1. KentVision Code and title of the module

COMP6690 Cognitive Robotics

## Division and School/Department or partner institution which will be responsible for management of the module

Division of Computing, Engineering, Mathematical Sciences (CEMS)

School of Computing

## The level of the module (Level 4, Level 5, Level 6 or Level 7)

Level 6

## The number of credits and the ECTS value which the module represents

15

## Which term(s) the module is to be taught in (or other teaching pattern)

Autumn or Spring

## Prerequisite and co-requisite modules and/or any module restrictions

Prerequisite: COMP5200 Further Object-Oriented Programming, or comparable programming competence

## The course(s) of study to which the module contributes

Optional to the following courses:

All UG courses in the School of Computing (except YinCo)

## The intended subject specific learning outcomes. On successfully completing the module students will be able to:

8.1 Conceptual understanding to describe and comment on the benefits of socially Interactive Robots in the human robot interaction.

8.2 Demonstrate a systematic understanding of theory and implementation of robotics, for both physical and simulated robots.

8.3 Critically evaluate the differences between the various branches of robotics.

8.4 Demonstrate a critical awareness of computational and practical challenges existing in robotics.

8.5 Understand the software/hardware integration requirements in robot architectures for critically advanced research tasks and industrial applications.

8.6 Demonstrate an understanding of the mechanism to program robots using the Robot Operating System (ROS).

8.7 Competently write software to solve practical problems with robots.

## The intended generic learning outcomes. On successfully completing the module students will be able to:

9.1 Demonstrate critical thinking and problem-solving skills.

9.2 Communicate with other professionals using appropriate technical vocabulary.

9.3 Construct reasoned arguments about pros and cons of algorithms and their implementations

9.4 Exercise initiative and personal responsibility to manage their time and resources within a task.

## A synopsis of the curriculum

The module will provide an overview of the core areas in robotics and a focus on Cognitive Robotics, such as the following indicative topics: motion planning; state estimation, localisation, and mapping; vision and language for robotics; robotics platforms and the Robotic Operating system (ROS). Furthermore, different applications of robotics will be introduced such as industrial robots and collaborative robots (Cobots), Neuro-robotics, Social robotics and human-robot interaction. The module will explore the role of the Embodiment in Socially Interactive Robots and their interaction with humans and why should embodied robots be used instead of simpler and more economical virtual agents.

## Reading list

Behavioural and Cognitive Robotics: An Adaptive Perspective. Roma, Italy: Institute of Cognitive Sciences and Technologies, National Research Council (CNR-ISTC). ISBN 9791220082372 - Nolfi Stefano (2021). free online <https://bacrobotics.com/Chapter1.html>

Handbook of Robotics – Bruno Siciliano and Oussama Khatib, Springer, 2016.

Robotic Systems and Autonomous Platforms: Advances in Materials and Manufacturing – Shawn M. Walsh, Michael S. Strano, Elsevier, 2019.

Artificial Intelligence for Robotics: Build intelligent robots that perform human tasks using AI techniques – Francis X. Govers, Packt Publishing, 2018.

## Contact Hours

Private Study: 120

Contact Hours:30

Total: 150

## Assessment methods

* 1. Main assessment methods

This module will be assessed by 100% coursework.

50% Practical assignment 1 (individual/group; approximately 40 hours)

25% Video presentation (demo) (individual; 1 hour with 10 hours revision)

25% Time constrained test (individual; 1 hour with 10 hours revision)

13.2 Reassessment methods

Retrieval by 100% Coursework

## Map of module learning outcomes (sections 9 & 10) to learning and teaching methods (section 13) and methods of assessment (section 14)

**Module learning outcomes against learning and teaching methods:**

| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 8.5 | 8.6 | 8.7 | 9.1 | 9.2 | 9.3 | 9.4 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Private Study** |  |  |  |  |  |  | **x** | **x** | **x** | **x** | **x** |
| *Laboratory* |  | **x** |  |  | **x** | **x** | **x** | **x** |  |  |  |
| *Lectures* | **x** | **x** | **x** | **x** | **x** | **x** | **x** |  | **x** | **x** |  |

**Module learning outcomes against assessment methods:**

| **Module learning outcome** | 8.1 | 8.2 | 8.3 | 8.4 | 8.5 | 8.6 | 8.7 | 9.1 | 9.2 | 9.3 | 9.4 |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Time constrained test* | **x** | **x** | **x** | **x** | **x** | **x** |  |  |  |  |  |
| *Practical assignment (coursework)* |  | **x** |  | **x** | **x** | **x** | **x** | **x** | **x** | **x** | **x** |
| *Video presentation (coursework)* | **x** |  | **x** | **x** | **x** |  | **x** | **x** | **x** | **x** | **x** |

## Inclusive module design

The Division recognises and has embedded the expectations of current equality legislation, by ensuring that the module is as accessible as possible by design. Additional alternative arrangements for students with Inclusive Learning Plans (ILPs)/declared disabilities will be made on an individual basis, in consultation with the relevant policies and support services.

The inclusive practices in the guidance (see Annex B Appendix A) have been considered in order to support all students in the following areas:

a) Accessible resources and curriculum

b) Learning, teaching and assessment methods

## Campus(es) or centre(s) where module will be delivered

Canterbury

## Internationalisation

The topics addressed by this module relate to a field which is of international importance, given the global role of robots in today's technological innovation. The topics covered by this module are international in nature, being identical worldwide and independent of traditional spoken language.

**If the module is part of a course in a Partner College or Validated Institution, please complete sections 19 and 20. If the module is not part of a course in a Partner College or Validated Institution these sections can be deleted.**

## Partner College/Validated Institution

## University Division responsible for the course

**DIVISIONAL USE ONLY**

**Module record – all revisions must be recorded in the grid and full details of the change retained in the appropriate committee records.**

| Date approved | New/Major/minor revision | Start date of delivery of (revised) version | Section revised  (if applicable) | Impacts PLOs (Q6&7 cover sheet) |
| --- | --- | --- | --- | --- |
| 15/12/2022 | New | Sept 2023 | New | Yes |
|  |  |  |  |  |