IDENTIFICATION DETAILS

Degree: Expert in Robotics
Faculty/School: Senior Polytechnic School
Course:
Type: Compulsory Internal
ECTS credits: 1.50
Year: 1
Code: 56210
Teaching period: First semester
Teaching type: Classroom-based
Language: English
Total number of student study hours: 37.50

Teaching staff | E-mail
---|---
Alberto Garcés Jiménez | alberto.garces@ufv.es

SUBJECT DESCRIPTION

Introduction to Robotics is the introductory subject to Robotics mastery which is a complement of Computer Science Degree. This course covers the introduction to what is understood by robotics in the different disciplines of engineering, such as electronics, industrial and computer science. Taking into account the historical evolution of robots across the last five decades, the main goals achieved are presented and crosschecked with the state-of-the-art in the Information Management Technology. It is a predominantly theoretical, where the student must be proactive, by researching and realizing how the computer processing is the core of a robot for most of the capacities developed today.

GOAL

The overall objective of this subject is to learn about the purposes of Robotics, focused on the computer side, and discover the major achievements and technological challenges in this matter.
The specific aims of the subject are:

To understand the scope of Robotics and its evolution  
To know the basic definitions of Robotics  
To know the types of Robots  
To know the parts of a robot  
To know how to classify any given Robot  
To acquire basic arguments to discuss on possible applications of Robotics  
To implement a basic simulation with a mobile robot  
To implement a basic simulation with an industrial robot  
To understand the challenge of Forward and Inverse Kinnematics

PRIOR KNOWLEDGE

B2 level of English is required.  
Good predisposition to Mathematics, Physics, Electronics and Computing.  
Personal interest in Robotics.

COURSE SYLLABUS

Course outlines  
1. History of Robotics  
2. Robot definitions & classification  
   2.1. Physical configurations  
   2.2. Applications  
3. V-rep Simulator  
   3.1. Simulator interface and functionality  
   3.2. Robot features  
   3.3. Visualization  
4. Robot components  
   4.1. Sensors, actuators  
   4.2. Control  
5. Robot simulation challenges  
   5.1. Model representation  
   5.2. Physics  
   5.3. Kinnematics: DK, IK  
6. Case: Robotic arm

EDUCATION ACTIVITIES

The Professor will explain the different topics, raising discussions, explaining the problems, giving guidelines about the evaluation progress, so that attending with proactivity is essential for success.  
The Professor explains the assignments and answer the questions of the students.  
The Student complements the classroom activities working on his own.  
Students collaborate with the whole group to generate an effective work environment and with the assigned team when the activity is in groups.  
The platform Aula Virtual provides an efficient way of communications and notifications between the professor and every student, hosting the material, indications for the assignments and a repository for uploading the work assigned and online exercises.

DISTRIBUTION OF WORK TIME
<table>
<thead>
<tr>
<th>CLASSROOM-BASED ACTIVITY</th>
<th>INDEPENDENT STUDY/OUT-OF-CLASSROOM ACTIVITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>18 hours</td>
<td>19.50 hours</td>
</tr>
<tr>
<td>Lectures 6h</td>
<td>Individual study 12h</td>
</tr>
<tr>
<td>Supervised assignments 6h</td>
<td>Teamwork 7.50h</td>
</tr>
<tr>
<td>Public presentation 2h</td>
<td></td>
</tr>
<tr>
<td>Examination 2h</td>
<td></td>
</tr>
<tr>
<td>Tutoring 2h</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SKILLS**

- To be able to identify the potential of Robotics
- To understand the challenges of Robotics
- To know how to operate a Robot simulator

**LEARNING RESULTS**

- To know what a robot is and its basic definitions
- To know how to classify any robot as per its configuration and the application that is intended for
- To know Robotics potential for business and society
- To know what Robot simulators are for
- To know the challenges of simulation and how to overcome them
- To know the basic functionality of simulators
- To know how to implement a basic model responding efficiently to physics
- To know how to extract visual information of kinematics from a model running in a simulation
- To know how to differentiate the type of a control problem
- To know how to fix a basic problem of coordinates transformation
- To know how to consider an Inverse Kinematics problems
- To know how to present the work making use of the sections of a scientific article

**LEARNING APPRAISAL SYSTEM**

Evidences (Grade weight):
1. Assignment (60%)
   1.1. Assignment 1
   1.2. Assignment 2
2. Individual Test (30%)
3. Proactivity and Attendance (10%)

Conditions for each one of the Evidences 1.1, 1.2 and 2:
- require grade 5 out of 10 or above.
- can be retaken in resit.
- not dispensable.

Those students who are officially dispensed from the obligation of attending the classes, will be graded as the rest of students with evidences 1.1, 1.2 and 2. Evidence 3 will be graded, whenever the dispensed student requests at least 2 tutoring sessions with the professor to evaluate the progress of the student. The tutorials must be requested with enough anticipation to the exam and separated at least 4 weeks.
The student will be graded in any of the two calls of the enrollment (standard and resit), if submits the work for the 50% or more the value of the evidences. Otherwise the student will not be graded and the call will not increment the number of tries.

Any type of fraud or plagiarism on the part of the student in an evaluable activity, will be sanctioned as it is included in the UFV Coexistence Regulations. For these purposes, any attempt to defraud the evaluation system, such as copying exercises, exams, practices, works or any other type of delivery, either from another partner or from unauthorized materials or devices, will be considered "plagiarism". In order to make the teacher believe that they are their own.

BIBLIOGRAPHY AND OTHER RESOURCES

Basic


Additional