Digital electronic systems

Academic Year: (2020 / 2021)   **Review date: 10/07/2020 13:23:37**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: HERNANDEZ CORPORALES, LUIS

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Programming, Industrial Automation, Electronics Engineering Fundamentals, Electronic Instrumentation, Digital Electronics

OBJECTIVES

- Knowledge of applied electronic instrumentation, including:
- Design an electronic system for industrial applications, includding parts and subsystems, such as analog circuits, sensor interfaces and microprocessor based digital systems
- Ability to organize and planify the development of a complex electronic system and practise team work

DESCRIPTION OF CONTENTS: PROGRAMME

Lesson 1: Description of the microprocessor to be used in the laboratory
1.1 CPU Architecture
1.2 Digital Input and Output
1.3 Interrupts
1.4 A / D and D / A Converters
Lesson 2: Structure of a real-time embedded application
2.1 real-time operating systems
2.2 Periodic interrupts (ticker)
2.3 interface with data conversion circuits
2.4 PWM signal generation
Lesson 3: Example of a sampled control system in real time
3.1 discrete equivalent of an analog integrator
3.2 Generalization of a control systems with discrete systems
3.3 Example of analog PI controller and its digital equivalent
Lesson 4: Description of the projects to be undertaken
4.1 Project Development Activity
4.2 Evaluation and documentation of results

LEARNING ACTIVITIES AND METHODOLOGY

The purpose of this subject is to integrate all the knowledge on electronics that has been taught during the degree by the development of a lab project. This porject includes a microprocessor, some analog electronics and sensor signal conditioning and requires to develop an embedded real time application software.
The subject is composed of a first block of lectures to review all necessary maters and to explain the projects. (2 ECTS). Afterwards, the lab exercise is developed in the lab (4ECTS) supported by group and individual tuition.

ASSESSMENT SYSTEM

% end-of-term-examination/test: 45

% of continuous assessment (assigments, laboratory, practicals…): 55

The final target of this topic is de hardware and software development of an electronic system involving a microprocessor, analog/digital interface circuits, sensors and actuators. During the course, the students will work in small groups and a specific project will be assigned to each group. . Each project has 6 milestones to develop that will be evaluated by the professor in the lab and small group lectures. The final mark will be composed by adding the evaluation of each of the milestones accomplished up to a maximum of 75%, a 10% will be a final report elaborated by the group and three reports for up to 15% . Those students not following the continuing assesment will have a final lab examination with 85% of worth.

BASIC BIBLIOGRAPHY

- Gaonkar, Ramesh S. Fundamentals of microcontrollers and applications in embedded systems, Thomson/Delmar Learning, 2007

- M.A. Perez Garcia, J.C. Alvarez Anton, J.C. Campo Rodriguez, F.J. Ferrero Martin, G.J. Grillo Ortega Instrumentacion Electronica, Thomson - Paraninfo, 2003

- Sedra, Adel S Circuitos microelectrónicos, McGraw-Hill Interamericana, 2006