Module Specification

Introduction to Robotics and Electronics

Version: 2023-24, v2.0, 13 Mar 2023

Contents

Part 1: Information

Module title: Introduction to Robotics and Electronics

Module code: UFMFJ3-30-1

Level: Level 4

For implementation from: 2023-24

UWE credit rating: 30

ECTS credit rating: 15

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: Not applicable

Features: Not applicable

Educational aims: Robots, like so many other smart gadgets, are machines which change their behaviour upon sensing changes in their environment and making decisions based upon these data. In order to build such systems, students need to develop an understanding of electronics components and circuits, and appreciate the

properties of sensors, actuators and effectors so that they can choose appropriate components and techniques to solve problems. The Introduction to Robotics module seeks to equip students with that knowledge as well as some of the underpinning theory behind components and simple mechatronic systems, and practice of using this knowledge and practical skills to build a robot.

In addition to Learning Outcomes, the educational experience may explore, develop, and practise but not formally discretely assess the following:

Group working

Outline syllabus: Components; Resistors, Capacitors, Inductors, Diodes, Transistors. Amplifiers.

Linear Circuits and Circuit Analysis. Designing and testing circuits.

Electricity, Magnetism and Electromagnetic Theory.

Types, theory and function of actuators, effectors and sensors

Basic Robot Kinematics

Processing data from sensors, A/D conversion and basic control.

Integrating sensors, actuators and effectors by designing and building appropriate electronic circuits to interface with a microcontroller prototyping environment, for example, the Arduino.

Design and build your first robot.

Choosing components to solve particular problems based upon their characteristics.

Part 3: Teaching and learning methods

Teaching and learning methods: Lectures : 24 hours

Practicals : 48 hours

Self-directed learning : 150 hours

Summative assessment : 78 hours

Total hours : 300

Scheduled Learning.
Sessions will include lectures and practical sessions. You will typically work in teams within the lab.

Independent learning includes hours engaged with essential reading, case study preparation, assignment preparation and completion etc. You'll be expected to spend about 100 hours outside of the scheduled time in these activities, and we expect that you and your fellow students will want to work long hours outside the scheduled sessions as it gets nearer to the time to demonstrate what your robot can achieve.

Module Learning outcomes: On successful completion of this module students will achieve the following learning outcomes.

MO1 Demonstrate knowledge and understanding of facts and theories concerning electronics components, analogue circuits, and electromagnetism

MO2 Show skills in analysing circuits in steady state and transient conditions using a variety of common laboratory equipment such as power supplies and test equipment

MO3 Demonstrate knowledge and understanding of facts and theories concerning sensors, effectors and actuators and their application in simple robots

MO4 Demonstrate cognitive and intellectual skills in interpreting requirements and creating innovative solutions to robotics problems using engineering skills

MO5 Show growing autonomy in selecting appropriate materials, the practical skills needed to integrate them, and an experimental approach to minimising technical risk arising from uncertainty

MO6 Demonstrate management of information through finding, assessing and using technical literature and other information sources

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

Total = 300

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/ufmfj3-30-1.html

Part 4: Assessment

Assessment strategy: Your achievements in the module will be assessed in two components. You will have to pass both assessments to pass the module.

There is one examination. The examination is summative and assesses students' understanding of basic concepts and techniques and their ability to apply them to relatively straightforward problems. This strategy has been chosen to ensure that basic engineering principles are assessed.

The other assessment task consists of portfolio and a report coursework:

The assessment is made of the student's log book and submission of a written report, in which they record their lab practice, experimentation and the students work in a group to write a report on design and build a robot.

Additionally, there will be opportunities for formative assessment (which do not contribute to the module mark. For example, you may be asked to give a live demo of your robot, or to compete against other teams' robots to assess its relative performance.

Feedback will be given on your work each week in the lab sessions.

Resit assessment:

There will be an exam and a portfolio. The portfolio consists of a report (2000 words) and Individual assignment (based on lab work). No further attendance at classes is required.

Assessment tasks:

Examination (Online) (First Sit)
Description: Online Exam (24 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO3

Portfolio (First Sit)
Description: Report (2000 words) and Logbook.
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Examination (Online) (Resit)
Description: Online Exam (24 hours)
Weighting: 50 %
Final assessment: Yes
Group work: No

Learning outcomes tested: MO1, MO3

Portfolio (Resit)
Description: Individual assignment (based on lab work) and written report (2000 words) submissions
Weighting: 50 %
Final assessment: No
Group work: No
Learning outcomes tested: MO1, MO2, MO3, MO4, MO5, MO6

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Automation and Robotics Engineering {Foundation} [GCET] BEng (Hons) 2022-23