

ECGR4161/5196, MEGR4127 – Introduction to Robotics

Lab Assignment #10 – Summer 2020 – Version 2

See Canvas for the due date/time

This lab assignment has three parts and will be done in teams of one or two (your choice).

- **Part 1:** In a square “room”, have the TI Robot localize itself.
- **Part 2:** In that same “room”, have the TI Robot identify the location of one obstacle.
- **Part 3:** In that same “room”, have the TI Robot exit the room in the fastest way.

These parts are suggestions of the organization of the robot’s code. See the requirements below for the specific output that will be assessed for grading.

Requirements

- Req. 1. You must use the vehicle provided.
- Req. 2. You may run at any speed.
- Req. 3. The video submission will show two trials of the robot completing the assignment.
- Req. 4. The video submission must be a continuous video of the two trials (no editing, no reloading of code between trials).
- Req. 5. The exercise must be demonstrated on any flooring where a room has been set up.
- Req. 6. The room size shall be a minimum of 1m by 1m.
- Req. 7. The room size shall be a maximum of 2m by 2m (so, user choice on the size).
- Req. 8. The room dimensions must be square.
- Req. 9. You may not use the robot bumpers.
- Req. 10. The room will have one obstacle which is the robot cardboard box (or similar size box).
- Req. 11. The obstacle should be randomly “tossed” into the room for each trial.
- Req. 12. There will only be one exit point from the “room”.
- Req. 13. The exit point of a room will be an opening in a wall of 1/3 the length of the wall.
- Req. 14. The exit point should be different in trial 1 and trial 2.**
- Req. 15. At the beginning of each trial, the vehicle should be placed in the center of the room in one of two orientations.
- Req. 16. In trial 1, the robot should be placed facing a wall.
- Req. 17. In trial 2, the robot should be placed facing a corner.
- Req. 18. The vehicle should identify its location in the room.
- Req. 19. The vehicle should identify the location of the obstacle in the room.
- Req. 20. Immediately before leaving the room, the robot should turn to point at the obstacle.
- Req. 21. To identify the location of the obstacle, the robot will “point” in the direction of the obstacle and light LED 1 for 2 seconds.
- Req. 22. The robot must leave the room in the most direct way after lighting the LED.
- Req. 23. The vehicle must complete each trial in 1 minutes or less.

Submission type: Video and lab report (must include your name(s) and all video requirements mentioned below).

Video Instructions:

1. The video should be normal speed and must be less than 2 minutes in its entirety.
2. Looking down at your running area, film the robot running the two trials (no editing from start to stop).
3. Upload a video to your YouTube account (or other location with a URL). Provide the URL in the report.

Lab Report

1. Prepare a file, output to PDF that includes:
 - a. Your name
 - b. Your “partner’s” name (if applicable)
 - c. What the general objective the robot / apparatus is expected to perform
 - d. URL of the video
 - e. (in report or video) Commentary on the lab (lessons learned, problems encountered).
2. Upload the PDF to Canvas, Lab 10 submission

Code upload

You will have only one main file with your setup, loop, and other functions. It will be a text file – copy the file and rename this file Lab10.txt. Upload the file to the Canvas assignment Lab10Code. It should go without saying that you should use appropriate commenting.