

Field Robots

Academic Year: (2022 / 2023)

Review date: 22-11-2020

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: BALAGUER BERNALDO DE QUIROS, CARLOS

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Knowledge of basic industrial robotics.

OBJECTIVES

The aim of the subject is to transmit to the students knowledge about outdoor robots. Contrary to manufacturing robots, which work in closed spaces, field robots operate in open and normally unstructured environments. This fact leads to rethink the issues of control, planning and decision making. The robots that will be studied will be those that will focus on the maintenance and inspection of civil structures: roads, bridges, ports, tunnels, lighting systems, etc. Special attention will be given to mining and its surveillance and inspection systems.

The typology of the robots to study will be very wide: mobile robots, climbing robots, specific drones, crawler robots, snake-type robots, underwater robots, etc. Both its design and its control will be studied, as well as its sensory systems. In this regard, the sensors used are not limited to cameras, it include location sensors both outdoors and under the ground and under water, ultrasound sensors, infrared cameras, etc.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to field robots
2. Inspection and infrastructure maintenance robots
 - 2.1 Robots for roads
 - 2.2 Robots for bridges
 - 2.3 Robots for tunnels
 - 2.4 Robots for lighting and gold systems
3. Mining robots
 - 3.1 Digging robots
 - 3.2 Robots for exploration and inspection
 - 3.3 Rescue robots
4. Control of field robots
 - 4.1 Aquator systems
 - 4.2 Sensory systems
 - 4.3 Geolocation systems (open air, under the ground, under water)
 - 4.3 Planning of tasks and trajectories in unstructured environments

LEARNING ACTIVITIES AND METHODOLOGY

The activities will be divided as follows:

- Theoretical classes in the classroom
- Practical classes in the classroom
- Laboratory classes

In addition, students will have to do and prepare a work related to the contents of the subject.

The schedules of the tutorials will be public.

ASSESSMENT SYSTEM

% end-of-term-examination:	40
% of continuous assessment (assignments, laboratory, practicals...):	60

The evaluation system will be:

- 20% for class attendance
- 40% class work
- 50% exam

BASIC BIBLIOGRAPHY

- Varios Proceedings IEEE/RSJ IROS, IEEE, Varios

BASIC ELECTRONIC RESOURCES

- Carlos Balaguer . Robots de campo: <http://Aula global>