Course guide
300267 - ARASM - Augmented Reality & Smart Objects

Unit in charge: Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit: 701 - DAC - Department of Computer Architecture.
Degree: MASTER’S DEGREE IN APPLIED TELECOMMUNICATIONS AND ENGINEERING MANAGEMENT (MASTEAM) (Syllabus 2015). (Optional subject).

Academic year: 2023  ECTS Credits: 3.0  Languages: English

LECTURER
Coordinating lecturer: Royo Vallés, M. Dolores
Others: Royo Vallés, M. Dolores

PRIOR SKILLS
Solid computer programming skills

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Generical:
03 DIS. (ENG) Diseñar aplicaciones de alto valor añadido basadas en las Tecnologías de la Información y las Comunicaciones (TIC), aplicadas a cualquier ámbito de la sociedad.
06 RES. (ENG) Resolver problemas y mejorar procesos en cualquier ámbito social a partir de la aplicación de las TIC, integrando conocimientos de diversos ámbitos y aplicando ingeniería de alto nivel tecnológico.

Transversal:
03 TLG. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

Basic:
CB6. Possess and understand knowledge that provides a basis or opportunity to be original in the development and/or application of ideas, often in a research context.
CB9. Students will be able to communicate their conclusions and the knowledge and ultimate reasons that support them to specialized and non-specialized audiences in a clear and unambiguous manner.

TEACHING METHODOLOGY
The subject combines a small number of lectures, several guided lab sessions and an small project that combines Augmented reality and Smart Objects technologies

LEARNING OBJECTIVES OF THE SUBJECT
In this course, students will learn to:
1. What is and what does Augmented Reality consist of, as well as its applications.
2. To create intelligent objects with Arduino.
3. To program Augmented Reality applications for mobile platforms that use image processing and GPS location techniques.
3. To program Applications for mobile platforms that include information of intelligent objects.
STUDY LOAD

<table>
<thead>
<tr>
<th>Type</th>
<th>Hours</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self study</td>
<td>48.0</td>
<td>64.00</td>
</tr>
<tr>
<td>Hours small group</td>
<td>27.0</td>
<td>36.00</td>
</tr>
</tbody>
</table>

Total learning time: 75 h

CONTENTS

Introduction

Description:
General introduction to the course:
1. Introduction to the content of the subject where are presented a detailed breakdown of what topics will be explored during the academic sessions: Augmented Reality and Smart Objects.
2. Materials and work tools: books, documents, programming frameworks
3. Course evaluation
4. Students have to answer a programming level test

Full-or-part-time: 2h
Laboratory classes: 2h

Unity 3D framework

Description:
The work tool of this course is Unity 3D framework. Throughout the course you can see how this framework allows access to the sensors of mobile devices (GPS, camera ...) and how they can be used to create applications for mobile devices (Android), applications that can access smart objects and can combine virtual objects with the real world (Augmented Reality Applications)

Full-or-part-time: 6h
Practical classes: 2h 30m
Self study : 3h 30m

Augmented Reality

Description:
This part of the course will teach you the basics of developing mobile applications using Augmented Reality technology. Through small guided projects, you’ll learn practical techniques to rapidly and easily prototype applications for Android devices.

Specific objectives:
Objectives:
. Students will learn the basics of Augmented Reality technology
. Students will be able to prototype applications for Android devices that use this technology

Related activities:
Activities:
1. Augmented Reality Introduction
2. Unity 3D introdction. My firs Augmented Reality app.
3. Augmented Reality based on GPS location
4. Theoretical assessment
5. Project

Full-or-part-time: 40h 20m
Laboratory classes: 13h 30m
Self study : 26h 50m
## Smart Objects

**Description:**
This part of the course, through small guided projects, will teach how to design and build a smart object based on Arduino and CoAp protocol (server side), also the basics of developing mobile applications to access this smart object (client side).

**Specific objectives:**
Objectives:
1. Students will learn how to build simple smart objects based on Arduino and CoAp communication protocol.
2. Students will learn to build prototype applications to get smart object’s sensor values.

**Related activities:**
Activities:
1. Introduction to Smart Objects
3. Client side. How to access to the smart object through an Android app.

**Full-or-part-time:** 26h 40m  
Laboratory classes: 9h  
Self study: 17h 40m

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**GRADING SYSTEM**

Qualification System.
45% Augmented Reality and Smart Object evaluation concepts. Oral and written evaluation of the knowledge acquired regarding basic concepts of these technologies and what added value they can offer with respect to other technologies (web applications for example).
45% Project evaluation. Quality of the apps presented in terms of functionality, usability and complexity.
10% Subjective evaluation.

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**BIBLIOGRAPHY**

**Basic:**

**Complementary:**