Advanced Industrial Robotics

Academic Year: (2022 / 2023) **Review date: 10/01/2023 15:08:39**

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: OÑA SIMBAÑA, EDWIN DANIEL

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Industrial Robotics
Robot Operating Systems

OBJECTIVES

The goal of the course the acquisition of new advanced concepts about industrial robotics. The course is related to th eindustrial robot from and integrated point of view, that is, the robot is not an isolated machine but it is a main part of the productive process. In this way, advanced programming and control methods are studied to design advanced industrial applications.

The student will acquire the necessary knowledge for designing and programming advanced applications with industrial robots, multi-robot systems, and colaborative robots. As well, the student will learn to use the necessary resources for robotic systems integration within a flexible production cell.

Each part of the theoretical content of the course is complemented with practical sessions to apply the methods and concepts exposed. It will be performed by the use of robotic simulators and real robots in laboratory.

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction.
1.1. The industrial robot and the flexible production cell
1.2. Advanced applications

2. Advanced programming of industrial robots
2.1. Advanced programming of movements
2.2. Programming of advanced functions
2.3. Advanced concepts of security

3. Design and simulation of advanced applications

4. Task control for advanced applications
4.1. Advanced methods for task control
4.2. Visual control
4.3. Force control

5. Practical applications of advanced control methods

6. Multi-robot systems
6.1. Design of multi-robot systems
6.2. Communication technologies
6.3. Task synchronization

7. Practical application of multi-robot systems

8. Cooperative robots
8.1. The cooperative robot
8.2. Devices for cooperative robots
8.3. Study and specification of applications

LEARNING ACTIVITIES AND METHODOLOGY

- Lecture sessions oriented to the acquisition of theoretical knowledge of advanced industrial robotics. Groupal or individual tutorial sessions oriented to specific concepts clarification

- Personal student homework to set up practical sissions, to carry out practical exercices and problem solution

- Practicval sessions to apply theoretical acquired knowledge through the design and programming of robotic applications in simulated and real environments

ASSESSMENT SYSTEM

% end-of-term-examination/test:	40
% of continuous assessment (assigments, laboratory, practicals…):	60

1) Continuous evaluation (60%) divided in:
  - Practical sessions attendances (10%)
  - Solution of proposed problems (90%)
2) Final Exam (40%)

BASIC BIBLIOGRAPHY

- Ganesh S. Hegde A TEXTBOOK ON INDUSTRIAL ROBOTICS , Laxmi Publications, 2007

- Mike Wilson IMPLEMENTATION OF ROBOT SYSTEMS: AN INTRODUCTION TO ROBOTICS, AUTOMATION, AND SUCCESSFUL SYSTEMS INTEGRATION IN MANUFACTURING, Butterworth-Heinemann, 2014

- Tadej Bajd INTRODUCTION TO ROBOTICS, Springer Science & Business Media, 2013