Mobile Robots

Academic Year: (2022 / 2023) **Review date: 08-05-2022**

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: BARBER CASTAÑO, RAMON IGNACIO

Type: Electives ECTS Credits : 6.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

The objective of this course is for students to master the different techniques of mobile robot navigation. In the subject methods will be studied both topological and geometrical navigation.

OBJECTIVES

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DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction
   - 1.1 Mobile Robots
   - 1.2 Navigation systems of mobile robots
   - 1.3 Representation of the environment
2. Geometric navigation
   - 2.1 Map generation
   - 2.2 Planning and Navigation
   - 2.3 Relocation of mobile robots. SLAM.
3. Topological navigation
   - 3.1 Map generation
   - 3.2 Planning and Navigation
4. Semantic Navigation
   - 4.1 Semantic representation of the environment
   - 4.2 Planning and semantic inference
5. Navigation in outdoor environment.
   - 5.1 Terrain modeling.
   - 5.2 Crossable and non-crossable areas.
   - 5.3 Planning in outdoor environment.
6. Hardware and software of mobile robots
   - 6.1 Constructive element of a mobile robot
   - 6.2 Software control of mobile robots: ROS.

LEARNING ACTIVITIES AND METHODOLOGY

- Theroretical lectures oriented for the acquisition of theoretical knowledge.

- Classes of problems in small groups for problem solving and case studies.

- Lab sessions.

- Individual tutorials and students' personal work, aimed at the acquisition of skills related to the subject program.

ASSESSMENT SYSTEM

The student evaluation will be made from several jobs that will be suggested on the topics covered in the course, and for their active participation in class activities.
- % end-of-term-examination 20
- % of continuous assessment (assigments, laboratory, practicals...) 80

% end-of-term-examination:	20
% of continuous assessment (assigments, laboratory, practicals…):	80

BASIC BIBLIOGRAPHY

- Federico Cuesta, Anibal Ollero. Intelligent Mobile Robot Navigation, Springer, 2005
- Jean-Claude Latombe Robot Motion Planning, Springer, 1991
- Thrun, Wolfram Burgard, Dieter Fox Probabilistic Robotics, Technology & Industrial Arts, 2006