Software Development for Embedded Systems

Module Information

2022.01, Approved

Summary Information

Module Code	4402ELE
Formal Module Title	Software Development for Embedded Systems
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 4
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
Engineering

Learning Methods

Learning Method Type	Hours
Lecture	11
Practical	33

Module Offering(s)

Display Name	Location	Start Month	Duration Number Duration Unit
JAN-CTY	CTY	January	12 Weeks

Aims and Outcomes

Aims	Provide an overview of the operation of modern microprocessors/microcontrollers and the mechanisms used to represent and process information. Design and implement applications written in both low level and high level languages.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Describe the instruction set of a computer contrasting RISC and CISC approaches.
MLO2	2	Identify the fundamental components of an embedded processor.
MLO3	3	Describe the role of modern Operating Systems in embedded, mobile, desktop and server environments.
MLO4	4	Specify and design embedded applications, then implement them utilising high or low level languages
MLO5	5	Demonstrate an understanding of the software used to drive an Embedded system.

Module Content

Outline Syllabus	Binary, HEX, 2s Complement, Number endianness, IEEE 754, ASCII, UNICODE.Processor core and cache hierarchies, Buses, Memory Organisation.Application Scheduling, Security, Interrupt Handling, Libraries, Communications.Variables, Arrays, Iteration, Selection, Interaction with I/O, Structures, Flow charts.
Module Overview	
Additional Information	This module introduces the fundamentals of embedded systems architecture and the development of high level software. General Notes UNESCO Sustainable Development GoalsGood Health and WellbeingQuality EducationGender EqualityAffordable and Clean EnergyDecent Work and Economic GrowthIndustry, Innovation and InfrastructureReduced InequalitiesSustainable Cities and CommunitiesUK SPEC AHEP 4CEng. M1 Apply a comprehensive knowledge of mathematics, statistics, natural science and engineering principles to the solution of complex problems. Much of the knowledge will be at the forefront of the particular subject of study and informed by a critical awareness of new developments and the wider context of engineering.M3 Select and apply appropriate computational and analytical techniques to model complex problems, discussing the limitations of the techniques employed.M4 Select and critically evaluate technical literature and other sources of information to solve complex problems.M6 Apply an integrated or systems approach to the solution of complex problems.M7 Evaluate the environmental and societal impact of solutions to complex problems (to include the entire lifecycle of a product or process) and minimise adverse impacts.M9 Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity.M10 Adopt a holistic and proportionate approach to the mitigation of security risks.M11 Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion.M12 Use practical laboratory and workshop skills to investigate complex problems.M13 Select and apply appropriate materials, equipment, engineering technologies and processes, recognising their limitations.M16 Function effectively as an individual, and as a member or leader of a team. Evaluate effectiveness of own and team performance.M17 Communicate effectively on complex engineering matters with technical and non-technical audiences, evaluating the effectiveness of the methods used.IEng.B1 Apply knowledge of mathematics, statistics, natural science and engineeringprinciples to broadly-defined problems. Some of the knowledge will be informed by current developments in the subject of study.B2 Analyse broadly-defined problems reaching substantiated conclusions using first principles of mathematics, statistics, natural science and engineering principles.B3 Select and apply appropriate computational and analytical techniques to model broadly-defined problems, recognising the limitations of the techniques employed.B4 Select and evaluate technical literature and other sources of information to address broadly-defined problems.B6 Apply an integrated or systems approach to the solution of broadly-defined problems.B7 Evaluate the environmental and societal impact of solutions to broadly-defined problems.B9 Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activityB10 Adopt a holistic and proportionate approach to the mitigation of security risksB11 Recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion.B12 Use practical laboratory and workshop skills to investigate broadly-defined problems.B13 Select and apply appropriate materials, equipment, engineering technologies and processes.B16 Function effectively as an individual, and as a member or leader of a team.B17 Communicate effectively with technical and non-technical audiences.Where this module is part of a Degree Apprenticeship programme, the knowledge learning outcomes are K4, the skills learning outcomes are S3 and S4

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Centralised Exam	Exam	60	2	MLO1, MLO2, MLO4, MLO3, MLO5
Technology	Design and Programming	40	0	MLO1, MLO2, MLO4

Module Contacts