

Materia 4_34: Sensors and Internet of Things

Materia:	Sensors and Internet of Things	ECTS:	20
Descriptores	<ul style="list-style-type: none"> Sensors, Sensor Networks, Transducers, Signal Conditioners. IoT, machine-to-machine communications, sensors, actuators, microprocessors, sensor networks, real-time monitoring. IoT, IoT Platforms, IoT Protocols, Machine To Machine (M2M) Communication, Network Communication, Middleware, Interoperability, Cybersecurity, IoT Enablers. IoT, Vehicular Ad-Hoc Networks (VANETS), Vehicular Sensor Networks (VSN), Smart Cities, Cloud Computing, Edge Computing, Fog Computing, V2V Protocol, V2I Protocol, V2X Protocol, Big Data 		
Objetivos generales	<p>This subject has the objective of presenting the different types of sensors and the appropriate signal conditioners for each sensor. The concept of the internet of things and the main communication protocols will be introduced. Communication systems between vehicles, users and other elements based on Internet of Things (IoT) architectures will be described. Finally, digital systems will be designed in the Internet of Things (IoT) paradigm.</p>		
Competencia específica	<p>CE 4_34a: Ability to specify and use electronic instrumentation and measurement systems. CE 4_34b: Ability to design analogue and digital electronic circuits, analogue-digital and digital-analogue conversion, radio frequency, power supply and electrical energy conversion circuits for telecommunication and computing applications. CE 4_34c: Use the characteristics, functionalities and architecture of data networks and Internet, protocols, services and applications, for the administration, design and implementation of telematic systems. CE 4_34d: Apply and evaluate technologies and systems that guarantee levels of security and quality of service and experience in telematic systems.</p>		
Resultados de aprendizaje	<p>Understand the physical principle of operation of sensors, deriving from them their specifications, advantages and limitations. Choose the specific signal conditioner for each type of sensor. Develop a sensor system, starting from its specifications, and choosing and designing the appropriate signal conditioner. Experimentally characterise the response of a given sensor. Mount on the contact board and adjust a previously designed signal conditioner, and make measurements to obtain the sensor's calibration curve.</p> <p>Design a communications system for real-time monitoring of 3 continuous variables. Select communication modes, protocols and technologies according to the specifications. Prototype an embedded system based on IoT.</p> <p>Identify the peculiarities of the IoT ecosystem. Apply communication protocols to perform IoT data exchange. Understand the functioning of IoT platforms and distinguish their architectures and standards. Analyse the interoperability and security of IoT platforms. Investigate IoT application domains. Configure and implement an open IoT platform.</p> <p>Identify the specific communication needs of IoT networks and vehicular networks. Assess the different alternatives for physically locating the computing closer to or further away from the data source: Fog, Edge and Cloud. Explain the characteristics, architecture and operating parameters of vehicular ad hoc networks (VANETS) and vehicular sensor networks (VSN). Justify the advantages of using Big Data in IoT networks. Develop and program a node capable of monitoring IoT parameters. Propose and simulate a new protocol for VANETS networks.</p>		
Métodos de evaluación	<ul style="list-style-type: none"> Evaluation: Written open-ended test and Problems Assessment instruments: Checklists and Rating Scales 		