



## MODULE SPECIFICATION

Part 1: Information			
Module Title	Human Robot Interaction Technologies		
Module Code	UFMFUT-15-3	Level	Level 6
For implementation from	2022-23		
UWE Credit Rating	15	ECTS Credit Rating	7.5
Faculty	Faculty of Environment & Technology	Field	Engineering, Design and Mathematics
Department	FET Dept of Engineering, Design & Mathematics		
Module type:	Standard		
Pre-requisites	None		
Excluded Combinations	None		
Co- requisites	None		
Module Entry requirements	None		

Part 2: Description
<p><b>Overview:</b> Robots are already used and will be more and more used in new application areas in which untrained humans have to collaborate and successfully use these robots. Therefore, it is important to study and understand what the fundamental building blocks are that are needed to enable a robot to interact with a human, and how to implement these technologies.</p> <p>This module will cover the basic technology needed for a robot to process and understand human intentions, to track its environment for spatial reasoning, to make decisions based on the input, and to generate responses to the human. The module will also give an introduction to architectures for HRI systems. Additionally, the module will cover a general overview of user-centred design concepts and usability engineering methods that are helpful to develop robots that are tailored to the needs of an end user.</p> <p><b>Educational Aims:</b> This module will provide an overview of the technical components and embedded cognitive AI that are needed for a human-robot interaction (HRI) system. It will also teach about user-centred design methods used to analyse end user requirements, involve end users in robot development, and do user-based robot testing.</p> <p><b>Outline Syllabus:</b> Syllabus outline Robot Input Modalities</p>

## STUDENT AND ACADEMIC SERVICES

Speech recognition  
 Person tracking  
 Face recognition  
 Posture recognition  
 Object recognition

Decision Making and Reasoning

Finite state systems  
 Logical reasoning  
 Probability-based reasoning  
 HRI system architectures and inter-module communication

Robot Output Modalities

Robot appearance  
 Speech synthesis  
 Legible robot motions

User-Centred Design

Introduction and general concepts  
 Usability testing

**Teaching and Learning Methods:** Sessions will include lectures leading to group work in practical sessions. In the practical session, students will work together in groups to design and implement a HRI system on a real robot. This will include the implementation of basic input and output modalities, a decision making component, and the communication architecture for all modules. The practical part will also include preparing and running a usability test with the implemented system.

### Part 3: Assessment

The module will be assessed in two components.

Component A is an exam where students are required to demonstrate detailed technical understanding of the technical properties of HRI systems. This examination will consist of short descriptive textual questions as well as problems, calculations and data interpretation questions, for the students to show that they have a technical understanding of the design and operation of HRI systems in different usage contexts.

Component B is a group presentation in which student groups present the technical details of the HRI system they have implemented in the practical sessions.

Resit strategy:

Component A

An exam of two hours duration.

Component B

A report of a design exercise (1500 words).

First Sit Components	Final Assessment	Element weighting	Description
Examination - Component A	✓	50 %	Written examination (2 hours)

## STUDENT AND ACADEMIC SERVICES

Presentation - Component B		50 %	A group presentation in which students present the technical details of the HRI robot developed in the group project
Resit Components	<b>Final Assessment</b>	<b>Element weighting</b>	<b>Description</b>
Examination - Component A	✓	50 %	Written examination (2 hours)
Report - Component B		50 %	A report of a design exercise (1500 words)

### Part 4: Teaching and Learning Methods

Learning Outcomes	On successful completion of this module students will achieve the following learning outcomes:	
	<b>Module Learning Outcomes</b>	<b>Reference</b>
	Describe and critically analyse the constituent parts of a HRI system architecture.	MO1
	Apply concepts from user-centred design and usability testing to a given human-robot interaction use case	MO2
	Implement a complete HRI system with input and output modalities as well as a decision making component	MO3
	Execute a usability test with users who have not used the implemented HRI system before	MO4
	Report and critically discuss the results of a usability test with an HRI system	MO5
Contact Hours	<b>Independent Study Hours:</b>	
	Independent study/self-guided study	114
	<b>Total Independent Study Hours:</b>	114
	<b>Scheduled Learning and Teaching Hours:</b>	
	Face-to-face learning	12
	Laboratory work	24
	<b>Total Scheduled Learning and Teaching Hours:</b>	36
	<b>Hours to be allocated</b>	150
	<b>Allocated Hours</b>	150
Reading List	<p>The reading list for this module can be accessed via the following link:</p> <p><a href="https://rl.talis.com/3/uwe/lists/0D82515B-7073-C2B3-D59E-E4C193B72B3C.html">https://rl.talis.com/3/uwe/lists/0D82515B-7073-C2B3-D59E-E4C193B72B3C.html</a></p>	

<b>Part 5: Contributes Towards</b>
This module contributes towards the following programmes of study: