Course guide

340621 - ROVI-R2P07 - Robotics and Vision

Unit in charge: Vilanova i la Geltrú School of Engineering
Teaching unit: 707 - ESAII - Department of Automatic Control.

Degree: MASTER’S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012). (Optional subject).

Academic year: 2022  ECTS Credits: 5.0  Languages: Catalan, Spanish

LECTURER

Coordinating lecturer: LUIS MIGUEL MUÑOZ MORGADO
Others: LUIS MIGUEL MUÑOZ MORGADO

PRIOR SKILLS

Previous knowledge on programming, control theory and automation

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Transversal:
1. TEAMWORK. Being able to work as a team player, either as a member or as a leader. Contributing to projects pragmatically and responsibly, by reaching commitments in accordance to the resources that are available.
2. EFFECTIVE USE OF INFORMATION RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

TEACHING METHODOLOGY

Master classes, and participative Active Learning, Learning and Projects based problems, and case study.

LEARNING OBJECTIVES OF THE SUBJECT

Understand the fundamentals of mathematical models of the robots
Understand the fundamentals of machine vision systems
Learning to program applications of computer vision
Learning to program robots and teleoperation tasks with robot manipulators
Learn the techniques associated with mobile robots and its applications

STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours small group</td>
<td>15,0</td>
<td>11.11</td>
</tr>
<tr>
<td>Hours large group</td>
<td>30,0</td>
<td>22.22</td>
</tr>
<tr>
<td>Self study</td>
<td>90,0</td>
<td>66.67</td>
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Total learning time: 135 h
## (ENG) - Mathematics of vision and robotics

**Description:**
(ENG) Spatial Transformations
Quaternions
Kinematics models

**Specific objectives:**
(ENG) Knowing the mathematical tools necessary for the disciplines of robotics and vision.

**Related activities:**
(ENG) MP1, MP2

**Full-or-part-time:** 1h
Theory classes: 1h

## (ENG) - Visió per ordinador

**Description:**
(ENG) Introducció a la visió per computador
Adquisició i processament d'imatges
Segmentació i reconeixement
Visió estereoscòpica

**Specific objectives:**
(ENG) Aprendre els fonaments dels sistemes de visió per computador i les tècniques aplicades a la robòtica.

**Related activities:**
(ENG) MP1, MP2

**Full-or-part-time:** 2h
Theory classes: 2h

## (ENG) - Interaction and Teleoperation

**Description:**
(ENG) Man-Machine interaction
Interface devices
Teleoperation
Virtual and augmented reality

**Specific objectives:**
(ENG) Aprendre els fonaments dels sistemes d'interacció persona-màquina i la Teleoperció

**Related activities:**
(ENG) MP1, MP2

**Full-or-part-time:** 1h
Theory classes: 1h
**(ENG) - Autonomous Robots**

**Description:**
(ENG) Wheeled mobile robots
Walking robots
Planning
Social robots

**Specific objectives:**
(ENG) Learn the basics of mobile robots and autonomous planning techniques.

**Related activities:**
(ENG) MP1

**Full-or-part-time:** 1h
Theory classes: 1h

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**(ENG) - MP1 Miniproject: Autonomous navigation of a mobile robot**

**Description:**
(ENG) Developing an application in order to make a mobile robot navigate autonomously in an unknown environment, using its own sensors and actuators in order to perform a predefined task.

**Full-or-part-time:** 20h
Guided activities: 20h

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**(ENG) - MP2 Miniproject: Vision guided robotic manipulation**

**Description:**
(ENG) Developing an application to make an industrial robot performing a handling task autonomously assisted with computer vision.

**Full-or-part-time:** 20h
Theory classes: 20h

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**GRADING SYSTEM**

The final qualification is:
NF = 0,3Ex + 0,7Team Group
There is no re-evaluation
BIBLIOGRAPHY

Basic:

Complementary: