Universidad Zaragoza

Academic Year/course: 2023/24

69161 - Assistive Robotics

Syllabus Information

Academic year: 2023/24
Subject: 69161 - Assistive Robotics
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 615 - Máster Universitario en Robótica, Gráficos y Visión por Computador / Robotics, Graphics and Computer Vision
ECTS: 3.0
Year: 1
Semester: Second semester
Subject type: Optional
Module:

1. General information

In recent years there have been substantial advances in the field of healthcare robotics and medical robotics. In relation to care robotics, it will focus on the modeling and control of robotic exoskeletons, such as orthoses and prostheses. The course is multidisciplinary, since it covers from robot modeling, movement generation, control of polyarticulated mechanisms, and processing and adaptation of biosignals for device control. The applications have a growing social interest, since they are fundamentally oriented to people with motor disabilities, and a clear professional interest as these technologies currently provide very useful automation and robotization tools in medical applications.

The Sustainable Development Goals are: Goal 3; Objective 4, Targets 4.4, 4.5 Objective 9, Targets 9.4, 9.5; Objective 11, Target 11.2.

2. Learning results

- It is capable of modeling polyarticulated systems, such as manipulator robots and exoskeletons.
- It is capable of carrying out the design of the control system of a manipulator robot, in particular of a robotic exoskeletons.
- It is capable of understanding the mechanisms of the generation and processing of biosignals, particularly EEG (electroencephalographic) and EMG (electromyographic).
- It is able to understand bioinspired models to generate control signals from biosignals.
- Learn about the different applications of Robotics in the biomedical and healthcare field.

3. Syllabus

- Introduction to Robotics. Manipulation robotics. Mobile robotics. Medical robotics. Applications.
- Modeling of a robot manipulator mechanism, generation of trajectories, kinematic and dynamic control of the movement.
- Robotic exoskeletons. Application of manipulation robotics techniques to the control of exoskeletons.
- Filtering and processing of EEG and EMG biosignals.
- Control of exoskeletons from EEG and EMG biosignals.

4. Academic activities

Lectures: sessions with the professor in which the contents of the course will be explained (15 hour)

Problems and cases: sessions to solve exercises and practical cases proposed by the teacher (6 hours)

Laboratory practices: practical sessions in the laboratory (9 hour)

Study of the subject, works: 42 hours

Assessment tests: 3 hours

5. Assessment system

- Exam (30% of the mark, minimum 5 out of 10).

- Evaluable work and activities (50% of the grade). The evaluation of the works will be carried out through the report presented.

- Laboratory practices (10% of the mark, minimum 5 out of 10). The evaluation of the practices will be carried out through the memory of the same and the work carried out in the laboratory.

- Oral presentations (10% of the mark). Presentation of results of exercises, assignments and practices and answering questions about them.

To pass the subject, the **4 evaluation activities** must be carried out.

- Global test (official calls, 100% of the mark, mínimum 5 out of 10). It includes:

- **Exam** (40% of the mark, minimum 5 out of 10). It will contain questions related to theoretical content, case studies and laboratory practices.
- **Assignments and evaluable activities** (50% of the grade). The evaluation of the works will be carried out through the report presented.
- **Laboratory practices** (10% of the mark, minimum 5 out of 10). The evaluation of the practices will be carried out through the memory document presented.