position of the turtlebot in gazebo world first in order to make subscribers. I could find the topic names and topic types by using ROS command line tools. Use rostopic list and the position information is under turtlebot/odom rather in turtle1/pose I usually find in turtlesim. I used rostopic to quickly check that the gazebo is connecting with turtlebot and ROS. I will also need to publish command to move the turtlebot. From the earlier ROS topics list I can see the topic's name is

/turtlebot/mobile\_base/commands/velocity geometry\_msgs/Twist.

I tried to implement a p controller to move our turtlebot to the desired position by one command line. There's a lot of theory we can go into to pick the best gain, but here I simply use a common simulation gain of 0.5 for our proportional controller to get a control velocity for angular and linear speed. I also add a piece of code by setting cmdvel equal to zero and stop turtlebot moving backward because normally there's no sensor in the back and moving backward could be dangerous for turtlebots.

## **Challenges**

### **Collecting data**

At the first I cannot get the position data because I throw it away at each call back. But I came up a solution to hold onto the data by creating a global variable holder and make variables of the goal data types copied in each callback.

### **Environment setting**

Sasanka, a Ph.D student in Katia's lab, helped me in correcting this problem, teaching me how to distinguish setting betlen ROS hydro and the version after ROS hydro, and writing nodes in cmakefile in a correct and convention manner.

### **Errors in launching map**

The error message looks like “error loading <rosparam> tag XML is <rosparam command="load" file="\$(find turtlebot\_bringup)/config/diagnostics.yaml"/>” This happened because I replace a line in a parameter document of a launch file. I did this because there was a turtlebot.urdf.xacro in myturtlebot\_description folder, but only in the "graveyard" subfolder. Changing to the turtlebot\_gazebo.urdf.xacro file fixed this error, but now I have another error as list above.

### **Fail to connect**

In order to find out the reason why the connection betlen gazebo and turtlebot stop to work I tried many methods but none of them work out yet. For now I are trying to collect errors of turtlebots to figure out the reason why and build a control system. I will need to calculate error for every DOF. The turtlebot can

rotate and move forward, so I need to calculate linear and angular error respectively.

## **Teamwork**

Gauri and Sida built multi master on a laptop. The multi master system could exchange the Intraface data between each master. Therefore I can exchange the face expression percentage information between turtlebots by ROS listener and talker. They also encounter the problem of setting up ROCON, a communication platform for robots, on different turtlebots.

Jimit set up global camera on the ceiling with Sasanka, a Ph.D student in Katia's lab. The global cameras are able to locate turtlebots through the April Tag on them. On the other hand, the April Tag on the floor enable the cameras to align with the map frame in case the camera might be moved. He also taught me the basic idea of ROCON and showed me how to change the setting of environment files for multi robots.

Rohit redesign the elevation part of the turtlebots to make the camera more stable. The new elevation part remove the noise by reducing the vibration from the aluminum bar. Now he finished the designing part in CAD and he plans to build it in the next week.

## **Future Plan**

- 1. I will correct the connecting problem between gazebo and turtlebots**
- 2. I will how to operate ROCON on multi robots**

- 3. Gauri and Sida will try to realize multi master on multi laptop. For now they already accomplished multi master on single laptop.**
- 4. Jimit will learn how to operate turtlebot communication on ROCON and gazebo.**
- 5. Rohit will implement the elevation part and test it.**