

Mechatronics

Module Information

2022.01, Approved

Summary Information

Module Code	5508USST
Formal Module Title	Mechatronics
Owning School	Engineering
Career	Undergraduate
Credits	20
Academic level	FHEQ Level 5
Grading Schema	40

Teaching Responsibility

LJMU Schools involved in Delivery
LJMU Partner Taught

Partner Teaching Institution

Institution Name
University of Shanghai For Science and Technology

Learning Methods

Learning Method Type	Hours
Practical	33
Tutorial	11

Module Offering(s)

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

Aims and Outcomes

Aims	To develop a practical understanding of how sensors and actuators may be used, along with embedded systems, to control and monitor mechanical engineering systems.
------	--

After completing the module the student should be able to:

Learning Outcomes

Code	Number	Description
MLO1	1	Propose appropriate sensors for an application and analyse their characteristics, and practical interfacing requirements
MLO2	2	Propose appropriate actuators for an application and analyse their characteristics, and drive requirements
MLO3	3	Design an appropriate control system structure for an engineering application and determine the characteristic dynamic response of a system.
MLO4	4	Critically appraise a range of hardware interfaces and their methods of programming.

Module Content

Outline Syllabus	The list below provides an overview of topics which may be covered in this module: Sensors• Measured Physical Quantityo Temperatureo Position, Displacement and Velocityo Accelerationo Pressure & Forceo Fluid Flow Rates• Signal Typeo Analogue o Digital• Characteristicso Range & Spano Sensitivityo Precision, Accuracy, RepeatabilityActuators and Indicators• Electro-mechanical Actuatorso Motorso Solenoids• Indicators and Displayso LED Lightso LED DisplaysEmbedded Systems Hardware• Micro-controllers • Characteristics of I/Oo Analogue Voltage (e.g. Typical Ranges: 0-5v, +/-10v)o Digital (e.g. Typical Voltages: 3.3v, 5v, 12v, 24v)• Serial Interfaces o i2c and UART• Signal Conditioning & Filteringo Amplifierso Filterso ProtectionProgramming Embedded Systems• Common programming design patterns using While loops and conditional statements • Reading from, and writing to hardware ports.Control• Control Objectiveso Set-point o Tracking o Stabilisation • Closed-loop Control• Feed-forward control• ON/OFF (Bang-Bang) Control
Module Overview	
Additional Information	This model incorporates elements of flipped delivery. The source of primary knowledge for this module will be via material made available through the VLE, while understanding will be developed through a tutorial and significant practical content.

Assessments

Assignment Category	Assessment Name	Weight	Exam/Test Length (hours)	Module Learning Outcome Mapping
Portfolio	Practical assessments in a lab	100	0	MLO1, MLO2, MLO3, MLO4

Module Contacts

Module Leader

Contact Name	Applies to all offerings	Offerings
Frederic Bezombes	Yes	N/A

Partner Module Team

Contact Name	Applies to all offerings	Offerings
--------------	--------------------------	-----------