Liverpool John Moores University

Title:	INDUSTRIAL ROBOTICS
Status:	Definitive
Code:	**5501ICBTMT** (127065)
Version Start Date:	01-08-2021
Owning School/Faculty:	Engineering
Teaching School/Faculty:	ICBT, Colombo

Team	Leader
Alison Cotgrave	Y

Academic Level:	FHEQ5	**Credit Value:**	15	**Total Delivered Hours:**	77
Total Learning Hours:	150	**Private Study:**	73		

Delivery Options
Course typically offered: S2 and Non Std S2 (S2 for Jan)

Component	Contact Hours
Lecture	45
Practical	9
Tutorial	15
Workshop	6

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Coursework (1500 words)	30	
Exam	AS2	Examination	70	2

Aims

This unit will develop learners' understanding of robots and the skills needed to program them for a range of industrial applications.

Learning Outcomes

After completing the module the student should be able to:

1 Explain the fundamentals of Robotics.
2 Demonstrate ability to programme a Robot.
3 Design a robot cell and plan its implementation.
4 Analyse the applications of Industrial Robots.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Coursework	3		
Examination	1	2	4

Outline Syllabus

Manipulator elements: electrical and fluid drive systems such as harmonic, cycloidal, shaft, rod, screw, belt, chain; sensors such as absolute and incremental encoders, potentiometers, resolvers, tachometers; brakes; counterbalance devices

Control elements: CPU; system and user memory; interface modules; power modules

Intelligence: relating to proximity, range, position, force, temperature, sound and gas
Sources of error or malfunction: environmental contamination such as smoke, arc-flash, dirt, fluids, heat; parallax; wear; data corruption; accessibility; sensitivity; accuracy; design

Programming methods: task programming; manual data input; teach programming; explicit programming; goal-directed programming

Facilities: conditional loops; datum shifts; location shifts; interrupts; peripheral communications; TCP offsets; canned cycles; macros
Industrial tasks: such as welding; assembly; machining; gluing; surface coating; machine loading
Setting up and executing the program: program/location input; start-up inter-locking; program testing; fine-tuning; automatic operation

Design parameters: layout; cycle times; control; accessibility; error detection; component specification; protection of the robot and peripherals, future developments; hazard analysis such as human, robot design, robot operation, workplace layout, hardware failure, control system failure, control system malfunction, software failure, external equipment failure, external sensor failure; guarding; fencing; intrusion monitoring; safe system of work; restriction mechanisms
Selection criteria: accuracy; repeatability; velocity; range; operation cycle time; load-carrying capacity; life expectancy; reliability; maintenance requirements; control and play-back; cost; memory; fitness for purpose; working envelope
Design: station configuration; parts presentation; fixtures; parts recognition; sensors;

cell services; safety interlocks; end effector design; flexibility
Implementation factors: company familiarisation; planning; robot manufacturer back-up; economic analysis and ethical implications; installations scheduling; training

Learning Activities

Students will be supported in their learning, to achieve the above learning outcomes, in the following ways:

By a series of lectures and tutorials and through participation within practical sessions for problem solving.

Notes

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