Khalid Arif (k.arif@massey.ac.nz)

282.758 - Simulation, Modeling and Optimization

1. Simulation of a Mobile Robot in ROS Gazebo (10%)

In this assignment you will setup ROS on your computer and install Gazebo simulator. ROS has a number of robot models ready for using in Gazebo, of which you can choose one and link it to main ROS packages for tele-operation from your keyboard. Add a laser scanner (e.g. Hokuyo URG or Sick Scanner) to the robot making sure the scanner publishes laser data over ROS. One choice of the robot model could be *Poineer-3DX* which is also available in hardware form. Your simulated code will run on the real robot without modification.

Due date: 0/8/2017 by 5:00PM. (TBD)

Report Requirements:

Maximum 10 pages including figures, screenshots and references.

1. What is your motivation to learn ROS? Briefly summarize what you think of ROS as a robotics development platform.
2. Add a screenshot of ROSCORE running in a terminal

3. A block diagram of your robot setup in the ROS and Gazebo. This block diagram must show how and what messages are sent from one node to the others to make the robot move in the simulator.
4. Include screenshots of "teleop node" and the robot in Gazebo at different positions. This should not be more than one page.
5. What links the simulated robot in Gazebo to ROS nodes? A good explanation with figures and/or codes snippets is required.

6. Create a C++ node that subscribes to **/cmd_vel** topic advertised by Keyboard Teleop (for your selected robot) and displays[1] the command in the terminal you sent to the robot. In the same node (or another) subscribe to **/odom** and when the robot has gone beyond a certain value of **X** or **Y**, a message is displayed in the terminal to warn the user. For example, when the robot you drive in the simulator crosses 5m along x-axis (or Euclidean distance of 5m), your node displays "going too far along x-axis" or something similar.

7. **Challenge Question:** Setup "rviz" to display the topics published by the nodes. For example, the /odom, laser scan.

[1] You can also try to display message only when the current message is different from previous message.