Analysis and Design of Control Systems

Academic Year: (2019 / 2020) **Review date: 05-07-2019**

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: GARCIA FERNANDEZ, FERNANDO

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Sin requisitos previos.

OBJECTIVES

Basics Competences
Knowledge related to control engineering techniques that can be applied to the IoT field
Capacity to apply these knowledge to the specificity of the model

General Competences
To identify the different control methods available for IoT and their advantages and disadvantages
Capacities to identify, define and formulate the control problems related to IoT applications. This capacity includes the assessment of all the factors at stake, not only at technical level but environmental and civil responsibility.
Capacity to publicly communicate the concepts, developments and results of control engineering results related to IoT, adapted to the specificity of all audiences.
Capacity to apply the acquired knowledge for solving problems in a wide variety of multidisciplinary new situations, with the ability to integrate knowledge.

RESULTS OF THE LEARNING PROCESS
The results of the learning process will be:
- Capacity of analysis and synthesis for advance control systems.
- Capacity to design a system of small or medium complexity and its interaction with the environment.
- Knowing and applying the techniques of automatic learning in IoT.

DESCRIPTION OF CONTENTS: PROGRAMME

1- Introduction to Control Engineering
a. Origin of control Engineering
b. Applications
c. Naming and definitions

2- Classifications
a. Systems
b. Control Techniques

3- PID and its applications
a. Controllers type P
b. Controller type I
c. Controller type D
d. Controller type PID

4- Control techniques and alternatives
a. Linear Techniques
b. No-linear techniques

5- Artificial Intelligent Control
a. Genetic Algorithms
b. Fuzzy logic
c. Machine Learning
d. Deep Learning

6- Control Application in IoT
a. Autonomous and connected vehicle
b. Robotics
c. drone
d. Other examples

LEARNING ACTIVITIES AND METHODOLOGY

- Lectures, classes for resolution of doubts in small groups, student presentations, tutorials and individual work of students; aimed at the acquisition of knowledge (9 sessions).
- Laboratory practices and sections of problems in small groups, individual tutorials and individual work of students, aimed at the acquisition of practical skills related to the syllabus of the subject (4 sessions).

ASSESSMENT SYSTEM

- Continuos assessment 20%
- Exercises proposed by the teacher related to the topics 40%
- Final exam 40%

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

BASIC BIBLIOGRAPHY

- K. Ogata Modern Control Engineering, Pearson-Prentice Hall., 2010
- Zhang, H. and Liu, P. Fuzzy Modeling and Fuzzy Control, Ed Birkhauser, 2006