Electronic Sensors for IoT

Academic Year: (2020 / 2021) **Review date: 01-07-2020**

Department assigned to the subject: Electronic Technology Department

Coordinating teacher: VERGAZ BENITO, RICARDO

Type: Compulsory ECTS Credits : 3.0

Year : 1 Semester : 1

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

None

OBJECTIVES

BASIC COMPETENCES

CB6 To acquire and understand knowledge that provides a basis or an opportunity to be original in the development or application of ideas, often in a research context.
CB7 To know how to apply the acquired knowledgge and the problem resolution skill in unknown new environments, in wider frameworks related to the studnet's study area.
CB9 To know how to spread the conclusions, skills, etc and their reasons, to both specialized and not specialized audiences, in a clear and unambiguous way.

GENERAL SKILLS

CG2 The ability to collect and analze the knowledge existing in several IoT areas, in a non-assisted way, and the ability to make a proposal of possible solutions to the problems.
CG6 The ability to apply the acquired knowledge and solve problems in new environments in wider and multidisciplinar frameworks. Integrate knowledge.

SPECIFIC SKILLS
CE2 The ability of using instrumentation technologies, selecting the suitable sensor in a product or application, knowing its operation field, to create an instrumentation design that collects and communique the proper data in an effective way.

LEARNING RESULTS
The students will acquire the next skills at the end of the course:
- Knowledge of the physical magnitudes involved in the acquisition of IoT parameters and the sensors for measuring them.
- How to get the proper selection of the sensor for a certain IoT application.
- Knowledge of the different conditioning circuits for the IoT signals, solving their communication problems, remote sensing and interferences.
- Learning the new sensing systems currently under research.

DESCRIPTION OF CONTENTS: PROGRAMME

The subject programme shows the contents that the students will study in the classroom. Nevertheless, the students will develop the rest of the content by exploring during their works the current state of the technique in sensing, transducing, conditioning and actuation in IoT environments.

1. An introduction to the new sensors in IoT.
2. The physical magnitudes to control and monitor in an IoT environment: ¿the things of Internet of things¿.
3. Discovering the sensors (electronic, optical, optoelectronic¿) in IoT through their applications.
4. Signal conditioning in integrated, embedded and compact sensors in IoT. Their connections and signal processing in critical and diverse environments.
5. Actuators and their conditioning in IoT: MEMs, motors, displays, etc.

LEARNING ACTIVITIES AND METHODOLOGY

LEARNING ACTIVITIES
- Theory lectures.
- Videos and podcast research.
- Tutorials.
- Research and bibliography review work.
- Group work.
- Individual homework, and presentations.

METHODOLOGY

¿ Traditional lectures with multimedia support. There, the key concepts in magnitudes and sensors will be introduced through real IoT applications.
¿ Critical Reading of datasheets, application notes, papers and book chapters recommended by the Professors.
¿ Information search to solve a problem: measuring and actuation in a certain IoT environment.
¿ Document writing, presentation, and defense of the work in front of the mates and Professors.

ASSESSMENT SYSTEM

Ordinary season
Continuous assessment based on: contributions to forums, class work, group work, and the resolution of a research work about a sensing and conditioning IoT application, making a presentation and answering questions. 60%
Final exam (individual): 40%
Retake
An extraordinary exam will be done. The continuous assessment mark will be preserved. The mark will be a 100% in case of not having a continuous assessment mark.

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

BASIC BIBLIOGRAPHY

- Boby George, Joyanta Kumar Roy, V. Jagadeesh Kumar, Subhas Chandra Mukhopadhyay Editors. Advanced Interfacing Techniques for Sensors Measurement Circuits and Systems for Intelligent Sensors. , Springer (ISBN 3-319-55369-0), 2017
- Dharma Prakash Agrawal. Embedded Sensors Systems., Springer (ISBN 978-981-10-3037-6), 2017
- Mohammad Hammoudeh (Ed.) ; Mounir Arioua (Ed.). Sensors and Actuators in Smart Cities, MDPI AG - Multidisciplinary Digital Publishing Institute (ISBN: 9783038428732 ; ISBN: 9783038428749), 2018
- Rayes A., Salam S. The Things in IoT: Sensors and Actuators. In: Internet of Things From Hype to Reality. , Springer, Cham. Switzerland , 2017

ADDITIONAL BIBLIOGRAPHY

- Greg Dunko, Joydeep Misra, Josh Robertson, Tom Snyde A Reference Guide to the Internet of Things, Bridgera, LLC, 2017