**Robotics Software Nano-Degree Program**

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In this program the major focus was towards learning the concept of Localization and Mapping through the hands-on development of each individual blocks starting from building a world environment in GAZEBO and finally integrating the all the ROS packages together to run the home service robot.

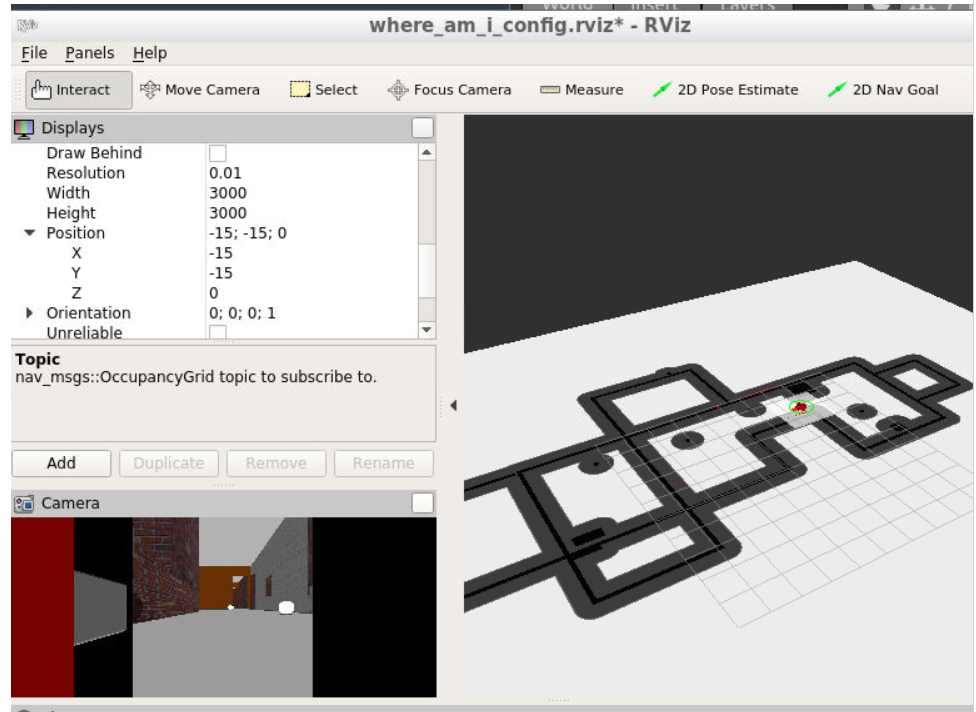
**Project 1 :: Build My World**

In the first project we built a simple world environment which included a single floor structure designed in the model editor of the GAZEBO tool box. We developed the required plugin scripts in in C++ for the world along with configuring the CMakeLists.txt file. We also developed a simple robot using the SDF format. This simple environment developed in the first assignment is the base for the subsequent projects.

**Project 2 :: Go Chase It**

In the second project we build a robot and designed a simple algorithm to chase some white balls in the world we build in the earlier project. The foundation steps we followed here are making a URDF format file for the robot. This is required as against the SDF format used in the first assignment since in this project we want to include the ROS basics to communicate with the robot. We can use a URDF file to define a robot model, its Kino dynamic properties, visual elements and even model sensors for the robot. URDF can only describe a robot with rigid links connected by joints in a chain or tree structure. It cannot describe a robot with flexible or parallel links. We configure the various properties of the URDF file to make the final version of the robot, like enhancing it with wheel and joints on sides of the chassis. Finally, we added the sensory components like a CAMERA and a LIDAR module. This requires adding GAZEBO plugins to be added in the URDF file for the camera, lidar and the wheel joints. We also configure the RViz to visualize the sensor data published over ROS topic, like camera images, point clouds, ultrasonic measurements, lidar data, etc. The final requirement for the project is to create a simple C++ script to detect white balls in the world and chase those balls. We created two ROS nodes, “drive\_bot” and “process\_image” which communicate with each other to detect and move towards a white ball.

**Project 3 :: Where Am I**



**Project 4 :: Map My World**

**Project 5 :: Home Service Robot**