CSE 460 Mobile Robotics - Lab 2

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***Abstract*— Lab 2 report for CSE 460 Mobile Robotic with Professor David Saldaña.**

I. Robot 7's First Program

The python script I created to make the robot perform the desired tasks can be found here: lab2.py. The video recording of the robot performing the required tasks by running the python script can be found here: video.

II. Lab 2 Questions

A. Does your robot form a square trajectory?

Yes, the robot forms a square trajectory. The ending position varies from run to run due to differences in the friction of flooring in different locations as well as changing battery power levels. This creates some squares that are more 'perfect' than others from run to run.

B. How far is your robot from the starting location?

In the run that is recorded and visible at the google drive link above, the center of the robot finished approximately 9 inches from the position the center started in. This value varied from just 2 inches to over a foot from run to run. Most notable was the differences seen after replacing the batteries, which allowed me to properly adjust the motor power more accurately.

C. Ways to improve the accuracy of the robot's trajectory?

In order to improve the accuracy of the robot's trajectory, several approaches can be taken. First, modifying the program to force the robot to stop and perform a point turn rather than drifting into the turn proved to create more consistent trial runs. However, as the video shows sometimes the wheels still lost traction causing the amount of time spent turning to not result in a full 90 degree turn. Rather than making a turn based on a certain amount of time, it would be better if we could use a sensor that determines when the robot has rotated 90 degrees, such as a gyro sensor. Also, in order to better handle the dynamic friction of the environment, equipping the robot with tires with better tread can help the drifting problem. Another way to improve the accuracy of the robot's trajectory would be change the measurement of the robots forward movement from time such as 2 seconds to a distance measurement to achieve a perfect square with equal-length "sides". This would help negate some of the inaccuracy that is introduced by changes in motor power, battery life, and even environment factors like changes in the floor. Finally, to take this one step further would be to add a GPS device to the robot. The starting position coordinates would be recorded, and upon the final stretch back to complete the square, the robot can use the GPS to determine when it should stop in order to return back to its starting coordinates.

References

[1] Amanda Baran, Github, https://github.com/amandabaran/robotics/tree/main/lab2