CMPUT 412: Experimental Mobile Robotics
Winter 2018
Demo #3
Date: February 8, 2018
Line Following

Objectives

- Learn how to use OpenCV in ROS to solve simple vision tasks.
- Study the basic autonomous driving through line following.

Procedure

Part I:

Study Chapter 12 of the text on the Follow-Bot, which follows a yellow line around a loop. Ensure first that you are able to run Follow-Bot code in Gazebo. Then run the robot under a variety of proportional gains and observe the behavior the TurtleBot for the different gains. Determine the range of linear velocity and angle gain (see p. 207) under which the TurtleBot can still follow the "course" successfully. What conclusions can be draw in terms of the effect of the gains on robot performance? **Explain to your TA**

In addition, you will notice that when driving the robot around the course, the Turtlebot will move off the line when the turn is sharp. **Write your own node** so that the robot will always stay on the line, i.e., its body always covers or touches the line at all times including at sharp turns. To achieve this, you need to explore the idea that your controller should take into account both the past error and the predicted future position of the line in deriving the velocity information, within the framework of the PD or PID control, which we discussed in class. **Demo and email your node's python script to your TA.**

Part II:

In this part of the demo, you will program the real TurtleBot to follow a white line, which we create on the floor in CSC 2-29. You will need to be able to detect line correctly and reliably in images captured with Xtion Pro Live. Make an effort to follow the line as quickly as possible in order to prepare the robot for the upcoming competition. **Demo to TA**

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 of that marking component, and an additional 20% for each day of delayed demo.