

Faculty of Technology – Coursework Specification 2018/19

Module name:	Intelligent Mobile Robotics		
Module code:	IMAT5233		
Title of the Assignment:	Localisation in a Known Environment		
This coursework item is: (delete as appropriate)	Summative	Formative	
This summative coursework will be marked anonymously	Yes	No	
The learning outcomes that are assessed by this coursework are: <ol style="list-style-type: none"> 1. A critical awareness of current techniques used for mapping and localisation 2. A comprehensive understanding of stochastic techniques for robot mapping and localisation. 3. Demonstrate originality in the application of knowledge of robot mapping and localisation. 			
This coursework is: (delete as appropriate)	Individual	Group	
This coursework constitutes 50 % of the overall module mark.			
Date Set:	27 March 2019		
Date & Time Due:	Wednesday 8 May 2019 at 12:00 PM (noon)		
Your marked coursework and feedback will be available to you on: If for any reason this is not forthcoming by the due date your module leader will let you know why and when it can be expected. The Associate Professor Student Experience (studentexperience-tech@dmu.ac.uk) should be informed of any issues relating to the return of marked coursework and feedback. NOTE that you should normally receive feedback on your coursework by no later than 20 University working days after the formal hand-in date , provided that you have met the submission deadline.			Wed 5 June 2019
When completed you are required to submit your coursework via: <ol style="list-style-type: none"> 1. Turnitin for the report 2. Online submission area for zipped folder of code files and video files 			
Late submission of coursework policy: Late submissions will be processed in accordance with current University regulations which state: <i>"the time period during which a student may submit a piece of work late without authorisation and have the work capped at 40% [50% at PG level] if passed is 14 calendar days. Work submitted unauthorised more than 14 calendar days after the original submission date will receive a mark of 0%. These regulations apply to a student's first attempt at coursework. Work submitted late without authorisation which constitutes reassessment of a previously failed piece of coursework will always receive a mark of 0%."</i>			
Academic Offences and Bad Academic Practices: These include plagiarism, cheating, collusion, copying work and reuse of your own work, poor referencing or the passing off of somebody else's ideas as your own. If you are in any doubt about what constitutes an academic offence or bad academic practice you must check with your tutor. Further information and details of how DSU can support you, if needed, is available at: http://www.dmu.ac.uk/dmu-students/the-student-gateway/academic-support-office/academic-offences.aspx and http://www.dmu.ac.uk/dmu-students/the-student-gateway/academic-support-office/bad-academic-practice.aspx			

Tasks to be undertaken:**Resources:**

For this assignment you will be using the PeopleBot robot (and MobileSim simulator) and the Aria C++ libraries, or the language you used in the previous assignment. You should also use your submission for the previous assignment as a starting point for this assignment.

Assignment Specification:

You must write a program which allows the robot to localise (identify the position of) itself within a 2D map which the robot has been given prior. The localised position should include:

- X position in units of your choice
- Y position in units of your choice
- Heading (theta) in degrees

The robot must report its position at least once a second in one or more of the following ways:

- Output to the console
- Map centric graphical view
- Robot centric graphical view

Your report should outline how your program identifies the position of the robot, giving all of your working with appropriate diagrams. It should include the following sections:

- 1) Introduction
- 2) Localisation technique
- 3) Software Implementation (basic overview with snippets – not a code listing)
- 4) Testing and Results
- 5) Conclusions
- 6) Bibliography

Deliverables to be submitted for assessment:

A report of no more than 8 pages (not including figures or graphs) must be submitted through the Assignment 2 - Turnitin link under the Assessments tab on Blackboard.

Your software source code should be put in a zip file (please delete *.sdf, the debug folder) and submitted through the link on BlackBoard. This zip file must be less than 250 Mb.

You may also submit a video or no more than 2 minutes showing your robot's mapping behaviour but this is not compulsory.

Non-submission of any of the above may lead to a significant reduction of marks and potentially a fail.

Please note the weighting of these topics as indicated in the marking scheme.

How the work will be marked:

PLEASE SEE MARKING SCHEME AT THE END

Module leader/tutor name:

Matthew Fox

Contact details:

matthew.fox@dmu.ac.uk

Marking Scheme

MARKS	Fail < 50%	Pass 50% to 59%	Merit 60% to 69%	Distinction 70% to 100%
Software Worth 80% of the overall mark	Program cannot identify the robot's position	Program localises the robot in 1-dimension ie only travels up and down the x axis keeping y and theta constant.	Program localises the robot in 2D giving an x, y and theta value once every second. These values are output to the console and when plotted give a reasonable approximation of the robot's position over time.	Program localises the robot in 2D giving an x, y and theta value once every second. These values are output via a graphical interface displaying a reasonable approximation of the robot's position over time.
Report Worth 20% of the overall mark	Lack of understanding of how localisation algorithms work.	Brief explanation of the approach taken to localise the robot is given. Poor referencing of other work. Little or no testing	Good explanation of the approach taken to localise the robot is given. Most working detail is given, perhaps not enough to reproduce the approach. Fair referencing of external sources. Good overview and testing.	Good explanation of the approach taken to localise the robot is given. Enough working detail is given that the approach could be reproduced by an expert. Good referencing of external sources. Good overview and sensible testing strategy employed.

Notes:

- Failure to prove ownership of any part of the work may lead to a fail.
- If you have any questions about this PLEASE ASK