Lab 11 - Obstacle Avoidance

1 Objectives.

1. Become familiar with the Sharp GP2Y0A51SK0F Analog Distance Sensor.
2. Utilize the Arduino to detect walls.
3. Integrate the Distance Sensor with the DFECBot and program the DFECBot to avoid obstacles.

2 Materials.

1. 3x Sharp GP2Y0A51SK0F Analog Distance Sensor
2. USB Programming Cable
3. DFECBot

3 Introduction.

3.1 Sharp GP2Y0A51SK0F Analog Distance Sensor

The Sharp GP2Y0A51SK0F Analog Distance Sensor uses an infrared radiation (IR) reflectance sensor with an IR light-emitting diode (LED) and an IR sensitive phototransistor.[1]Ensure your three sensors are wired per the below diagram.

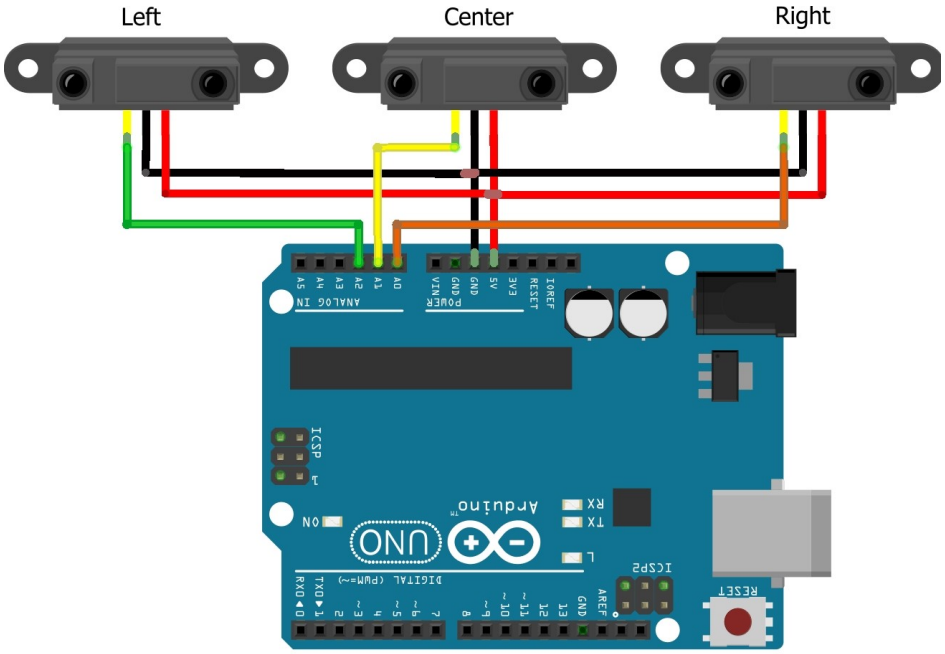

Figure 1: Sharp GP2Y0A51SK0F Analog Distance Sensor Wiring Schematic

[1]GP2Y0A51SK0F Datasheet, https://www.pololu.com/file/0J845/GP2Y0A41SK0F.pdf.pdf

3.2 Example Code

Copy the Arduino sketch folder `robot_wallfollowing` from **Teams** (`Labs/robot_wallfollowing`). Open the `robot_wallfollowing.ino` sketch.

3.2.1 SharpDistanceSensor.h

The Arduino Sketch utilizes a library called SharpDistSensor. You need to install this library for the example code to work.

1. Click *Tools* → *Manage Libraries*
2. Search for SharpDistSensor
3. Select Install

3.2.2 robot_wallfollowing.ino

This example Arduino Sketch provides code to read the values from the DFECBot's right Distance Sensor (see below example) and provides a distance value in *mm*.

```
1    // Read distance (in mm) for each sensor
2    unsigned int distR = sensorR.getDist() + OFFSET;
3    Serial.print("Right: "); Serial.println(distR);
```

4 Procedure

Use the example code provided to code the DFECBot to do the following:

1. Print the values from the DFECBot's center and left GP2Y0A51SK0F Analog Distance Sensor to the serial monitor.
2. Use a ruler to confirm the accuracy of each distance sensor - the sensor should be fairly accurate between 3 *cm* and 12 *cm*.
3. Program the DFECBot to follow wall on right.
4. Program the DFECBot to follow wall on left.
5. Program the DFECBot to stay between two walls.

HINT: You should remove all print statements and delays when testing your wall following.

5 Notes on Proportional Controller: