Lab 0x04 - Line Following and Romi Introduction

This assignment is to be completed in your lab groups and is meant to be a smaller magnitude assignment in which you begin developing code to interact with your line detection sensors and start working with your Romi robot.

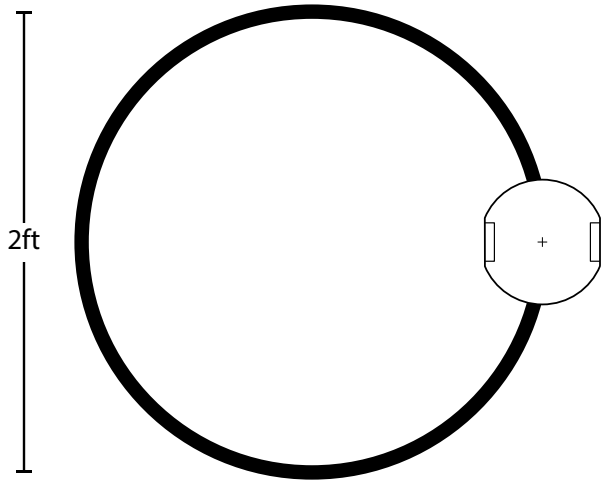
1 Background

The lines that you follow for the term project will be produced with dark black ink on white paper; the lines will be 0.75 inch (19 mm) wide.

The location and quantity of line detection sensors will greatly affect the ability of your robot to follow lines and navigate the "game arena" for the term project. Part of the motivation for this lab is to experiment with location and quantity of these sensors along with how the code should be set up to read the sensors and utilize the information effectively.

2 Assignment

For this lab you will need to program your robot to follow a circular line that is 2 feet (61 cm) in diameter. The robot will need to start and stop in the same location on the line, within a small margin of error.



It is up to each team individually to decide methods to remain on the line and track the total distance traveled. Some techniques may be more mathematically motivated than others based on geometry and kinematics; your preliminary HW 0x03 analysis will help you relate the relative motion of the robot wheels to the overall motion of the robot within its environment.

You will also need to update your motor driver code to work with the new interface on Romi that uses one PWM input with a direction input instead of two PWM inputs.

3 Requirements and Deliverables

The deliverables for this assignment will come in two forms:

1. A brief demonstration for your instructor to show that your robot remains on the circle and stops in the same location where it began. To avoid challenges with live demonstrations, you will instead record a brief video demonstration to submit on Canvas.
2. A memorandum explaining the following:
   (a) How many of what sensors have you added to your robot, and where are they located? Provide a scale drawing, produced by hand or with CAD tools, so show the location of each line sensors.
   (b) A description of how you are using information from each line sensor to remain "on track". Be as detailed as possible in describing your methodology and consider including coding examples or snippets to aid your description.
   (c) How are you tracking the distance traveled to stop the robot in the same position where it started?