Materia 4_42: Software, Automation and Computer Vision in Robotic

Materia:	Software, Automation and Computer Vision in Robotic	ECTS:	25
Descriptores	• The lifecycle of user interface development, from requirements gathering to conceptual design and visual design of interfaces. Techniques for prototyping and evaluating interfaces. Development of desktop applications with graphical user interfaces oriented to the field of robotics and industrial computing. • Information exchange standards (e.g. OPCUA). Basic guidelines for industrial digitization (UNE0060 and UNE0061). The relationship between the structure of high-level information systems and the concrete programming of automation operations with robots is also studied. Client-server structures based on events with open operating systems ROS and ROS-I. Examples and cases of programming model for industrial management systems of the MES type and their interaction with ERP systems. • Modelling and simulation of dynamical systems. Effects of feedback control. Feedback control design techniques including proportional, integral, and derivative control. Instrumentation, sensors, and actuators for industrial process control. Implementation of closed-loop control systems for industrial process control. • Capture, analysis and reaction to discrete events. Boolean algebra for modelling. Captors, preactuators and actuators. Design of automatisms. Architecture of programmable Programmable Logic Controllers (PLCs). Programming languages: Ladder Logic, Sequential Function Charts and Structured Text. • Knowing the scientific and technological foundations of computer vision and its application to process control and robotics allowing the system to measure, analyse, and respond to their environment, and applying common techniques in this area: product inspection and quality control, object recognition, detection and tracking.		
Objetivos generales	This subject has the objective of giving an overview of automatic production systems in industrial environments. The different elements that make up these production systems such as user interfaces, information exchange standards, sensors, actuators, controllers and vision systems will be introduced. Subsequently, the most common control strategies in industry will be introduced, as well as the modeling of production processes for the subsequent design of controllers. The objective is to provide the student with the necessary knowledge to be able to understand the automatic production processes of the present and the future of industry and to be also capable of adapting to the environment through image processing techniques.		
Competencia específica	CE [4-42]: Model and simulate industrial processes, and design and implement algorithms for industrial process control.		
Resultados de aprendizaje	• Developing interactive and presentation systems for complex information that ensure accessibility and usability to computer systems, services, and applications. • Knowing and applying the most relevant software support and standards in information management and exchange in the industry. • Modelling and analysing discrete systems to design and implement software controllers and configure hardware components for industrial process control. • Modelling and simulating industrial processes and designing and implementing automatism for industrial processes. • Designing and implementing industrial image analysis-based subsystems, including all stages of a computer vision system: camera calibration and acquisition, preprocessing, segmentation, feature extraction, and object recognition.		
Métodos de evaluación	• Evaluation: Written open-ended test and Problems • Assessment instruments: Checklists and Rating Scales		