CSCE 274 – Robotics
Fall 2015 – Project 04

Assigned: November 24
Due: Prior to the Final Exam (December 8)

The purpose of this assignment is to utilize all of the knowledge you have gained this semester programming the iRobot Create. If you have been keeping up with your lab assignments and have been building a robust iRobot Create library, this project should not take you very long.

The Task

Your task in this assignment is to "dock" the robot. I will place your robot inside a polygonal environment. Your robot should do the following

1. Starting from the interior of the polygon (rectangle, square, triangle, hexagon, etc) drive forward until the robot hits a wall.
2. Once the robot hits a wall, use a PID controller to follow the wall.
    - If the robot detects the "docking station" have the robot park on the dock. The robot must be actively charging in park to receive full credit.
    - If the robot does not detect a docking station it should follow the wall indefinitely.

Remember **I can choose any polygon**.

Extra Credit

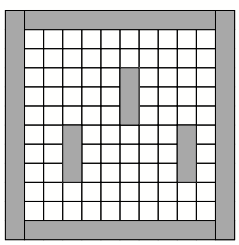
If you want the opportunity to earn some extra credit here is your opportunity. The extra credit can range anywhere between 0 and 5 points to your **overall** grade. You may still work in your groups, but I will be grading this on an individual basis.

This task requires you to implement a coverage algorithm. In this scenario the dock can be anywhere within the environment. So this will require the robot to cross into the interior of the polygon.

The following should completely describe the scenario.

- The environment will be a Square.
- I will give you an exact representation. So as the example below shows, you will have a (10×10) grid. Each grid cell will be the size of the iRobot Create.
- I can choose to make any cell obstacle, prior to running your program.
- There may be no dock, in which case the robot should give an audio cue (cries miserably).

Here is a sample environment. Remember **I can choose any configuration**.



CSCE 274 – Project 04 Cover Sheet – Team _____

Team number: _____
Names:
_____
_____
_____
_____

Overall Behavior (35):

- ☐ Robot finds the polygonal boundary?
- ☐ PID implemented correctly?
- ☐ Reasonable response to right side bumps?
- ☐ Reasonable response to left and center bumps?

Docking (35):

- ☐ IR signal read correctly?
- ☐ Robot takes appropriate action when just the red beam is detected?
- ☐ Robot takes appropriate action when just the green beam is detected?
- ☐ Robot takes appropriate action when both beams are detected?
- ☐ Robot docks.
- ☐ Robot is actively charging once it docks.

Style (20):

- ☐ One function per command?
- ☐ Separate file?
- ☐ No duplication of executable code?
- ☐ No magic numbers?
- ☐ Names match functionality?
- ☐ Adequate comments?
- ☐ Comments match code?
- ☐ Consistent formatting?

Report (10):

- ☐ Report is complete and clear?
- ☐ Required sections exist?
- ☐ Free of typos and grammatical errors?
- ☐ Describes docking task in detail?

Other comments:

Total:

CSCE 274 – Extra Credit Cover Sheet – Team _____

Coverage and Docking (4):

- ☐ Robot correctly reads pertinent sensors?
- ☐ Robot moves from cell to cell within the environment.
- ☐ Robot attempts to visit all reachable cells (unless it receives an IR sensor reading from the dock)
- ☐ Robot takes appropriate action when just the red beam is detected?
- ☐ Robot takes appropriate action when just the green beam is detected?
- ☐ Robot takes appropriate action when both beams are detected?
- ☐ Robot docks.
- ☐ Robot is actively charging once it docks.

Team number: _____
Names:
_____
_____
_____
_____

Style (.5):

- ☐ One function per command?
- ☐ Separate file?
- ☐ No duplication of executable code?
- ☐ No magic numbers?
- ☐ Names match functionality?
- ☐ Adequate comments?
- ☐ Comments match code?
- ☐ Consistent formatting?

Report (.5):

- ☐ Report is complete and clear?
- ☐ Required sections exist?
- ☐ Free of typos and grammatical errors?
- ☐ Describes the coverage algorithm in detail?

Other comments:

Total: