Sardar Vallabhbhai National Institute of Technology

CS 210 : ARTIFICIAL INTELLIGENCE

LAB 3: Simulation Tools and Configuration Spaces

[TODO:
1. Please save your lab.doc as *Lab_No_Roll_No.doc.*
2. Use/paste the snapshot of the steps followed along with result/s.
3. Mention your observation/comment after results in the doc.
].

## PART A: Environment and Software Installations

1. Robot Operating System (ROS) is an open source software development kit for robotics applications. ROS offers a standard software platform to developers across industries that will carry them from research and prototyping all the way through to deployment and production.
   Install the ROS 1 in your system as discussed in the LAB. (Help File). Mention the steps in Installation and Configuration.

2. Execute the **turtlesim** node as discussed in LAB to control the Turtlesim by terminal and python script; and implement the basics of 2D navigation.
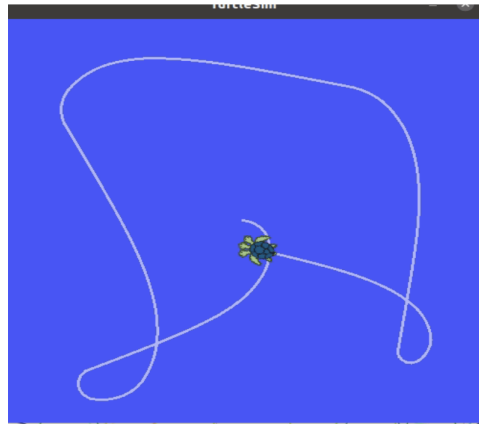
   - Explore the ROS Basic Commands : roscore, rosrun, rosnode and rostopic.
   - Send a single message to turtlesim telling it to move with a linear velocity of 2.0, and an angular velocity of 1.8. It will move from its starting position along a circular trajectory for a distance and then stop.
   - Try to add a new turtle. You don't have to stop the rosnode turtlesim. Move the second turtle to position -2 -2 1 (x y theta) by terminal.

3. Install Gazebo in your system and mention the steps in installation and configuration.

4. Construct the following house configuration space/ environment using Gazebo.
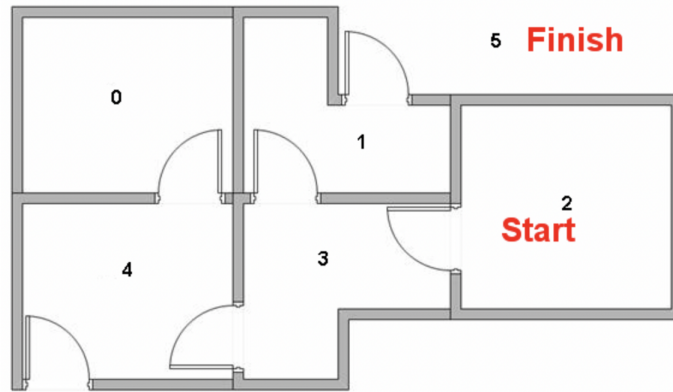
5. Construct a wheeled differential robot in the environment of Gazebo. Move the robot in one direction
. Show your creativity in the designing of the robot. Hint
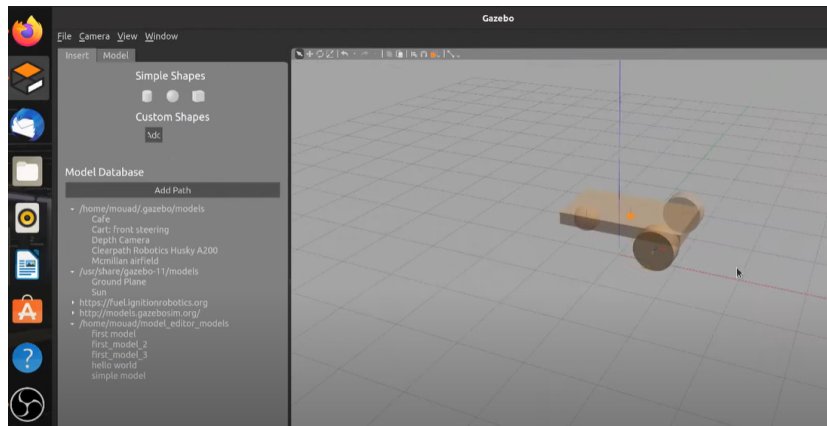
PART B : Exploratory Problem

6. Explore the

   - History of ROS,
   - ROS Versions and
   - Examples of ROS-compatible robots and hardware.

7. Explore the different robot simulator used for research, design, and development of robots.

8. Explore the Turtle bot3 / Husky in the Gazebo in the 5 room setup (created in problem no 4).Hint

NOTE: Follow the Installation guide provided on the course webpage

- Installing Gazebo and Ros1: Hint

- Gazebo tutorials: Hint

Observation /Comments: