Distributed and Embedded Systems

Module Information

2022.01, Approved

Summary Information

Module Code	6131COMP
Formal Module Title	Distributed and Embedded Systems
Owning School	Computer Science and Mathematics
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 6
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
Computer Science and Mathematics

Learning Methods

Learning Method Type	Hours
Lecture	11
Workshop	44

Module Offering(s)

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

Aims and Outcomes

Aims	To provide an overview of designing and engineering both distributed software systems and embedded systems with references to architectures, communication and synchronisation. The practical focus of this module is on developing software with concurrent and distributed components and developing for embedded systems.

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Survey technologies and methods used in embedded systems design and development
MLO2	2	Solve execution issues intrinsic to embedded architectures and develop software for embedded systems alongside other software systems
MLO3	3	Appraise communications standards and techniques used in embedded systems
MLO4	4	Critically evaluate operational issues in embedded, concurrent and distributed systems

Module Content

Outline Syllabus	Monolithic vs Distributed SystemsDistribution vs Parallelisation-Message Passing and Shared MemoryConcurrency and Scheduling in Software Systems-Liveness, Races and Deadlocks-Ensuring deterministic behaviour-Shared resource access; synchronisation, mutual exclusion, atomicitySystem architecture for embedded systems-Microprocessor (modified) Harvard vs. Von Neumann architectures-Programmable Controllers and Microcontroller (MCU) architectures-Watchdogs -Memory and memory units (EPROM, EEPROM, RAM, FLASH)Software architectures for embedded systems-Superloop and RTOS-Managing I/O and interruptsCommunications standards used in embedded systems -Shared medium/bus systems-Dedicated line, clock synchronisation, A/D conversion-Deterministic arbitration and access protocols-Dedicated hardware and emulated ("bit-banged") software-defined implementations
Module Overview	
Additional Information	A largely practical software engineering course that will equip students with skills to work in distributed and concurrent software systems. It will also provide experience of development for embedded systems with consideration of relevant basic interfacing electronics concerns.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Report	Software System and Report	60	0	MLO1, MLO2
Centralised Exam	Examination	40	1.5	MLO3, MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
David Lamb	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings