CAPTEURS ET TRAITEMENT D'IMAGES

INTRODUCTION TO IMAGE SENSING AND PROCESSING

Lecturers: **Mohsen ARDABILIAN, David NAVARRO**

| Lecturers : 16.0 | TC : 0.0 | PW : 0.0 | Autonomy : 8.0 | Study : 8.0 | Project : 0.0 | Language : MI

Objectives

This course aims to introduce concepts and basic techniques on the acquisition of images, the structure of conventional sensors and image processing. It covers the foundations and addresses the principles of image formation, image processing, feature extraction and segmentation of images, and motion tracking. The course will cover concepts such as sensor structure (CCD / CMOS), image structure, spatial and frequency analysis of images, image descriptors (shape, contour, etc.), segmentation (point, contours, lines, etc.) and motion tracking. There are many applications, such as medicine, quality control, artificial vision, satellite imagery, etc.

Keywords : image formation, spatial and frequency filtering of images, contour detection, segmentation of images (point, line, etc.), image descriptors (shape, contour, etc.), image segmentation, motion tracking

Programme	• Imaging (cameras, radiometry, colors)
	• Phototransduction, sensor structure
	• Image structure, quantification, noise
	• Spatial analysis (manipulation of the histogram, the gradient and the Laplacian)
	• Frequency analysis
	• Morphology
	• The segmentation of images (detection of points, contour)
	• Representation and description (form, texture, signature, etc.)
	• Motion analysis and tracking (Kalman filter)

Learning outcomes	• At the end of this UE the student must be able to understand the process of the formation of digital images
	• He will also be able to make use of fundamental techniques for improving and processing digital images

Independent study	Objectifs :	The aim is to deepen and put into practice the concepts and techniques covered in the course.
	Méhodes :	lab work of exercices and resolution of concrete problems using Matlab

Core texts	Rafael C.Gonzalez, Richard E.Woods, *DIGITAL IMAGE PROCESSING*, Pearson Prentice Hall, 2008
	Richard Szeliski *COMPUTER VISION: ALGORITHMS AND APPLICATIONS*, Springer, 2010
	Dav id A. Forsyth, Jean Ponce*COMPUTER VISION : A MODERN APPROACH*, Prentice Hall, 2007

Assessment	Final mark = 30% knowledge + 70% know how
	mark on knowledge = 100% written test
	mark on know how = 50% lab work 1 + 50% lab work 2