Module Specification

Microcontrollers Applications Group Lab

Version: 2026-27, v5.0, Approved

Contents

Part 1: Information

Module title: Microcontrollers Applications Group Lab

Module code: UFMFKA-30-2

Level: Level 5

For implementation from: 2026-27

UWE credit rating: 30

ECTS credit rating: 15

College: College of Arts, Technology and Environment

School: CATE School of Engineering

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: Programming for Engineers 2025-26

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This module introduces concepts and practices related to microcontroller based systems. Students will gain skills and knowledge in microcontroller programming, embedded systems design, group work, sensor integration, motor control, navigation and algorithm development.

Features: This module aims to give students an in-depth, hands-on and teamwork experience of designing and building a microcontroller-based embedded system. Microcontrollers are frequently used in the design and implementation of control

interfaces for autonomous robots. An embedded system will often contain microcontrollers and can, for example, provide navigation capabilities without requiring human intervention. Such an embedded system will need to incorporate sensing, actuating, communicating, and controlling functionalities, all of which require hardware and software development.

Educational aims: The aim of this module is to integrate topics and concepts from across engineering to facilitate the design of an autonomous mobile robot.
The module also builds upon earlier modules and requires the students to demonstrate their project management skills.

Outline syllabus: The Syllabus is outlined as follows:

Embedded programming
Digital input/output
Interrupts and timers
Sensors and actuators
Controller design
Analogue to digital conversion
Serial communication
Path planning and maze solving algorithms

Part 3: Teaching and learning methods

Teaching and learning methods: Scheduled Learning includes lectures, practical laboratory sessions as follows:

In the first semester, there is an emphasis on students' individual work by completing laboratory exercises that are designed to help them gain knowledge of the principles and practical use of a microcontroller. Learning is assessed through the submission of solutions to the weekly laboratory exercises as a logbook.

In the second semester, students are divided into groups and are helped to develop an interesting and original mobile embedded system they could expect to complete

within the time allotted for the course. Laboratory sessions allow more time for students to work in a group on designing and implementing a microcontroller-based system. Groups make presentations to the rest of the class at the end of the project, demonstrate their mobile embedded system, and write a group report at the end of the course.

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

MO1 Design embedded software using a microcontroller and implementing a robot navigation algorithm.

MO2 Evaluate and test electronic components and circuits for electronics and robotics system design.

MO3 Implement and integrate core functionalities (e.g. sensing, actuating, etc.) required for a microcontroller-based robotic system.

MO4 Demonstrate capabilities in project planning, monitoring and reporting project progress.

Hours to be allocated: 300

Contact hours:

Independent study/self-guided study = 228 hours

Face-to-face learning = 72 hours

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/ufmfka-30-2.html

Part 4: Assessment

Assessment strategy: Students' achievements in the module will be assessed by the following strategy:

First Sit Assessment Opportunity

1. Laboratory Logbook (25%): Each student will submit their own logbook

containing their solutions to laboratory exercises set throughout the first semester of the module.

2. Portfolio (75%): This consists a group written report (2500 words) that summarises the group design process, test results and final evaluation of the embedded mobile robot system. This is supplemented by a group presentation (15-minutes) to demonstrate understanding and highlight key findings of project work.

Resit Assessment will follow a similar process.

Assessment tasks:

Laboratory Report (First Sit)
Description: A compilation of exercises from practical sessions (30 pages)
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO3

Portfolio (First Sit)
Description: A group project submitting written report and presentation
Weighting: 75 %
Final assessment: Yes
Group work: Yes
Learning outcomes tested: MO1, MO3, MO4

Laboratory Report (Resit)
Description: A compilation of exercises from practical sessions (30 pages)
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO3

Portfolio (Resit)
Description: Individual project submitting written report and presentation

Weighting: 75 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Electronic Engineering [Frenchay] WITHDRAWN BEng (Hons) 2023-24

Robotics {Foundation} [Frenchay] BEng (Hons) 2024-25

Mechatronics Engineering {Foundation} [Frenchay] MEng 2024-25

Mechatronics Engineering {Foundation}[Frenchay] BEng (Hons) 2024-25

Robotics {Foundation} [Frenchay] BEng (Hons) 2024-25

Mechatronics Engineering {Foundation} [Frenchay] MEng 2024-25

Mechatronics Engineering {Foundation}[Frenchay] BEng (Hons) 2024-25

Robotics {Foundation} [Frenchay] BEng (Hons) 2024-25

Mechatronics Engineering [Frenchay] MEng 2025-26

Robotics [Frenchay] BEng (Hons) 2025-26

Mechatronics Engineering [Frenchay] BEng (Hons) 2025-26

Robotics [Frenchay] BEng (Hons) 2025-26

Robotics {Foundation} [Frenchay] BEng (Hons) 2024-25