Last update: 22-07-2019

220144 - Uav Sensors & Applications

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering

Teaching unit: 220 - ETSEIAT - Terrassa School of Industrial and Aeronautical Engineering

Academic year: 2019

Degree: BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Optional)
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Teaching unit Optional)

ECTS credits: 3 Teaching languages: English

Teaching staff

Coordinator: Manel Soria

Prior skills

Previous concepts include basic electronics, programming skills and familiarity with the use of computing tools for engineering, acquired in previous subjects of the degree.

Teaching methodology

Classroom lectures combined with assignments to be solved during the class with the help of the professor

Learning objectives of the subject

To understand how different types of imaging sensors operate (RGB cameras, multispectral cameras, hyperspectral cameras) and how they can be used to gather useful information about the environment.

To obtain a panoramic of the current applications of UAVs for civilian applications.

To acquiere a hands-on experience reading and post-process UAV data.

Study load

Total learning time: 75h	Hours large group:	30h	40.00%
	Self study:	45h	60.00%

Last update: 22-07-2019

220144 - Uav Sensors & Applications

Content

Module 1: Introduction to imaging sensors

Learning time: 25h
Theory classes: 10h
Self study : 15h

Description:
The fundamentals of image sensors will be described. The sensors to be described include monochrome cameras, color (RGB) cameras, multispectral cameras, hyperspectral cameras and thermal imaging cameras.

Specific objectives:
Understand current image sensors, their main properties and their applications in UAV systems.

Module 2: Introduction to image processing for UAV applications

Learning time: 25h
Theory classes: 10h
Self study : 15h

Description:
Digital representation of images. Data types used for image representation. Loosely compressed and non-compressed image formats. Monochrome and color images. Contrast enhancement algorithms. RGB and HSV images. Processing of multispectral and hyperspectral images. Binary images. Morphological image processing. Image segmentation. Image registration. Application examples.

Module 3: Guided project

Learning time: 25h
Theory classes: 10h
Self study : 15h

Description:
The students will select the subject of their project in agreement with the professor. It will be based on a UAV imaging system (including spacecraft images). The students creativity in the selection of a project will be encouraged.

Some examples of possible bibliographic works are:
-Processing of spacecraft RAW images.
-Band-pass filters for multispectral imaging systems

Some examples of possible practical projects are:
-Characterization of a micro UAV camera
-Segmentation of planetary images
-Tracking of objects in a video

The students will work in groups. Each group will submit a report of the project, as well as a video presentation of their work.

Last update: 22-07-2019

220144 - Uav Sensors & Applications

Qualification system

First Assignment: 30%
Second Assignment: 30%
Project: 40%

Bibliography