Module Specification

Control and Automation

Version: 2023-24, v2.0, 11 May 2023

Contents

Part 1: Information

Module title: Control and Automation

Module code: UFMFMN-30-3

Level: Level 6

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: The automation of production/manufacturing systems plays a vital role in today's economies. Automation of industrial processes helps to achieve consistent quality as well as economic production whilst adhering to ever stricter environmental standards.

Outline syllabus: In this module we will introduce you to overall concepts of industrial automation, including material handling, machining, quality control and process planning as part of the wider concept of Computer Integrated Manufacturing (CIM).

Particularly, automation techniques and the underlying technologies will be covered in more depth. These include sensing and actuation technologies as well as typical control systems (programmable logic controller (PLC) and industrial PCs (IPC)). Here, we will cover the theoretical foundations as well as typical industrial examples. PLC concepts are introduced and several programming and system engineering concepts are studied in depth. These include small compact PLCs as well as distributed system using field bus technologies as well as visualisation and plant supervision and production control integration.

Part 3: Teaching and learning methods

Teaching and learning methods: The practical session of this module will focus on the application of closed-loop and open-loop control system to automate 'industry-like' automation/production systems. Students will develop their own PLC programmes in order to drive small scale electrical motors, pneumatic cylinders and conveyors that mimic a typical production system. Furthermore, digital and analogue sensors as well as encoder interfaces are interfaced in order to automate a small-scale industrial system.

Programming languages used are those defined by the IEC 61131-3 standard from programmable logic controller, focusing on structured text (ST), sequential function charts (SFC) as well as function block diagram (FBD). Ladder diagrams (LD) and instruction list (IL) will be briefly introduced for completeness.

Concepts and the scope of the syllabus topics will be introduced in lectures, supported by directed reading and lab experiments/simulation based work. The labs sessions will enhance the understanding of students of real-world applications of the material delivered in the module.

Relevant ethical issues will be highlighted and students will be encouraged to consider these further through directed reading.

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

MO1 Apply from automation and control to real-world industrial manufacturing problems and quality control

MO2 Develop software based on current PLC technologies, addressing openloop and closed loop control paradigms

MO3 Critically analyse potential solutions (each with pros and cons) to automation problems and apply economic and technical arguments to each

MO4 Research novel and/or appropriate methods for automation and control solutions and describe findings into both written and oral forms

MO5 Effectively distribute workloads between members of a small team and manage projects accordingly

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/index.html

Part 4: Assessment

Assessment strategy: This module is assessed via an exam and a group report, with viva.

The exam is designed to assess the students' ability to describe components of a

typical automation system and to perform a high level design of an automation solution. Some of their coding abilities will also be assessed by using pseudo-code or state-diagrams.

The coursework is a group report (2 students per group, 3000 words). The report describes an automation problem the students evaluated during the academic year. The report should include an overall system design as well as fully documented code and a visualisation of an automation task developed during the year. Students should contribute equally to the report and need to clearly label who contributed to what. The mark consists of the group mark (50% of the module) and an individual mark determined via an individual viva (25% of the module).

The resit is the same as the first sit.

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

Assessment tasks:

Presentation (First Sit)
Description: Individual viva regarding the group report 10-15 mins
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO3, MO4, MO5

Report (First Sit)
Description: Written group report (3000 words)
Weighting: 50 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO2, MO3, MO4, MO5

Examination (First Sit)
Description: Closed book exam (3 hours)

Weighting: 25 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1

Presentation (Resit)
Description: Individual viva regarding the report (10-15 mins)
Weighting: 25 %
Final assessment: No
Group work: No
Learning outcomes tested: MO2, MO3, MO4, MO5

Report (Resit)
Description: Written group report (3000 words)

Resit deliverable(s) will be scaled appropriately to group size and task complexity
Weighting: 50 %
Final assessment: No
Group work: Yes
Learning outcomes tested: MO2, MO3, MO4, MO5

Examination (Resit)
Description: Closed book examination (3 hours)
Weighting: 25 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Electronic and Computer Engineering [SHAPE] BEng (Hons) 2023-24