Module Definition Form (MDF)

Module code: MOD009725	**Version:** 2 **Date Amended:** 13/Jun/2024

1. Module Title
Robotic Control Design Project

2a. Module Leader
Sufian Yousef

2b. School
School of Engineering and the Built Environment

2c. Faculty
Faculty of Science and Engineering

3a. Level
5

3b. Module Type
Standard (fine graded)

4a. Credits
30

4b. Study Hours
300

5. Restrictions

Type	Module Code	Module Name	Condition
Pre-requisite:	MOD009722	Electronics and Embedded Systems	Compulsory
Pre-requisite:	MOD004430	Embedded Systems	Compulsory
Exclusions:	None		
Courses to which this module is restricted:			

LEARNING, TEACHING AND ASSESSMENT INFORMATION

6a. Module Description

This module is designed to provide you with a basic understanding of robotic digital design and robotic control processes and mechatronics, from the in-class electronic components and related hardware briefings to hands-on practical design activities. You will gain insight into how to select the most appropriate electronic design processes for designing, and building of robotic control systems, with controlling sensors and software functions to form different robotic control products based on IOT data that will be transferred by Lora protocol. You will learn how to conform to the regulations relating to safe workshop and laboratory practice and to apply your electronic and robotics background to integrated system prototyping. The data collected by IoT sensors and other resources will also provide the context you need for the testing and development of the designed robotic project.

The module covers a multi-disciplinary area with a focus on electronics, mechatronics and robotics, leading to some topics related to dynamics of robots and control systems will be covered by project-based learning.

6b. Outline Content

1. Project Planning
2. Microprocessors and Microcontrollers
3. H-Bridge and PWM
4. Serial Communications
5. Remote Sensing and IOT
6. Servo Motors
7. IOT and Lora Lecture Notes
8. Gyroscopes and Accelerometers
9. Flex Sensors
10. RS232 Overview
11. ESP32 Knowledge and pinout
12. Robot body hardware structure

6c. Key Texts/Literature

The reading list to support this module is available at: https://readinglists.aru.ac.uk/

6d. Specialist Learning Resources

Microcontrollers, Robotic Arm Control, Robotic Motion Control and Robotic 3D motion

7. Learning Outcomes (threshold standards)		
No.	**Type**	**On successful completion of this module the student will be expected to be able to:**
1	Knowledge and Understanding	Apply knowledge of mathematics and engineering principles to solve complex problems in electronic circuits, robotic sensors, control, and robot dynamic.
2	Knowledge and Understanding	Select and apply appropriate programming, numerical, and analytical methods for applications in microelectronics, robotics design, IoT, and wireless communications.
3	Intellectual, practical, affective and transferrable skills	Apply an integrated or systems approach to the solution of an engineering project.
4	Intellectual, practical, affective and transferrable skills	Use a risk management process to identify, evaluate, and mitigate risks (including security risks) in the project.
5	Intellectual, practical, affective and transferrable skills	Select and apply appropriate materials, equipment, technologies, and processes for a robotics project, recognising their limitations; Use practical laboratory and workshop skills in a complex robotics project.
6	Intellectual, practical, affective and transferrable skills	Function effectively as an individual, and as a member or leader of a team; Communicate effectively on complex robotics engineering matters with technical and non-technical audiences

8a. Module Occurrence to which this MDF Refers				
Year	**Occurrence**	**Period**	**Location**	**Mode of Delivery**
2026/7	ZZF	Template For Face To Face Learning Delivery		Face to Face

8b. Learning Activities for the above Module Occurrence			
Learning Activities	**Hours**	**Learning Outcomes**	**Details of Duration, frequency and other comments**
Lectures	36	1-6	Lectures 3 hours per week
Other teacher managed learning	36	1-6	Tutorials/practical sessions 3 hours per week
Student managed learning	228	1-6	Self-directed Learning
TOTAL:	300		

9. Assessment for the above Module Occurrence

The assessment for some modules includes a presentation (see below for details on how this particular module is assessed). We recognise that presenting, especially to a large group, can cause significant anxiety or distress for some students. If this may affect you, please contact your Module Leader or the Disability and Neurodiversity Service as early as possible. We will work with you to consider appropriate reasonable adjustments. Depending on your individual needs, these might include, for example, presenting to a smaller group or presenting only to a member of academic staff.

Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
010	Coursework	2-6	50 (%)	Fine Grade	30 (%)
1500-word report (maps to C3, C6, C9, C10, C12, C13)					

Assessment No.	Assessment Method	Learning Outcomes	Weighting (%)	Fine Grade or Pass/Fail	Qualifying Mark (%)
011	Coursework	1 2 3 5	50 (%)	Fine Grade	30 (%)
2 hours in class test (maps to C1, C2)					

In order to pass this module, students are required to achieve an overall mark of 40% (for modules at levels 3, 4, 5 and 6) or 50% (for modules at level 7*).

In addition, students are required to:
(a) achieve the qualifying mark for each element of fine graded assessment as specified above
(b) pass any pass/fail elements

[* the pass mark of 50% applies for all module occurrences from the academic year 2024/25 – see Section 3a of this MDF to check the level of the module and Section 8a of this MDF to check the academic year]