Last update: 27-05-2019

300267 - ARASM - Augmented Reality & Smart Objects

Coordinating unit: 300 - EETAC - Castelldefels School of Telecommunications and Aerospace Engineering

Teaching unit: 701 - AC - Department of Computer Architecture

Academic year: 2019

Degree: MASTER'S DEGREE IN APPLIED TELECOMMUNICATIONS AND ENGINEERING MANAGEMENT (MASTEAM) (Syllabus 2015). (Teaching unit Optional)

ECTS credits: 3 Teaching languages: English

Teaching staff

Coordinator: Royo Vallés, M. Dolores

Others: Royo Vallés, M. Dolores

Opening hours

Timetable: You can arrange an appointment by sending an email to dolors.royo@upc.edu
Office: 014 office, EETAC Building

Prior skills

Solid computer programming skills

Degree competences to which the subject contributes

Basic:

CB6. (ENG) CB6 - Poseer y comprender conocimientos que aporten una base u oportunidad de ser originales en el desarrollo y/o aplicación de ideas, a menudo en un contexto de investigación.

CB9. (ENG) CB9 - Que los estudiantes sepan comunicar sus conclusiones y los conocimientos y razones últimas que las sustentan a públicos especializados y no especializados de un modo claro y sin ambigüedades.

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.

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.

Last update: 27-05-2019

300267 - ARASM - Augmented Reality & Smart Objects

3. To program Applications for mobile platforms that include information of intelligent objects.

Study load

Total learning time: 75h	Hours large group:	0h	0.00%
	Hours medium group:	0h	0.00%
	Hours small group:	27h	36.00%
	Guided activities:	0h	0.00%
	Self study:	48h	64.00%

Last update: 27-05-2019

300267 - ARASM - Augmented Reality & Smart Objects

Content

Introduction

Learning time: 2h

Laboratory classes: 2h

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

Unity 3D framework

Learning time: 6h

Practical classes: 2h 30m
Self study : 3h 30m

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)

Augmented Reality

Learning time: 40h 20m

Laboratory classes: 13h 30m
Self study : 26h 50m

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.

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

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

Last update: 27-05-2019

300267 - ARASM - Augmented Reality & Smart Objects

Smart Objects	Learning time: 26h 40m Laboratory classes: 9h Self study : 17h 40m

Description:
This part of the course, through small guided projects, will teach how to desing 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).

Related activities:
Activities:
1. Introduction to Smart Objects
2. Server side. Build a Arduino smart object based on CoAp protocol.
3. Client side. How to access to the smart object through an Android app

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 buil prototype applications to get smart object's sensor values

Qualification 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

Bibliography

Basic:

R. Azuma ; Y. Baillot ; R. Behringer ; S. Feiner ; S. Julier ; B. MacIntyre. "Recent Advances in Augmented Reality". IEEE computer graphics and applications. New York: IEEE, 1981.

Tomás Sánchez López, Damith C. Ranasinghe, Mark Harrison, Duncan McFarlane. "Using Smart Objects to build the Internet Of things". IEEE internet computing. New York: IEEE Computer Society, 1997-.

Complementary:

Dimitris Chatzopoulos ; Carlos Bermejo ; Zhanpeng Huang ; Pan Hui. "Mobile Augmented Reality Survey: From Where We Are to Where We Go". IEEE Access [on line]. https://ieeexplore.ieee.org/document/7912316/ [Consultation: 06/06/2018]. Available on: <http://www.cse.ust.hk/ panhui/papers/FINAL-Article.pdf>.

Thad Starner , Steve Mann , Bradley Rhodes , Jeffrey Levine ,. "Augmen ted Reality Through Wearable Computing". Presence: Teleoperators and Virtual Environments [on line]. [Consultation: 06/06/2018]. Available on: <https://www.cc.gatech.edu/fac/Thad.Starner/p/journal/augmented-reality-through-wearable-computing.pdf>.