EGR 120 Due date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Introduction to Engineering

File: N120Bot5

### Team Assignment #5

## Navigating the Arduino-BOT using Infrared Sensors

**References**:

1) Arduino-BOT Lecture #5 - <http://faculty.tcc.edu/PGordy/Egr120/>

2) Robotics with the Board of Education Shield for Arduino web tutorials - <http://learn.parallax.com/tutorials/robot/shield-bot/robotics-board-education-shield-arduino>

3) Board of Education Shield for Arduino documentation - <https://www.parallax.com/downloads/robotics-board-education-shield-arduino>

4) Arduino web site (software, microcontrollers, examples, and more) - <https://www.arduino.cc/>

**Team Assignment:**

1) Adding QTI sensors to the Arduino-BOT

* The instructor will pass out QTI sensor s if they are not in your kit.
* Connect the QTI infrared sensors to the Arduino-Bot (refer to the class notes). Adjust the spacing between the sensors so that they will just straddle and black electrical tape on the track.

2) Entering the infrared sensor navigation program provided in the class notes

* Be sure to add comments with the assignment number, team members’ names, Arduino-BOT number, and group number.
* Modify the Pulse Width values using data for your servos in order to make the Arduino-BOT go straight, turn left, and turn right.
* Download the program to the Arduino-BOT.

3) Testing the LEDs

* Test the LEDs on your Arduino-BOT.
* The left LED should turn on when the left sensor moves over the tape on the track.
* The right LED should turn on when the right sensor moves over the tape on the track.
* If the LED’s do not operate correctly, check the wiring and the code for errors.

4) Navigating the track with infrared (IR) sensors

* Test your Arduino-BOT on the track (see the diagram on the following page). Adjust the program until the Arduino-BOT can complete the course. Possible adjustments include:
  + Adjust the spacing of the sensors
  + Adjust how much each servo is slowed down to make a turn.
* Make further adjustments such that your Arduino-BOT will complete the course as quickly as possible.
* Ask the instructor to time your Arduino-BOT. The team with the fastest time will earn bonus points.

## BOE-BOE Test Track

¾” black electrical tape

4) **Report**

Organize your results into a report and submit a single typed report for the group to the instructor by the assigned due date. The report should consist of:

A) Title page - as shown below.

1. Printout – Include a printout of the final program used to navigate the course.
2. Discussion - Include a substantial discussion section describing each method that your team has used to navigate the track (dead reckoning, whiskers, infrared sensors). For each method, discuss:
   * how difficult it was to complete the course (estimate how many times you had to modify the program)
   * how reliable the Arduino-BOT was in completing the course using your final program
   * limitations to the method
   * ideas for improvements (how you might have been able to complete the course faster)

EGR 120

Introduction to Engineering

# Team Assignment #5

Navigating the BOE-BOT using Infrared Sensors

Date

Group #N (your group number)

Arduino-Bot Kit Number

Attendance & Participation Record:

(list all team members and all dates when teams worked

together in class on this assignment and check boxes to mark attendance)

|  |  |  |
| --- | --- | --- |
| Team Member | Date 1 | Date 2 |
| John Doe | ✓ | ✓ |
| etc |  |  |
|  |  |  |
|  |  |  |

Demonstration of Programs

|  |  |  |
| --- | --- | --- |
| Program | Successfully  Demonstrated | Time |
| Track Navigation | ✓ | Record time |

Instructor’s Checksheet

EGR 120 - \_\_\_\_\_ (section)

Semester: \_\_\_\_\_\_\_\_

**Team Assignment #5 – Navigation with IR Sensors**

|  |  |  |
| --- | --- | --- |
| Team | Demonstration:  LEDs light when over tape? (✓) | Navigate entire course  ***(record time) \**** |
| 1 |  |  |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |

✓ - Program has been demonstrated

***\* 10 points extra credit for the fastest team!***