MODULE SPECIFICATION

Part 1: Information			
Module Title	Introduction to Machine Vision		
Module Code	UFMFLQ-15-2	Level	Level 5
For implementation from	2021-22		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engin Design & Mathematics		
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description

Overview: Vision is a powerful sense in humans; it allows us to make sense of, to navigate through and to interact with the world about us. In our everyday life, machine vision has already become well established in many areas ranging from manufacturing, to medicine, to security. Developments in machine vision will play a key role in the realisation of future autonomous and smart devices, such as robots, to interact with us as humans, to understand and respond to our needs, i.e. human-computer interaction. This module provides an introduction to the state of the art as well as exploring future directions in machine vision. The course content is both industry- and research-led and aims to provide students with skills that meet the needs of industry.

Educational Aims: This module equips students with knowledge in machine vision concepts and applications as well as image processing techniques. It employs examples from industry and research to inform teaching and learning.

Outline Syllabus: 1Typically, the syllabus will contain the following topics:

Machine vision concepts and introduction to machine vision applications.

Image formation (e.g. pinhole camera model) and representations (e.g. binary, greyscale and colour images):

Basic image processing and analysis techniques including histogram analysis, image segmentation and morphological operations.

3D Image analysis including laser triangulation, stereo triangulation and photometric stereo

Features descriptors

Introduction to machine learning methods such as artificial neural networks and deep learning

Machine vision in Robotics such as vision based simultaneous localisation and mapping

Management appraisal

Generating machine vision code

Teaching and Learning Methods: Scheduled Learning includes a twelve pattern of 2 hour laboratory sessions supported by 1 hour lectures.

Independent learning includes hours engaged with essential reading, coding and testing, assignment completion, etc.

Part 3: Assessment

First Sit:
Component A: Group presentation where students will be required to propose suitable imaging techniques to address a given machine vision problem. With a questions and answers element.

Component B: Written Individual Project Report (100%): this is a 2000-word individual report based on selected activities undertaken during the laboratory sessions plus a project based learning style task, centred on a practice-led real-world case study problem.

Resit:
Component A: Group or individual presentation where students will be required to propose suitable imaging techniques to address a given machine vision problem. With a questions and answers element.

Component B: Written Individual Project Report (100%): this is a 2000-word individual report based on selected activities undertaken during the laboratory sessions plus a project based learning style task, centred on a practice-led real-world case study problem..

First Sit Components	**Final Assessment**	**Element weighting**	**Description**
Presentation - Component A	✓	25 %	Group presentation where students will be required to propose suitable imaging techniques to address a given machine vision problem. With a questions and answers element.
Report - Component B		75 %	Written Individual Project Report (100%): this is a 2000-word individual report based on selected activities undertaken during the laboratory sessions plus a project based learning style task, centred on a practice-led real-world case study problem.
Resit Components	**Final Assessment**	**Element weighting**	**Description**
Presentation - Component A	✓	25 %	Group or individual presentation where students will be required to propose suitable imaging techniques to address a given machine vision problem. With a questions and answers element
Report - Component B		75 %	Written Individual Project Report (100%): this is a 2000-word individual report based on selected

			activities undertaken during the laboratory sessions plus a project based learning style task, centred on a practice-led real-world case study problem.

Part 4: Teaching and Learning Methods

Learning Outcomes

On successful completion of this module students will achieve the following learning outcomes:

Module Learning Outcomes	Reference
Apply a range of algorithmic methods to provide imaging-based solutions to problems in differing domains.	MO1
Explain the principles of a range of image acquisition, image processing and machine learning methods.	MO2
Select available technologies and techniques to meet users' needs using the requirements of an application task with reference to the capabilities and limitations of current machine vision systems.	MO3
Implement machine vision algorithms in software and evaluate their respective performance in resolving a practical problem.	MO4

Contact Hours

Independent Study Hours:	
Independent study/self-guided study	114
Total Independent Study Hours:	114
Scheduled Learning and Teaching Hours:	
Face-to-face learning	36
Total Scheduled Learning and Teaching Hours:	36
Hours to be allocated	150
Allocated Hours	150

Reading List

The reading list for this module can be accessed via the following link:

https://rl.talis.com/3/uwe/lists/DE7237B6-8C1B-2C54-D07F-A89CC54CC852.html?lang=en-GB&login=1

Part 5: Contributes Towards

This module contributes towards the following programmes of study: