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Electronics for industrial communications

Academic Year: (2023 / 2024)   **Review date: 27-04-2023**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: SANCHEZ REILLO, RAUL

Type: Electives ECTS Credits : 6.0

Year : 4 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Microprocessors and Microcontrollers
If you have not passed that subject or you need to revisit it, you can take the OCW course titled "Sistemas Digitales basados en Microprocesador", offered by UC3M in: https://ocw.uc3m.es/course/view.php?id=260 (only available in Spanish, but you can contact the subject coordinator to get material in English).

OBJECTIVES

By the end of this subject, students will be able to have:
1.   The ability to apply their knowledge and understanding of electronic equipment and systems to identify, formulate and solve engineering problems related to the industrial communication using established methods.
2.   The ability to apply their knowledge and understanding to develop and realise designs of electronic systems for industrial communications to meet defined and specified requirements.
3.   An understanding of design methodologies of electronic systems for industrial communications, and an ability to use them.
4.   Workshop and laboratory skills.
5.   An understanding of applicable techniques and methods in the design of electronic systems for industrial communications, and of their limitations.

DESCRIPTION OF CONTENTS: PROGRAMME

1.   Introduction
2.   OSI model for communications
3.   Analog and Digital Communication Fundamentals
4.   Parallel Communication
5.   Synchronous Serial Communication
    5.1.   I2C
    5.2.   SPI
6.   Wired Asynchronous Serial Communication
    6.1.   RS-232
    6.2.   RS-485
    6.3.   USB
    6.4.   Ethernet
    6.5.   CAN bus
7.   Wireless Communication
    7.1.   IrDA
    7.2.   Bluetooth
    7.3.   WiFi
    7.4.   ZigBee
    7.5.   RFID / NFD
8.   Communication using phone networks

LEARNING ACTIVITIES AND METHODOLOGY

The above course competences and skills provide skills within the program outcomes, through different activities. For each program outcome, we briefly describe the activities provided within the course:
-       In the course, exercises are held where students have to complete/develop their programs to meet requirements. They are asked to interpret electronic circuit schematics, block diagrams and flowcharts.
-       The course includes a laboratory design exercise, with an initial set of specifications that the

students must meet by the end of the term. The problem is a manageable version of an electronic system design, where the students must solve using the given resources (Microcontroller Development Board, Debugger, peripherals).

-        Design and analysis examples are presented to the students as guidance on good programming practices and electronic design techniques, showing how to apply specific peripherals to solve different problems.

-        The students must be able to comment their program code appropriately, develop program flow diagrams, use schematic capture programs for their designs. This will be evaluated comprehensively in laboratory works.

-        The students are required to work using engineering tools such as a Microcontroller Integrated Development Environment (IDE) program, use a Development Board, as well as a Debugger.

ASSESSMENT SYSTEM

The evaluation of the course will be based on the following criteria:

1.- Mandatory laboratory exercises, evaluating the progress achieved, with a total weight of 40% of the final mark. 4 Laboratory sessions will be handled.

2.- Final exam, with a total weight of 60% of the final mark. To pass the subject, a minimum mark of 4 out of 10 is requested in the final exam.

% end-of-term-examination: 60

% of continuous assessment (assigments, laboratory, practicals…):   40

BASIC ELECTRONIC RESOURCES

 - Raúl Sánchez Reíllo . Transparencias y Material Docente de la Asignatura: http://Aula Global