Lab 3: Robot Motion Control

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1 Exercise 1

In this exercise we used a Raspberry Pi and interfaced it to the Kobuki via USB to move it in a certain path. Using the provided documentation and skeleton code we programmed the Kobuki to move in a straight line for 50cm then in an arc with a radius of 50cm. We completed the program and demonstrated it to the lab instructor

2 Exercise 2

In this exercise we interfaced the Pi with a provided joystick to control the Kobuki's movement. Using the lab supplements we wrote a program to control the Kobuki's movement with a joystick. We demonstrated our program to the lab instructor.

3 Exercise 3

This exercise contained two parts a client and a server. At first we worked on the Client portion of the lab. Using the code from Exercises 1 and 2 we wrote a program that read the joystick inputs and sent them to the server. We used the provided skeleton code and documentation to write our program. When we completed it we demonstrated it to our instructor.

4 Bonus Exercise

The Bonus Exercises consisted of using the analog stick on the controller to variably control the Kobuki and completing the other part of Exercise 3. We implemented variable movement and the server side of Exercise 3 and demonstrated our results to the instructors.

5 Supplemental Questions

5.1 Briefly summarize what you learned from this lab.

We learned how to control the kobuki robot using its API and send commands to it. We then controlled the movement by reading inputs from a controller to allow us to command the robot. Then we learned how to setup a socket for the client side and the server side to send and handle requests that get translated into robot movement.

5.2 Explain the way the Kobuki's movement is controlled.

Kobuki movement is broken down into the speed and the radius of the movement. This data is sent to the robot and it will respond accordingly. A radius of zero is a straight line, radius of one is a point turn, and anything higher is an arc with the sign of the radius determining the direction of the turn. This information is passed to the robot over a byte stream where it is interpreted and acted upon.

5.3 Explain the steps of a complete control request from the client to the server.

Server establishes a connection with the client and constantly checks for new data. The client then reads the controller values. If any of the values change or an input it will send data containing the speed and radius to the server. The server will interpret the data and pass it along to the Kobuki API making the robot react to the controller.

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