

# COMP 329 2014 Assignment 01

**Deadline: Friday 13th November 2015, 13:00**

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This assessment covers the design of a robot able to navigate an arena, build a map of the arena, and communicate the map to the computer via Bluetooth. This assignment counts for 50% of the final grade for the module.

This is the detailed specification of the assignment:

- You are required to write a robot program that will enable your robot to explore the arena and produce a map.
- The robot will start from a known location either position based e.g. an  $(x, y)$  coordinate of (20cm, 20cm) or occupancy grid based e.g. the robot starts at the grid coordinate  $(x, y)$  of (1,1)
- The arena will have a small number (between 2 and 4) of obstacles, which will be placed at random locations. These obstacles will be about 21cm width, 33 cm depth, and 21cm high (we will use empty photocopier paper boxes). They are intended to be easily detectable.
- Your robot should explore its arena and produce a map using occupancy grid techniques, indicating the probability of each cell being occupied, unoccupied or whether the probability is unknown. Assume grid cells are about the size of the robot (say roughly 25cm long, 20cm wide).
- The map produced by the robot will be sent back to a PC via Bluetooth, and will be displayed on the LCD screen of the robot.
- To assist with localization, you can use landmarks/waypoints (e.g., a blue strip of paper crossing the arena) at known locations, which can be detected by your robot.

You will be evaluated as follow:

- By the deadline stated above, each group should hand in to the student office a printout of the code of their program, together with the peer-evaluation form for each member of the group, and the usual plagiarism forms.

Groups may optionally, in addition, submit a video showing a working solution. This video must be unedited<sup>1</sup> and no more than 5 minutes long. The video must be uploaded to YouTube and the URL included in a comment on the first page of the code of the program.

- Each group will be scheduled a time on the afternoon of Wednesday 11th November to demonstrate their solution. Partial marks will be awarded for partial solutions.

Consider submitting a video as insurance in case there are problems with the demonstration.

- Demonstrating the solution will be worth 50% of the mark for this assignment. This mark will be based on the results of the demonstration and the video (if one is submitted).
- The code will be assessed in terms of elegance of solution and correctness. It will be worth 30% of the mark for this assignment.
- Finally, the log that you have kept to illustrate the development of your solution for the all duration of the assignment (Weeks 3 to 7) will contribute 20% of the mark for this assignment.
- Individual marks will be based on the team mark adjusted according to the peer-evaluation form.

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<sup>1</sup>This means that the video has to be one continuous shot from the same camera — zooming is ok, but cutting between shots is not ok.