HARDWARE VERSION 3.03
NAVIGATION/ODOMETER TEST

GROUP 4

2nd December 2016
Verison 2

Abstract

This test is to further ensure the calibration of the track and wheel radius.

Contents

1 BACKGROUND

1.1 Edit History

Quentin Norris: 2016-11-27, Initial set up, testing, and filling in all information

1.2 Test Information

Testers: Quentin, Richie, Mamoun, Jake

Authors: Quentin

Hardware Version: 3.03

Software Version: Odometer.java, SquareDriver.java, Lab2.java

Goal: The goal of this series of tests is to determine whether hardware version 3.03 drive properly without slipping, and if it is determined that the robot drives properly, the wheel radius, and track width constants are to be calibrated based on observations on the turns at each corner, the distance traveled on each side of the square path.

2 PROCEDURE

Setup/Assumptions:

1. Edit the lab 2 code used earlier in the course by any of the groups to no longer use odometry correction, have the motors attached to the correct ports, and set the track width constant to 10.85 cm and the wheel radius constant 2.03 cm.
2. If necessary, modify the lab 2 code to turn 90 degrees at the end of its path (in theory, to set the robot to the same position and orientation it started at), so as to better observe the orientation and position of the robot at the end of its path.

Test: If extreme slipping is observed during the test, conclude the test immediately to avoid wasting time, and notify the hardware team with the observations.

1. Place the robot in the starting square, oriented at 0 degrees.
2. Mark the starting location of a reference point of the robot on the floor.
3. Upload the code to the robot
4. Click the right button on the robot to run the lab 2 code in "drive in a square" mode.
5. Observe the distance traveled on each side of the square, and the turns made at each corner.
6. Once the robot finishes the square path observe its final position and orientation compared to the starting point.
7. If the observations made throughout the test suggest that the robot isn't quite turning 90 degrees, or traveling the required distance, update the constants appropriately, and repeat from step 1.
8. If the robot appears to be traveling close to perfectly, record the values of the constants.

9. Repeat steps 1-5 five times while recording error values from the odometer and actual position.
10. If the average total error is greater than 3cm, update the constants accordingly, record them, and repeat from step 8.

3 EXPECTED RESULT

Hardware version 3.03 is expected to be able to navigate with very little slipping. This means that the odometer error testing, and constant calibration should be able to be completed. The final constants determined should be close to their true measured values. Since calibration tests were done previously this test will ensure those other tests accuracy.

4 TEST REPORT

4.1 Odometer Error and Calibrations

4.1.1 Hardware Version 3.03

This table will report the X and Y measurements and their errors from the initial starting point of the robot.

Track Width	X(error)	Y(error)	Total Error	
= 10.85	-1.32	-3.02	3.30	
Wheel Radius	-0.28	-3.71	3.72	
= 2.03	-0.72	-0.92	1.17	
	-1.83	-0.65	1.94	Average Error
	-0.53	-2.17	2.23	2.47

5 CONCLUSION

From our tests we've concluded that for both hardware versions 2.5 and 3.00 the optimal track width and wheel radius is 11.6 and 2.1 respectively.

6 ACTION

Nothing needs to be furthered improved as the error was in +/- 3 centimeters. This test should be run again after further hardware iterations.

7 DISTRIBUTION

Hardware Team
Software Team