Universidad Zaragoza

Academic Year/course: 2023/24

29843 - Autonomous Robots

Syllabus Information

Academic year: 2023/24
Subject: 29843 - Autonomous Robots
Faculty / School: 110 - Escuela de Ingeniería y Arquitectura
Degree: 440 - Bachelor's Degree in Electronic and Automatic Engineering
ECTS: 6.0
Year: 4
Semester: First semester
Subject type: Optional
Module:

1. General information

This is a subject of integration of various techniques learned in different subjects of the degree and other specific techniques learned in the subject itself.

The first objective of the course is that students learn the basic techniques used in the development and applications of autonomous robots. The second objective is for students to acquire the skills to carry out a robotics project, individually and in teams, designing a robot and providing it with intelligent decision-making capabilities . The Sustainable Development Goals are: Goal 3, target 3.6; Goal 9, targets 9.4 and 9.5; Goal 11, target 11.2.

2. Learning results

The results are:

- Learn about the fundamentals, principles and applications of autonomous intelligent robots.
- Understand the techniques of perception in robotics and their practical application.
- Apply path planning and navigation techniques in simple environments.
- Implements map building and robot localization functions.
- Select the type of robot software architecture best suited for an application.
- Be able to develop simple practical applications of intelligent robotics.

3. Syllabus

The contents to be developed are the following:

- Introduction.
- Mobile robots.
- Spatial location.
- Kinematic modeling.
- Odometry.
- Concurrent processes and robot programming.
- Motion control.
- Computer Vision in Robotics.
- Navigation planning.
- Location and maps.
- Perception systems.

The following practices will be carried out:

- Robot design, implementation of sensors and actuators, introduction to the robot programming environment.
- Calibration and programming of basic functions. Generation of trajectories and movements.
- Object tracking by vision.
- Planning and obstacle avoidance.
- Integration of software modules and hardware tuning.
- Application to the specific task of the competition.

4. Academic activities

- Lectures (26 hours): sessions with the teacher in which the course syllabus will be explained.

- Problems and cases (4 hours): sessions to solve exercises and practical cases presented by the teacher.
- Laboratory practice (18 hours): practical sessions in the laboratory.
- Study of the subject and assignments (96 hours).
- Assessment tests (6 hours)

5. Assessment system

The subject will be evaluated, in the first call, exclusively in the continuous assessment modality, due to the following reasons exceptionality in the assessment granted:

- Laboratory practicals (L, 30% of the grade, minimum 5 out of 10).
- Assignments and evaluable activities (T, 70% of the grade, minimum 5 out of 10). Practical group work, individual theoretical and practical exercises , oral presentations of exercises and work, tests during the theoretical classes, and development of optional modules related to the practical work. The student who does not deliver the results of on the dates established during the teaching period and does not achieve a minimum grade in each part, must pass the corresponding subject in the framework of the Global Tests to be held in theOfficial Calls.

Global test in second call (official call, 100% of the grade, minimum 5 out of 10). It will have two parts:

- Laboratory practicals (L, 30%, minimum 5 out of 10). Completion of one or more practices of the subject.
- Practical group work and delivery of evaluable work and activities (T, 70%, minimum 5 out of 10)). Presentation of the practical work proposed in the term and one or more of the other evaluable activities.

Final grade: 0.3*L+0.7*T , if the 2 parts are passed, or the higher of the marks not passed otherwise.