



## CAPTEURS ET TRAITEMENT D'IMAGES

### INTRODUCTION TO IMAGE SENSING AND PROCESSING

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| 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.

**Méthodes :** 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  
David 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