EC409: Computer Vision

Details of course:-

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Computer Vision	3	1	0	NIL

Course Objective**:**To introduce fundamentals of Computer Vision and algorithms for image & video processing, object detection, feature extraction, and recognition, motion understanding.

Course Outcomes:

CO1: Analyse and design a range of algorithms for image processing and computer vision.

CO2: Demonstrate fundamentals of image and video Processing techniques.

CO3: Explore Image representation approaches for efficient image processing.

CO4: To introduce fundamentals of object recognition techniques.

CO5: Demonstrate Object motion and tracking algorithms for computer vision applications

CO6: Develop efficient computer vision-based solutions for real world problems.

S. No.	Content	Contact Hours
Unit 1	Introduction to Computer Vision: role of AI and image processing in CV, industrial Machine Vision Applications, Visual Sensors, camera Calibrations	6
Unit 2	Basics of Image Processing-pixel representation, histogram, transforms. Colour filters, noise removal. Basics of Video Processing- Background subtraction techniques- frame differencing, GMM, object localisation and processing- contours, edges, lines, skeletons	10
Unit 3	Image Representation: Local Wavelet Basis (multi-scale), global Fourier basis (frequency), adaptive basis (PCA and ICA), Basics of object detection- template matching and cascade classifiers.	8
Unit 4	Object Recognition: Object modelling, Bayesian classification, feature selection and boosting, scene and object discrimination.	8
Unit 5	Motion and Tracking: Motion detection and tracking of point features, optical flow, SURF, SIFT. Tracking- Kalman filter, particle filter	10
	Total	**42**

Books:-

S. No	Name of Books/Authors/Publisher
1	Computer Vision: A Modern Approach (2nd Edition) 2nd Edition by David A. Forsyth (Author), Jean Ponce (Author)
2	Computer Vision and Image Processing by Bhuyan, CRC Press
3	Computer Vision: Models, Learning, and Inference - Simon J. D. Prince 2012
4	Computer Vision: Theory and Application-Rick Szeliski 2010