MRSD Project

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Team G Robographer

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Individual progress

Select suitable simulated environment

Since the powering up and setting stage took a lot of time, we decided to create a virtual map for turtlebots, in which we can stimulate the turtlebots behavior and transplant the program and codes to real turtlebots.
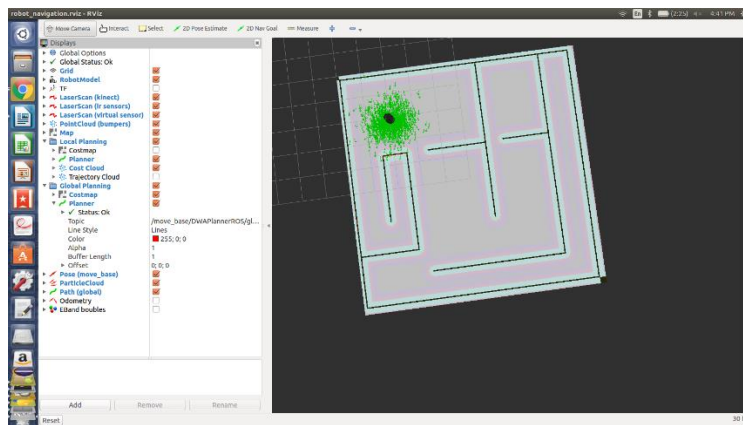
Before we even started, there are multiple simulators such as stage, gazebo and rviz to choose between.
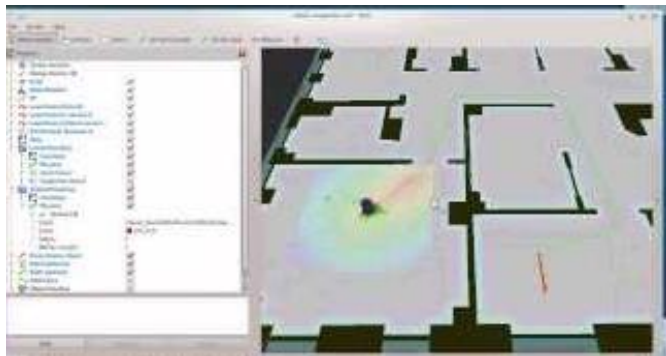
**Fig 1. Stage**
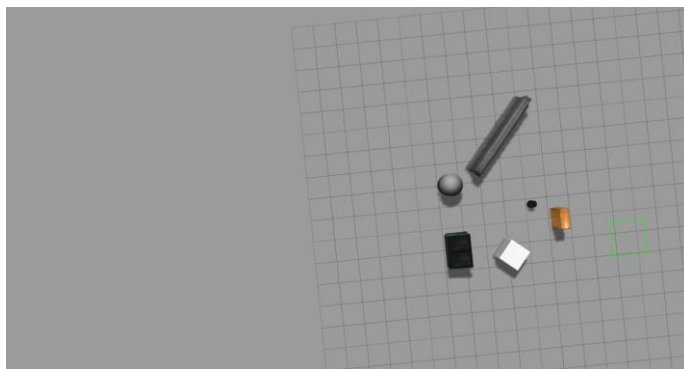
Fig 2. Gazebo

Fig 3. Rviz

When we chose to use Gazebo at the very first place, TA Miller told us there's another simpler simulator Rviz. It seems to be a good idea to try out each stimulator. After working on those different environment, stage is more for path planning. And Rviz is good for path planning as well, its teleoperation and exploring part are well implemented. Taking into accounts we need to simulate multi robots, gazebo has a friendly UI for swarm behavior. We decided to course turtlebots with gazebol and see the virtual world using Rviz.

## Building a Map by create a package in TurtleBot Simulator

Set up Rviz environment and make it work with Gazebo. This is not a hard part, since there's already a package turtlebot_rviz_launchers which can connects Rviz and Gazebo automatically.
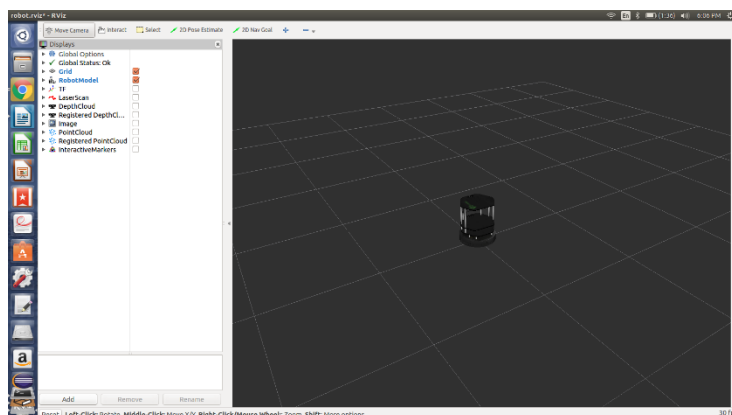

Fig 4. Seeing Gazebo world in Rviz's navigation mode

Fig 4 is the Rviz version of Fig 2. And as we mentioned, Rviz has an friendly the exploring mode UI. We can use the launch file to visualize the world as shown is Fig 5.
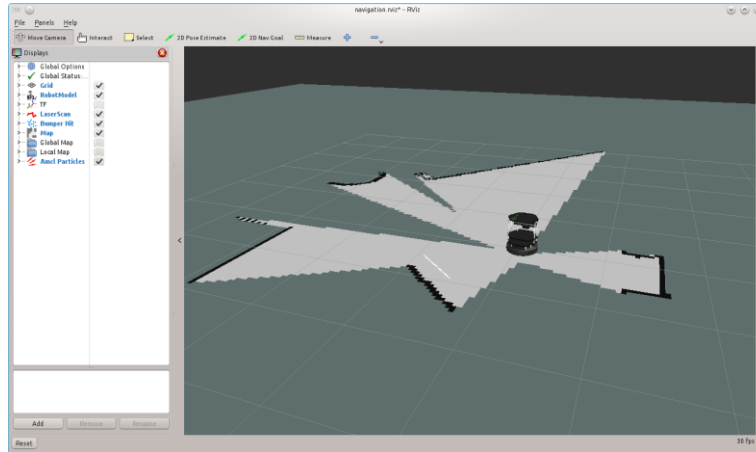
Fig 5. Activate view_navigation.launch file

To recreate the lab environment, first make a new folder for simulation work space, and roscreate-pkg. Next, create a world file and change the environment setting in it. Also remember to create robot.launch to bring up default ros nodes for the turtlebots.
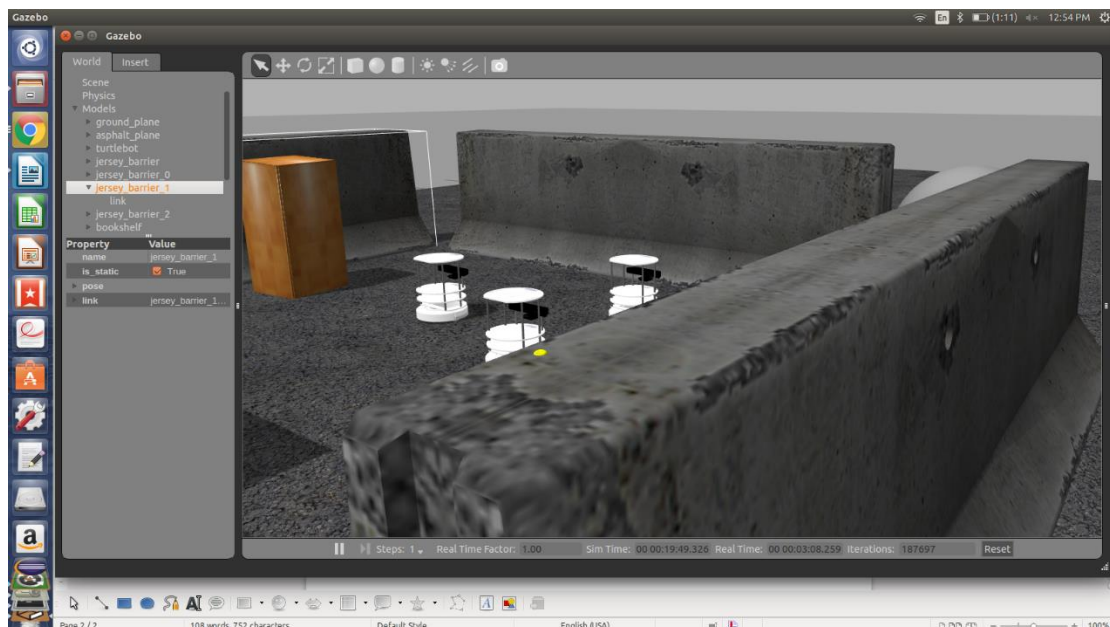
Fig 6. Stimulated lab environment of Newell-Simon Hall, 1602 and three turtlebots

After build up the map, we tested the turtlebots by a roaming package, and it worked eventually.

Challenges

Unable to lock the administration directory (/var/lib/dpkg/)

The first try is to remove the lock file by sudo rm /var/lib/apt/lists/lock. Later we find out it's the version rather than lock file problem that keep us from accessing the file. Update the gazebo solved this problem.

Warning [gazebo.cc:215] Waited 1seconds for namespaces.

This error disappear by adding packages.osrfoundation.org at Ubuntu repositories. sudo sh -c 'echo "deb http://packages.osrfoundation.org/gazebo/ubuntu trusty main" > /etc/apt/sources.list.d/gazebo-latest.list' wget http://packages.osrfoundation.org/gazebo.key -O - | sudo apt-key add -

Error [Param.cc:181] Unable to set value [1,0471975511965976] for key[horizontal_fov]

This bug happened because we didn't solve the last bug properly. Gazebo try to collect models from http://gazebosim.org/models but there 's something wrong... the folder ~/.gazebo/models does not exist and Gazebo simulator cannot start. Here's a bit more simple solution: run $ wget -r -R "index\.html*" http://old.gazebosim.org/models/ To get all models from gazebosim and copy them into ~/.gazebo/models folder (after you mkdir models inside ~/.gazebo) and everything will be ok.

Teamwork

Gauri successfully built multi master on matlab. She studied the ROCON framework and then implement the basic talker and

listener communication for single master and multi master. Sida installed Ubuntu on the chrome book. She also made a connection between her and Gauri's laptop using publish and subscribe. Jimit used Rviz and gazebo to teleoperate two turtlebots. Rohit famaliraze with gazebo and Rviz.

Future Plan

1. **I will work with Jimit to implement flocking and navigation function on gazebo.**

2. **After the first goal is done, I will work with Gauri on Router.**

3. **Rohit will redesign the pantilt unit and replace the servo motors.**

4. **Rohit will learn how to zoon and control the camera.**

5. **Gauri and Sida will integrate the communication of multi robots.**

6. **Jimit and Sida will test the chrome book.**