

**Project 4.2.10 Path Finder**

Introduction

Robots range from human controlled to fully autonomous mode. Robots with increased autonomy generally require more sensors and always require a more robust decision making ability. In this project you will program the RECBOT or Clawbot to navigate an obstacle course.

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Equipment

* Computer with ROBOTC software
* Completed RECBOT or Clawbot
* Line follower kit hardware
* Line follower course
  + - * Electrical tape (20 ft)
      * Flat, horizontal and white (uniform light color) surface at least 4 ft x 4 ft
* Stop watch

Procedure

1. Divide into four person groups using a method determined by the teacher.
2. Attach the line following hardware onto the bottom close to the frontof the robotchassis as shown below. What is the front of the robot? Can either end of the robot be called the front depending on the direction of travel? The front of the robot is a relative description. Here it means the end closest where the arm would touch floor.

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| Line Follower Sensors on RECBOT |
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| Line Follower Sensors on Clawbot |

1. Set up the Motors and Sensor window to account for each of the inputs and outputs used by the robot.
2. Program the robot to enter the line follower kit path map from the point indicated by your teacher. The robot will continue from the entry fork to the closed loop, turn left then make two laps around the closed loop ending at a predetermined point close to the entry point. Use the procedure below to calculate an appropriate Threshold with the aid of the Sensor Debug Window.
   1. In ROBOTC, open the Line Follower > Triple Sensor Line Tracking.c Sample Program
   2. Open the Sensor Debug Window
   3. Verify that the Program Debug Window’s refresh rate does not display Continuous. Click Continuous if it does.
   4. Place one of the line tracking sensors above the white surface.
   5. Record the value in your engineering notebook for that sensor displayed in the Sensors Debug Window.
   6. Place the same line tracking sensor above the dark line.
   7. Record the value for that sensor displayed in the Sensors Debug Window.
   8. Add the two values and divide by two. The result is the threshold for that sensor.
   9. If needed, repeat steps 1-9 for the other two sensors, identifying a new threshold for each OR verifying that your first threshold will work for each sensor.
   10. Use the threshold(s) in your program.
3. The objective is for the robot to complete two laps in the shortest amount of time.

**Conclusion**

1. Describe the advantage of attaching the line follower sensors to the robot center instead of the front.
2. Describe challenges that your team faced and how you resolved the obstacles.
3. Explain how the robot could be reconfigured to navigate the course more efficiently.