

<b>COURSE</b>	Name : Computer Vision
	Code : EE185557
	Credit(s) : 2
	Semester : (Elective Course)

### Description of Course

Computer vision learns techniques like how a machine can interact with the outside world through visual perception using images obtained from a camera. To achieve this, the course studies image formation, camera models, light and color, features, corner point detection, blob detection, descriptor. The course also covers visual geometry, stereo vision, multi-view stereo and visual tracking and optical flow.

### Learning Outcomes

#### Knowledge

(P01) Mastering the concepts and principles of science in a comprehensive manner, and to develop procedures and strategies needed for the analysis and design of systems related to the field of power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics as a preparation for further education or professional career.

#### Specific Skill

(KK01) Being able to formulate engineering problems with new ideas for the development of technology in power systems, control systems, multimedia telecommunications, electronics, intelligent multimedia network, or telematics.

#### General Skill

(KU11) Being able to implement information and communication technology in the context of execution of his/her work.

#### Attitude

(S09) Demonstrating attitude of responsibility on work in his/her field of expertise independently.  
(S12) Working together to be able to make the most of his/her potential.

### Course Learning Outcomes

#### Knowledge

Mastering the concept of the formation of a pinhole camera-based image model.

#### Specific Skill

Able to analyze the relationship between the image coordinate system, the camera and the world coordinate system.

#### General Skill

Able to use software related to computer vision for 3-dimensional feature extraction and visualization obtained from multiview imagery.

#### Attitude

Demonstrating attitude of being responsible for the work in his area of expertise independently.  
Working together to be able to make the most of their potential.

### Main Subjects

1. Transformation of geometry, homogeneous coordinate systems, duality of points and lines.
2. Corner point feature, two image correspondence.
3. Find two image homography using the direct linear transform (DLT) method
4. Pinhole camera models, intrinsic parameters and extrinsic parameters
5. Calibration of intrinsic and extrinsic parameters.
6. Epipolar geometrid and fundamental matrix.
7. Triangulation and 3D reconstruction.

### Reference(s)

- [1] Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision Second Edition, Cambridge University Press, March 2004.
- [2] Richard Szeliski, Computer Vision: Algorithms and Applications, 2010
- [3] Forsyth and Ponce, Computer Vision, A Modern Approach, 2nd ed., 2011
- [4] Trucco and Verri, Introductory Techniques for 3D Computer Vision, Prentice Hall, 1998

### Prerequisite(s)

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