Module Specification

Human-Robot Interaction

Version: 2023-24, v2.0, 31 Jan 2023

Contents

Part 1: Information

Module title: Human-Robot Interaction

Module code: UFMFHP-15-M

Level: Level 7

For implementation from: 2023-24

UWE credit rating: 15

ECTS credit rating: 7.5

Faculty: Faculty of Environment & Technology

Department: FET Dept of Engineering Design & Mathematics

Partner institutions: None

Field: Engineering, Design and Mathematics

Module type: Module

Pre-requisites: None

Excluded combinations: None

Co-requisites: None

Continuing professional development: No

Professional, statutory or regulatory body requirements: None

Part 2: Description

Overview: This module will provide an overview of human-robot interaction (HRI) as a research field. It will cover different contexts in which humans interact with robots now and in the future and how these contexts shape the physical and social constraints of the interaction. For example, we will look at the assisted living context, in which robots support humans in their homes and thus have to display socially appropriate behaviours. In contrast to that, we will look at collaborative robots in industrial settings, in which knowledge about task planning and part assembly is

more important. The module also introduces the technologies needed in a HRI system, for example vision processing, speech recognition and natural language understanding, reasoning, output generation, and cognitive robot architectures. We will introduce the human factors that are relevant for a successful HRI (e.g., acceptance, trust, cognitive load) and how to measure these factors. Finally, the module describes how to set up, execute, and analyse HRI user studies.

Features: Not applicable

Educational aims: See learning outcomes.

Outline syllabus: Definitions:

Human, robot, interaction

Properties of HRI systems

Multimodal interaction

Levels of autonomy

Technology: Parts of a human-robot interaction system:

Input processing

Speech recognition, natural language processing, dialogue management

Emotion recognition

Attention Tracking Reasoning, task planning

Multimodal output generation

Cognitive architectures for human-robot interaction

HRI user studies:

Study setup

Study execution

Study analysis (includes short intro into statistics)

Latest HRI research:

Social robotics

Machine learning and HRI

Contextual framing of HRI

Overview of latest work from HRI conferences and journals

Part 3: Teaching and learning methods

Teaching and learning methods: Sessions will include lectures leading to group work in practical sessions. During the module students will prepare and execute a small HRI user study with a real robot (Nao or Pepper). The lectures are designed to cover the major areas of HRI and should be a starting point for further reading and study, and for the practical sessions. In the practical sessions, HRI software tools will be used to learn how to perceive and react to humans interacting with the robot. You will also learn to use statistical software to analyse your datasets.

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

MO1 Identify and describe the interplay of the parts of a HRI system architecture, including input, reasoning, and output components

MO2 Demonstrate understanding of the challenges that arise when building a system for multimodal interaction, such as an HRI system

MO3 Analyse a given context for an HRI system and make necessary changes to the system design for the context

MO4 Design and construct an HRI system with rudimentary input processing, reasoning, and output processing

MO5 Design and execute a HRI user study

MO6 Analyse, critically discuss, and scientifically report the results of a HRI user study

Hours to be allocated: 150

Contact hours:

Independent study/self-guided study = 114 hours

Face-to-face learning = 36 hours

Total = 150

Reading list: The reading list for this module can be accessed at readinglists.uwe.ac.uk via the following link https://uwe.rl.talis.com/modules/ufmfhp-15-m.html

Part 4: Assessment

Assessment strategy: The module will be assessed by an exam where students are required to demonstrate detailed technical understanding of the design and properties of HRI systems and an individual report in the format of a scientific research paper. The assignment task is organised with students working as a member of a team on a research project and then submitting an individual report based on that group research activity.

An exam of two hours duration. 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.

An individual report of not more than 3000 words based upon practical work and the user study carried on during the group research project. The report will be structured as a scientific research paper.

Assessment tasks:

Examination (Online) (First Sit)
Description: Online Examination
Weighting: 40 %
Final assessment: Yes
Group work: No
Learning outcomes tested: MO1, MO2, MO3

Report (First Sit)
Description: Individual report (3000 words)
Weighting: 60 %
Final assessment: No
Group work: No
Learning outcomes tested: MO3, MO4, MO5, MO6

Examination (Online) (Resit)
Description: Online Examination
Weighting: 40 %
Final assessment: Yes
Group work: No
Learning outcomes tested:

Report (Resit)
Description: Individual report (3000 words)
Weighting: 60 %
Final assessment: No
Group work: No
Learning outcomes tested:

Part 5: Contributes towards

This module contributes towards the following programmes of study:

Robotics {Joint Award}[Frenchay] MSc 2023-24

Robotics and Autonomous Systems {Joint Award}[Frenchay] PhD 2023-24