# Specialist Module with Workshop: Positive Interactions between Humans and Robots in Rehabilitation, Training and Healthy Living

## Prof. Federico Manzi

COURSE AIMS AND INTENDED LEARNING OUTCOMES

Course Aims

The course aims to introduce the topic of Human-Robot Interaction (HRI), so providing students with the theoretical and operational knowledge to approach different robotic platforms and recognise their basic characteristics. Furthermore, during the course students will have the opportunity to gain experience with two of the most widely used Social Robots: the NAO and Pepper robot. Gaining practical experience with the two robots will deepen students' knowledge of the different application fields for social robots, with a particular focus on Socially Assistive Robotics (SAR), or the use of robots in the rehabilitation and assistance field, and on Robot for Learning, i.e. robots in educational contexts.

Intended learning outcomes

At the end of the course, students will be able to: (1) know the specific topics of HRI in relation to the theories covered during the course; (2) recognise the main robotic platforms, with particular attention to social robots; (3) understand the functioning of the two social robots presented during the course (NAO and Pepper robot); and (4) examine the context and situations in which social robots can be used to support the individual's well-being.

COURSE CONTENT

The course includes a *theoretical part,* a *methodological* part and a *practical part.*

The *theoretical* part deals with some of the most recent theoretical approaches to HRI and the fundamental issues for evaluating robotic platforms and their use. The *Uncanny Valley Effect*, *Developmental Robotics*, *Developmental Cybernetics*, *Socially Assistive Robotics* and *Robot for Learning* will be presented through the latest research, so as to provide an integrated view of robot use in design and application terms.

The *methodological* part focuses on the functions and usage methods of two robotic platforms, the NAO and Pepper robot. Specifically, use of the *Choregraphe* programming software (free download) is studied in depth.

The *practical* part consists of practical exercises, in small groups, focused on using robots in terms of design and application.

READING LIST

Bartneck, C., Belpaeme, T., Eyssel, F., Kanda, T., Keijsers, M., & Sabanovic, S. (2020). Human-Robot Interaction – An Introduction. Cambridge University Press (Chapters 2, 6, 7, 8, 10)

Riva G., Marchetti A., (2022). Humane Robotics: A multidisciplinary approach towards the development of humane-centered technologies. Vita e Pensiero (Section 1 – Chapter 1; Section 2 – Chapters 2, 4, 6, 8; Section 3 – Chapters 3 e 5).

Alnajjar, F. et al. (2021) Robots in Education: An Introduction to High-Tech Social Agents, Intelligent Tutors, and Curricular Tools. Routledge (Chapters 8 e 11)

Scientific articles on the subject of HRI will be provided.

TEACHING METHOD

Classroom lectures, practical exercises and guided practical work.

ASSESSMENT METHOD AND CRITERIA

The assessment is based on a paper that can be: 1) individual, should the student propose a theoretical reflection on the topics covered in the course; or 2) a group project, should a robot application project be proposed; in the paper, students should show an understanding of the basic principles of HRI. For both modalities, individual or group, each student then discusses the paper in the context of an interview with the lecturer, focused on deepening the theoretical and/or applicative aspects. The interview also includes questions on the topics addressed in class and the contents of the reading list indicated.

NOTES AND PREREQUISITES

There are no prerequisites for attending the course.

Should the current Covid-19 health emergency not allow face-to-face teaching, remote teaching will be carried out following procedures that will be communicated in good time to students.

Further information can be found on the lecturer's webpage at http://docenti.unicatt.it/web/searchByName.do?language=ENG or on the Faculty notice board.