

CSC 232 Lab 1

Academic Honesty Statement:

"I affirm that I have not given or received any unauthorized help on this assignment, and that all work is my own."

Abstract:

The purpose of this lab activity was to implement a substitute for a physical turtlebot by means of a simulator written in C++. The simulator was defined by a series of subscribers and publishers that would read published commands and output (publish) back to the odometry topic. As sister program, a series of files were created to act as a navigator. Most of these files were directly taken from Lab 1. The main new functionality explored was in the sampling of a data from a normal distribution and its use in the velocity motion model of the simulator. Odometry data was collected from the simulator, in the same way that you would from an actual TurtleBot, by reading from the /odom topic and outputting to a file. Using matlab, the data was plotted into a series of x,y, yaw, and velocity (linear and angular) graphs which denoted their values with respect to time. These were plotted twice with two different sets of values representing the uncertainty (noise) in our readings.

Code Implementation:

Simulator:

Functions:

Clear Odometry Subscriber:

Listens to the reset_odometry channel, and resets the values that would be published to the odometry channel.

Odometry Publisher

Publishes messages to the odometry channel to be picked up by the navigator.

Navigation Subscriber

Receives commands from the navi channel that have been published by the Navigator.

Yaw to Quaternion

Converts yaw values to quaternions.

Sample from Normal Distribution:

Samples a random value from a normal distribution based on uncertainty parameters

Navigator:

Clear Odometry Publisher

Publishes "Empty" messages to the "reset_odometry" topic

Odometry Subscriber

Listens to the odometry channel and reads in the messages for future plotting.

Navigation Publisher

Publishes to the /cmd_vel_mux/input/navi topic to give commands to the turtlebot.

Quaternion to Yaw

Converts quaternions to RPY values. Since only Yaw is important, only yaw is output.

Questions:

Data Not Yet Collected