

340128 - SIRO-K6007 - Robotic Systems

Coordinating unit:	340 - EPSEVG - Vilanova i la Geltrú School of Engineering
Teaching unit:	707 - ESAIL - Department of Automatic Control
Academic year:	2018
Degree:	BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Compulsory) BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional) BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
ECTS credits:	6
Teaching languages:	Catalan, Spanish, English

Teaching staff

Coordinator: Luis Miguel Muñoz

Others: Luis Miguel Muñoz

Prior skills

Skills in industrial automation, process control and programming.

Requirements

must previous passed
Q5 Industrial Automation; Industrial Informatics

Degree competences to which the subject contributes

Specific:

2. CE15. Basic knowledge of production and fabrication systems.
3. CE29. Ability to design automotion control systems.

Transversal:

1. EFFECTIVE USE OF INFORMATION RESOURCES - Level 3. Planning and using the information necessary for an academic assignment (a final thesis, for example) based on a critical appraisal of the information resources used.
4. TEAMWORK - Level 3. Managing and making work groups effective. Resolving possible conflicts, valuing working with others, assessing the effectiveness of a team and presenting the final results.

Teaching methodology

Master classes, active learning and participative expositive classes, projects and problems based learning, and study of real cases.

Learning objectives of the subject

Identify and analyze the elements of a robot, their specifications and terminology.
Describe and analyze the models of a robot.
Describe the robot control techniques.
Know the robot programming techniques.
Know the criteria, methodology and standards about the implantation of robots, evaluating their integration capability in a social or industrial environment.



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Study load

Total learning time: 150h	Hours large group:	30h	20.00%
	Hours medium group:	0h	0.00%
	Hours small group:	30h	20.00%
	Guided activities:	0h	0.00%
	Self study:	90h	60.00%

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Content

(ENG) 1 Background	Learning time: 6h Theory classes: 6h
<p>Description:</p> <ul style="list-style-type: none"> Definition Classification Brief history Robots morphology Joints Industrial applications <p>Related activities:</p> <ul style="list-style-type: none"> PR1 <p>Specific objectives:</p> <p>Locate the robot in the industrial domain and pay attention to collaborative tasks with humans. Know the different parts that the robot is composed.</p>	
(ENG) -2 Geometrics, Kinematics and dynamics	Learning time: 18h Theory classes: 18h
<p>Description:</p> <ul style="list-style-type: none"> Position and orientation representation Kinematic modelling Dynamic modelling <p>Related activities:</p> <ul style="list-style-type: none"> PR2 <p>Specific objectives:</p> <p>Learn geometry, kinematics and dynamic aspects to understand the robot control movement of the next chapter</p>	

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(ENG) -3 Control and robots programming	Learning time: 6h Theory classes: 6h
<p>Description:</p> <ul style="list-style-type: none"> Control architectures Control based in dynamic model Adaptative control Effort control Path generation GEstual and Textrual programming <p>Related activities:</p> <ul style="list-style-type: none"> PR1, PR2, PR3 <p>Specific objectives:</p> <ul style="list-style-type: none"> Learn some aspects of dynamic control and programming in order to prepare robotic tasks 	
(ENG) -4 Mobile Robotics	Learning time: 4h Theory classes: 4h
<p>Description:</p> <ul style="list-style-type: none"> Introduction to mobile robotics <p>Related activities:</p> <ul style="list-style-type: none"> PR4 <p>Specific objectives:</p> <ul style="list-style-type: none"> Know the science of the wheeled mobile robots 	
(ENG) PR1 Industrial robots programming	Learning time: 4h Theory classes: 4h
<p>Description:</p> <ul style="list-style-type: none"> Introduction to programming robot system Programming tools Edition and programming Examples Porfolio <p>Specific objectives:</p> <ul style="list-style-type: none"> Learn the basic intructions for the programming of robotic tasks 	

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(ENG) PR2 Robots: Modeling and simulation	Learning time: 8h Theory classes: 8h
<p>Description: Introduction to the robotics toolbox Matlab Study of the Spacial transformations Study of the kinematic model</p> <p>Specific objectives: Learn to use the mathematic tools in order to analyze the science behind robots</p>	
(ENG) PR3 Programming robots tools	Learning time: 2h Theory classes: 2h
<p>Description: Introduction to programming and simulations robots Programming a robotized task Programming a robotized system</p> <p>Specific objectives: Know advanced tools for program and simulate industrial robots</p>	
(ENG) PR4 Mobile robots	Learning time: 2h Theory classes: 2h
<p>Description: Programming wheeled mobile robots</p> <p>Specific objectives: Learn to solve mobile robot tasks using the acquired theoretical knowledge</p>	
PR5 Miniproject	Learning time: 10h Theory classes: 10h
<p>Description: Conducting a group project</p>	

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Qualification system

Individual tests in the middle of the course (60%)

Team work (40%)

Presentations in group about a theme or project related to robotics

Laboratory Practicum and activities proposed during the course

Re-evaluation may be accessed in accordance with school regulations

Bibliography

Basic:

Reyes Cortés, Fernando. Robótica : control de robots manipuladores. Barcelona : México: Marcombo : Alfaomega, 2011. ISBN 9788426717450.

Groover, Mikell P. Fundamentos de manufactura moderna : materiales, procesos y sistemas [on line]. 3a ed. México [etc.]: Prentice-Hall Hispanoamericana, 2007 [Consultation: 28/03/2017]. Available on: <<http://site.ebrary.com/lib/upcatalunya/docDetail.action?docID=10515063&p00=fundamentos%20de%20manufactura%20moderna>>. ISBN 9789701062401.

Corke, Peter. Robotics, Vision and Control : Fundamental Algorithms In MATLAB [on line]. 2nd ed. Cham: Springer International Publishing, 2017 [Consultation: 26/10/2018]. Available on: <<http://dx.doi.org/10.1007/978-3-319-54413-7>>. ISBN 9783319544137.

Complementary:

Libro blanco de la robótica : de la investigación al desarrollo tecnológico y futuras aplicaciones. Madrid: Comité Español de Automática : Ministerio de Educación y Ciencia, 2007. ISBN 9788469038840.

Gómez de Gabriel, Jesús Manuel; Ollero Baturone, Aníbal; García Cerezo, Alfonso José. Teleoperación y telerrobótica. Madrid [etc.]: Pearson Education, 2006. ISBN 9788483222966.

Craig, John J. Robótica. 3a ed. México [etc.]: Pearson Educacion, 2006. ISBN 9702607728.