CMPUT 412: Experimental Mobile Robotics
Winter 2018
Demo #4
Due Date: Thursday March 1, 2018
Simultaneous Localization and Mapping (SLAM) with GMapping

Objectives
- Learn how to build navigation maps in ROS using rosbag
- Build a map with the slam_gmapping node from the gmapping package and modify the map to include an exclusion zone

Procedure
Part I:
Study Chapter 9 of the text on building maps using rosbag. Start up a simulator with a Turtlebot in it (as instructed on page 141). Drive your Turtlebot around the simulated world recording the sensor data from the laser range finder and the odometry system. Use your bag file and the slam_gmapping node to build your map of the simulated environment. Demo to TA before saving map. Save your map (-f <ccid>_map) and make your zipped submission to your TA of the .pgm and a .txt file, explaining what you did to improve your map quality, to your TA before the end of the class (mark will be based on map quality). Note: One group member should include the Part II group map as part of their zipped submission. (submit to TA via email)

Part II:
In this part of the demo, you will teleop your real Turtlebot to build a map of the CSC 2nd floor, then modify your map to include an exclusion zone in front of the elevator doors to prevent path planning close to the open doors. Assign responsibility for herder, driver, mapper:
1. The **herder** must be with the robot at all times to prevent the robot from getting into trouble. Someone will be the herder for your group (TA, Grad Student, Instructor, other student etc). The group members must remain in CSC 2-29.
2. The **driver** must demonstrate, to TA, remote teleoperation while streaming images from their Turtlebot, while they drive their robot around the second floor.
3. The **mapper** must, demonstrate to TA and, run the gmapping_demo on their Turtlebot's laptop. (i.e. > ssh into robot and run roslaunch turtlebot_navigation gmapping_demo.launch) and then, on the local laptop, display the map building using rviz (i.e. > roslaunch turtlebot_rviz_launchers view_navigation.launch). (see http://wiki.ros.org/turtlebot_navigation/Tutorials/indigo/Build a map with SLAM)
Save your map (-f <groupname_CSC2ndFlr_map). Submit your group's final map (.pgm) to your TA before the end of the class (see above submission details).

Marking
If you are able to complete the demos before the end of the lecture, you will receive:
Part I: 30% (independent demonstration)
Part II: 70% (group demonstration)

If a student is 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.