

SYST C3603: Robotic Operating Systems

Module Title	:		Robotic Operating Systems
Language of	f Instructior	n:	English
Credits:		5	
		-	
NFQ Level:		8	
Module Deli	vered In		2 programme(s)
Teaching & Strategies:	Learning		This module will be delivered through a mix of lectures, laboratory assignments, and projects including a professional write-up. It will employ a mixture of active/task-based learning, reflective learning, and problem-based learning.
Module Aim	:		Robotic systems are implementing their control systems using the Robot Operating System (ROS) in both industry and academia. ROS supplies a development environment for modular control and communication infrastructure of robotic systems using an open-source library of control and data processing algorithms. In this course, we shall cover the development of software modules in ROS and integration into a completely functional system for autonomous robot control.
Learning Ou	tcomes		
On successf	I completion	n of th	nis module the learner should be able to:
LO1	Use ROS o	comm	nunication tools to exchange information to create and visualise a custom robot environment.
LO2	Analyse an	nd ma	p an environment and navigate a mobile robot around that environment
LO3	Implement	a pic	k-and-place function with industrial robot arms.
LO4	Design a c complexity	omple	ete robotic application with state machines within an individual or group project setting depending on the
Pre-requisit	e learning		
Module Rec This is prior l	ommendati earning (or a	ons a prac	ctical skill) that is recommended before enrolment in this module.
No recomme	ndations list	ed	
Incompatible	e Modules odules which	h hav	e learning outcomes that are too similar to the learning outcomes of this module.
No incompati	ble modules	s liste	d
Co-requisite	Modules		
No Co-requis	ite modules	listec	
Requiremen This is prior l	ts earning (or a	a prac	ctical skill) that is mandatory before enrolment in this module is allowed.
OS (Linux), F	Programming	g (vari	iables, loops, functions, conditionals), linear algebra.



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Module Content & Assessment

Indicative Content						
Linux operating system refresher Linux install, ROS installation etc						
Programming language refresher Python and C/C++						
Introduction to the Robot Operating Services, actions, nodes in ROS. Cont	Syster rol syste	n ems in SCADA.				
Unified Robot Description Format Use Unified Robot Description Format	(URDF), ROS parameter server, and simulation of re	eal-world obj	ect represe	entations	
Robot vision Robot vision with object detection and	pose es	stimation				
State machines and file systems State machines design and behaviour	and the	ROS file system and SCADA logs.				
Map creation and navigation Map creation and autonomous navigat	ion of a	known map e.g., GMapping				
Motion Planning and Behaviour Motion planning and pick and place be	haviour	s using industrial robots e.g., ROS Movelt.				
Safety and Cybersecurity Coding styles and standards for safety	, securi	ty and key management, Penetration testing	support.			
Assessment Breakdown				%		
Continuous Assessment				50.00%		
Project				50.00%		
				00.0070		
Continuous Assessment						
Assessment Truns						
Assessment Type		Assessment Description	Outcome addressed		% of total	Assessment Date
Practical/Skills Evaluation		Assessment Description n/a	Outcome addressed 1,2,3,4		% of total 50.00	Assessment Date Every Week
Practical/Skills Evaluation		Assessment Description n/a	Outcome addressed 1,2,3,4		% of total 50.00	Assessment Date Every Week
Practical/Skills Evaluation Project		Assessment Description n/a	Outcome addressed 1,2,3,4		% of total 50.00	Assessment Date Every Week
Assessment Type Practical/Skills Evaluation Project Assessment Type	Asses	Assessment Description n/a sment Description	Outcome addressed 1,2,3,4 Outcome addressed		% of total 50.00 % of total	Assessment Date Every Week Assessment Date
Assessment Type Practical/Skills Evaluation Project Assessment Type Project	Asses n/a	Assessment Description n/a sment Description	Outcome addressed 1,2,3,4 Outcome addressed 1,2,3,4		% of total 50.00 % of total 50.00	Assessment Date Every Week Assessment Date Sem 2 End
Assessment Type Practical/Skills Evaluation Project Assessment Type Project No Practical	Asses n/a	Assessment Description n/a sment Description	Outcome addressed 1,2,3,4 Outcome addressed 1,2,3,4		% of total 50.00 % of total 50.00	Assessment Date Every Week Assessment Date Sem 2 End
Assessment Type Practical/Skills Evaluation Project Assessment Type Project No Practical	Asses n/a	Assessment Description n/a ssment Description	Outcome addressed 1,2,3,4 Outcome addressed 1,2,3,4		% of total 50.00 % of total 50.00	Assessment Date Every Week Assessment Date Sem 2 End

SETU Carlow Campus reserves the right to alter the nature and timings of assessment



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Module Workload

Workload: Full Time		
Workload Type	Frequency	Average Weekly Learner Workload
Lecture	Every Week	2.00
Laboratory	Every Week	3.00
Independent Learning	Every Week	3.00
	Total Hours	8.00

Module Delivered In			
Programme Code	Programme	Semester	Delivery
CW_EEROB_B	Bachelor of Engineering (Honours) in Robotics and Automated Systems	5	Mandatory
CW_EEROO_D	Bachelor of Engineering in Robotics and Automated Systems	5	Mandatory