

Course Code	18CSE390T	Course Name	COMPUTER VISION	Course Category	E	Professional Elective	L	T	P	C
							3	0	0	3

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning	Program Learning Outcomes (PLO)
CLR-1:	Recognize and describe both the theoretical and practical aspects of computing with images. Connect issues from Computer Vision to Human Vision	1 2 3	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
CLR-2:	Describe the foundation of image formation and image analysis. Understand the basics of 2D and 3D Computer Vision.		
CLR-3:	Become familiar with the major technical approaches involved in computer vision. Describe various methods used for registration, alignment, and matching in images.		
CLR-4:	Get an exposure to advanced concepts leading to object and scene categorization from images.		
CLR-5:	Build computer vision applications.		
CLR-5:	Recognize and describe both the theoretical and practical aspects of computing with images. Connect issues from Computer Vision to Human Vision		

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:		
CLO-1:	Provide an introduction to computer vision including fundamentals of image formation	3 80 75	
CLO-2:	Provide a clear view of image formation	3 85 75	
CLO-3:	Provide a clear view of image processing	3 80 75	
CLO-4:	Provide knowledge about Computational photography	3 85 80	
CLO-5:	Provide knowledge about Image rendering	3 80 75	

Duration (hour)	9	9	9	9
S-1	SLO-1 Introduction to Computer Vision	Points and patches-An Introduction	Active contours	Triangulation
	SLO-2 Image formation	Feature detectors	Snakes	Two-frame structure from motion
S-2	SLO-1 Geometric primitives	Feature descriptors	Dynamic snakes and CONDENSATION	Projective reconstruction
	SLO-2 2D,3D Transformations			Self-calibration
S-3	SLO-1 3D to 2D Projection	Feature matching	Scissors	Perspective and projective factorization
	SLO-2 Lighting, Reflectance and shading		Level Sets	Bundle adjustment
S-4	SLO-1 Sampling and aliasing	Feature tracking	Split and merge	Exploiting sparsity
	SLO-2 Image processing Point operators			Cylindrical and spherical coordinates
S-5	SLO-1 Pixel transforms	Edge detection	Mean shift and mode finding	Constrained structure and motion
	SLO-2 Color transforms			Bundle adjustment
S-6	SLO-1 Histogram equalization	Edge linking	Normalized cuts	Hierarchical motion estimation
	SLO-2			Parallax removal
S-7	SLO-1 Linear filtering	Successive approximation	Graph cuts and energy-based methods	Fourier-based alignment
	SLO-2 Non Linear filtering	Hough transforms		Recognizing panoramas
S-8	SLO-1 Fourier transforms	Hough transforms	2D and 3D feature-based alignment	Incremental refinement
				Compositing
S-9	SLO-1 Two-dimensional Fourier transforms, Wiener filtering	Vanishing points	Pose estimation	Case Study
				Case Study

Learning Resources	1. RichardSzeliski,"Computer Vision:Algorithms and Applications",Springer,2010. 2. Forsyth/Ponce, "ComputerVision:AModernApproach",PearsonEducationIndia,2edition(2015)	3. S.Nagabhushana,"ComputerVisionandImageProcessing",NewAgeInternationalPvtLtd;First edition(2005) 4. Rafael C. GonzaleZ,"Digital Image Processing",Pearson Education; Fourth edition (2018)
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Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (15%)		CLA – 3 (15%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	40 %	-	30 %	-	30 %	-	30 %	-	30%	-
	Understand										
Level 2	Apply	40 %	-	40 %	-	40 %	-	40 %	-	40%	-
	Analyze										
Level 3	Evaluate	20 %	-	30 %	-	30 %	-	30 %	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers	Experts from Higher Technical Institutions	Internal Experts
Experts from Industry	Dr. A.P.Shanthi , CEG Campus Anna University	1.Dr.V.Ganapathy,SRMIST
		2.T.Senthil Kumar,SRMIST