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RO6601 VISION SYSTEMS AND IMAGE PROCESSING

DETAILED SYLLABUS

UNIT I VISION SYSTEM

Basic Components – Elements of visual perception, Lenses: Pinhole cameras, Gaussian Optics – Cameras – Camera-Computer interfaces

UNIT II VISION ALGORITHMS

Fundamental Data Structures: Images, Regions, Sub-pixel Precise Contours – Image Enhancement: Gray value transformations, image smoothing, Fourier Transform – Geometric Transformation - Image segmentation – Segmentation of contours, lines, circles and ellipses – Camera calibration – Stereo Reconstruction.

UNIT III OBJECT RECOGNITION

Object recognition, Approaches to Object Recognition, Recognition by combination of views – objects with sharp edges, using two views only, using a single view, use of dept values.

UNIT IV APPLICATIONS

Transforming sensor reading, Mapping Sonar Data, aligning laser scan measurements - Vision and Tracking: Following the road, Iconic image processing, Multiscale image processing, Video Tracking - Learning landmarks: Landmark spatiograms, K-means Clustering, EM Clustering.

UNIT V ROBOT VISION

Basic introduction to Robotic operating System (ROS) - Real and Simulated Robots - Introduction to OpenCV, Open NI and PCL, installing and testing ROS camera Drivers, ROS to OpenCV – The cv_bridge Package.

TEXT BOOKS

1. Carsten Steger, Markus Ulrich, Christian Wiedemann, “Machine Vision Algorithms and Applications”, WILEY-VCH, Weinheim,2008.

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2. Damian m Lyons, "Cluster Computing for Robotics and Computer Vision", World Scientific, Singapore, 2011.

REFERENCES

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", Addison – Wesley Publishing Company, New Delhi, 2007.

2. Shimon Ullman, "High-Level Vision: Object recognition and Visual Cognition", A Bradford Book, USA, 2000.

3. R. Patrick Goebel, "ROS by Example: A Do-It-Yourself Guide to Robot Operating System – Volume I", A Pi Robot Production, 2012.

OBJECTIVES

To know about the principles and applications of vision system in modern manufacturing environment.