

CMPUT 412: Experimental Mobile Robotics

Winter 2018

Demo #1

Date: Thursday January 18

Topics: Turtle-bot Teleoperation / Wander-bot State-Machine

Objectives

- Install ROS Indigo on Ubuntu 14.04 (Trusty)
- Learn how to create a ROS package
- Become familiar with Gazebo, Rviz and SMACH
- Interact with a simulated TurtleBot & write a state-machine “wander” behaviour.

Procedure

Part I - Individual Demo

Read Chapter 8 of the text, which uses w, a, s, d, and x keys of the keyboard to move the robot (understand Velocity Ramps). Using Gazebo, create a closed environment so that your robot does not run away. You can use any of the objects already part of Gazebo, or if you are feeling adventurous make your own. Control a simulated TurtleBot within the environment from a keyboard using any method you choose.

Run Rviz to display the robot, its 'PointCloud2', & 'Image' captured by the simulated camera as you move the robot around. **Demo to TA.** All students in a group need to complete and demo this part, independently.

Part II - Group Demo

Read Chapter 7 of the text and create a ROS package for the Wander-bot (based on example 7-3) but implemented as a smach state-machine called 'wanderSM.py' (see <http://wiki.ros.org/smach/Tutorials> 1, 2, 3, 5 of 'Learning Step-by-Step') i.e. your state-machine should have the same functionality as example 7-3.

Using Gazebo, create a closed environment so your robot does not run away (same as Part I). Run Gazebo and let your Wander-bot move around randomly in a collision free manner. Add objects to your Gazebo simulation and watch Wander-bot avoid them.

Run Rviz and display both the PointCloud2 and LaserScan while the Wander-bot is moving. Using smach_viewer, display your Wander-bot's state-machine execution. Run simpleScreenRecorder to capture your demo and all its windows (e.g. Tmux terminals with ROS commands; Gazebo simulation; Rviz sensor data; smach_viewer with state-machine execution.)

Group demo to your TA (live or video). No independent demonstration is necessary.

Marking

If you are able to complete the demos before the end of the lecture, you will receive:

Part I: 50% (independent demo)

Part II: 50% (group demo)

If you are not able to complete any parts of the demo within the lecture session, you will get a 20% penalty, and an additional 20% for each day of delayed demo.