Module Specification

Robotic System Architectures

Version: 2027-28, v3.0, Approved

Contents

Part 1: Information

Module title: Robotic System Architectures

Module code: UFMFWT-15-3

Level: Level 6

For implementation from: 2027-28

UWE credit rating: 15

ECTS credit rating: 7.5

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: 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 Apply appropriate theoretical and practical methods to model architectural approaches to solve robotics problems.

MO2 Use programming languages and conventional middleware to optimise solutions for design problems of robot control software.

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://rl.talis.com/3/uwe/lists/4C6EA9E7-6871-B6B4-8044-94DB653B5D9F.html

Part 4: Assessment

Assessment strategy: First Sit Assessment.

Portfolio consisting of:
(1) A group presentation with questions. It is an assessment of learning and feedback towards the submission of the report (feedforward) will be provided. This takes the form of a group presentation followed by an oral examination (questions). The students (in group) will describe the designs, experiments, and results based on the robotic system of their project. Subsequently, the examiners will ask them a set of questions to probe their knowledge and understanding of the work presented (20 mins). This oral examination gives the assessors an opportunity to extensively test student understanding and to help combat plagiarism. Feedback (in format of feedforward) towards the submission of the report will be provided.

(2) Associated with the same coursework exercise, a group report follows of not more than 3000 words based upon the coursework in robotic system architectures. This is a 3000-word written group report based on the group project, namely design and implementation of a robotic system. This groupwork assessment uses peer assessment to reflect individual contribution to the project. Students will report the work they have done for the project, including meeting minutes.

Resit is the same as the first sit

Resit deliverable(s) will be scaled appropriately to group size and task complexity

Assessment tasks:

Portfolio (First Sit)
Description: 3000-word group report and 30-min presentation on group project about a ROS-based robotic software development.
Weighting: 100 %
Final assessment: Yes
Group work: Yes
Learning outcomes tested: MO1, MO2

Portfolio (Resit)
Description: 3000-word group report and 30-min presentation on group project about a ROS-based robotic software development.

Resit deliverable(s) will be scaled appropriately to group size and task complexity.
Weighting: 100 %
Final assessment: Yes
Group work: Yes
Learning outcomes tested: MO1, MO2

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Robotics {Foundation} [Frenchay] BEng (Hons) 2023-24

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

Robotics [Frenchay] BEng (Hons) 2024-25

Robotics {Foundation} [Frenchay] BEng (Hons) 2023-24

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

Robotics [Frenchay] BEng (Hons) 2024-25

Robotics {Foundation} [Frenchay] BEng (Hons) 2023-24

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

Robotics [Frenchay] BEng (Hons) 2025-26

Robotics [Frenchay] BEng (Hons) 2025-26

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

Robotics [Frenchay] BEng (Hons) 2024-25

Robotics {Foundation} [Frenchay] BEng (Hons) 2023-24