



Module Specification

Robotic System Architectures

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Part 1: Information

Module title: Robotic System Architectures

Module code: UFMFWT-15-3

Level: Level 6

For implementation from: 2022-23

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Delivery locations: Frenchay Campus

Field: Engineering, Design and Mathematics

Module type: Standard

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This module introduces students to technical aspects of architectures for robotic systems, including system/software engineering principles to develop robots endowed with sophisticated capabilities, e.g., autonomous navigation. The focus of the module is on the system/software engineering and programming tools that can support the often-complex concepts of robotic system architectures.

Features: Not applicable

Educational aims: This will equip students with the theoretical and practical techniques used for the development of robotic systems that are based on widely used conventional architectures, modelling standards, and programming languages.

Outline syllabus: Architecture and development of complex, robotic systems studying the following technical aspects:

Robot Architectures

Robot anatomy, nature of robotic systems, complexity management, robotic system representation, architectural inspirations, types of robot architectures

Development Lifecycle

Requirements analysis, robotic system design, modelling standards, realization of robot architecture, robotic system verification/validation, acceptance and certification

Robotics Software

Software integration, operating systems, middleware, development tools, Robot Operating System (ROS), Python

Part 3: Teaching and learning methods

Teaching and learning methods: A combination of lectures, demonstrations and laboratory sessions ensure that students are able to apply programming concepts within a robotics environment applied to real engineering problems.

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

MO1 Identify and evaluate relevant theories and techniques in order to develop control software for robotics applications. [SM1b] {SM1m}

MO2 Apply appropriate theoretical and practical methods to analyse a variety of architectural approaches to solve robotics problems. [EA1b, EA4b] {EA1m, EA3b}

MO3 Use programming languages and conventional middleware to optimise solutions for design problems of robot control software. [D4] {D4m}

MO4 Manage resources and identify and critically review technical literature for research and project process. [P4] {EP4m}

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 12 hours

Total = 150

Reading list: The reading list for this module can be accessed at [readinglists.uwe.ac.uk](https://rl.talis.com/3/uwe/lists/EFF0F12B-1965-20C3-3007-BC637C2773ED.html) via the following link <https://rl.talis.com/3/uwe/lists/EFF0F12B-1965-20C3-3007-BC637C2773ED.html>

Part 4: Assessment

Assessment strategy: Component A: Online Examination

An online examination in which students will solve architectural problems of robotic systems and show understanding of the technical aspects studied in the semester.

Component B: Coursework Report

A group report of not more than 3000 words based upon the coursework in robotic system architectures.

Resit strategy

Component A: The online resit examination will assess student's knowledge of the materials to show understanding of problems from robotic systems and their architectures.

Component B: The Resit coursework assessment would involve individual students working on an appropriately scoped project. It will be to put into practice the theory to

robotic system architectures. Students will have to submit an Individual Report (1500 words).

Assessment components:**Examination (Online) - Component A (First Sit)**

Description: Online examination (2 hours)

Weighting: 35 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2

Report - Component B (First Sit)

Description: Group written report (3000 words)

Weighting: 65 %

Final assessment: No

Group work: Yes

Learning outcomes tested: MO1, MO2, MO3, MO4

Examination (Online) - Component A (Resit)

Description: Online examination (2 hours)

Weighting: 35 %

Final assessment: Yes

Group work: No

Learning outcomes tested: MO1, MO2

Report - Component B (Resit)

Description: Individual written report (1500 words)

Weighting: 65 %

Final assessment: No

Group work: No

Learning outcomes tested: MO1, MO2, MO3, MO4

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Robotics [Sep][FT][Frenchay][3yrs] BEng (Hons) 2020-21