Memo

10/10

To: Dr. Berry

From: K[redacted] Team Homer

Date: 12/4/2014

Re: ~~Robotics Lab~~1 Robot Odometry Lab 1

The purpose of this lab was to program the robot to perform three primary tasks: travel in a circle, a square, and a figure eight. Along with these primary tasks, the robot was programmed to run its movements given push button sequences.

To implement the circle movement, we ran the right side motor faster than the left side. We determined the timing required for a complete circle through trial and error check of a timer. The figure eight utilized the same code that ran the circle for its first loop, and upon completion of the first circle slowed down the right motor and sped up the left in order to make an opposite circle of the first. Similar methods of guessing and checking timers were utilized for this path.

The square was created by running both motors at the same speed for a given amount of time that was equal for each side of the square. The turns were completed by running the right track in reverse and the left forward at the same speeds so that a 90 degree right turn would be made. Guess and check methods on timers were used to determine the amount of time necessary to complete a 90 degree turn.

The button sequences to control the robot were initialized through the sensing of an initial button push. If Button1 is first pushed, the program waits 300 milliseconds to sense if Button2 was pressed. If it was, it goes into the figure eight, and if not, it performs the circle. If Button2 is pressed first, and Button1 is pressed, it again performs the figure eight, and if not the square is performed.

To check odometry error, the starting point of the robot was marked and the distance between the finishing point and starting point were then measured. The following results were obtained from the three paths.

	Square	Circle	Fig. 8
Run #	Error (in)	Error (in)	Error (in)
1	8.1	2	13
2	4.25	3.5	14
3	9.7	0	13
4	10.5	1	9
5	6.4	0	14
	7.79	1.3	12.6

Table 1: Odometry Error

As it can be seen, the odometry of the robot is fairly accurate, but not extremely reliable. We feel that the largest source of the error is in the mechanical functionality of the robot's drive system. The tracks

click on and off the wheels randomly, slowing down either motor and, results in unreliable movement. This might be fixed through the use of wheels and a caster in place of the tracks. Also, the variation of the battery's voltage causes the motor speeds to be non-constant. This could be improved through the utilization of line sensing to track an actual circle or square. Also, assuming there would be no wheel slips, wheel revolutions could be tracked, which would help to indicate the actual distances moved, and potentially reduce the error.

In conclusion, the robot worked well in the end despite the initial mechanical problems. We were able to complete all the required tasks. The only problem we have derived is that Homer has a mind of his own. We think he might need a Duff to function properly.

Commented [CAB1]: What is duff?

Attached is the comment Code.