CSCE 236 Embedded Systems, Spring 2012
Project 2 Checkpoints
Making Robots Draw

Compass Checkpoint: Tuesday, April 17, 2012
Wheel Encoder Checkpoint: Thursday, April 19, 2012

1 Overview

This outlines two checkpoints that lead up to the final project. Each checkpoint is worth 10 points of the final project grade. Note that this is due at the **start** of class on the specified date. If you are not ready to demonstrate your robot performance at that point, you will receive zero points. If you only demonstrate part of the checkoff, you will receive partial credit. I encourage you to complete these tasks earlier than the checkpoints, since these are a key component of the final project.

2 Compass Checkpoint

For this checkpoint, you must demonstrate turning a particular angle using the compass based on a serial command input. To do this, you must parse serial input (from the Arduino serial monitor). The input, for example, will be of the form `40` or `-120` to turn 40 degrees clockwise and 120 degrees counterclockwise, respectively. You should be able to parse and turn up to positive and negative 720 degrees. Your robot should accurately turn the specified number of degrees on most any surface and should do so in place, without significant translation.

To do this, you must also properly interface with and calibrate the compass we started using in Lab 6. Instead of using the raw readings (as we did in Lab 6), you should take advantage of an existing library to do this. Go to: `https://github.com/pololu/LSM303` and download the source (there is a **zip** icon towards the top of the page that lets you get a zip file of the source.). Place the LSM303 directory in your own sketch directory (where things you save in arduino go) under a folder called `libraries` (create this folder if it doesn't exist). Then restart the Arduino program and this code should show up under the libraries examples in the menu as LSM303. Follow the instructions on the webpage for calibrating the compass and obtaining a heading.

The calibration program is used to determine the minimum and maximum values for each axis. You should do this calibration away from metal objects to avoid interference. I recommend modifying the calibration program so that it will display both the max and min values for each axis, as well as the current reading. This will make it easier to determine the max and min values. You then need to input these values into the heading program, which will calculate the heading for you. Make sure to test the results of your calibration to ensure that it is producing good results (e.g. that turning it 90 degrees causes the compass to report a 90 degree change in heading).

3 Wheel Encoder Checkpoint

For this checkpoint, you must demonstrate traveling a distance specified by a serial command. The distance will be specified in centimeters with a range between -1000 and 1000 (negative should move backwards, positive forward). You should use the wheel encoders to measure the distance traveled. Your robot should move in a straight line and stop after it has traveled the specified distance. It should be able to move relatively straight on a variety of surfaces, including when the wheels are on different surfaces (e.g. one is on carpet and one is on cardboard).