

## **RO8602 MACHINE VISION SYSTEMS**

### **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.
2. Damian m Lyons,“Cluster Computing for Robotics and Computer Vision”, World Scientific, Singapore, 2011.

For Notes, Syllabus, Question Papers and many More

**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

- To learn about the algorithms in vision
- To know about the recognition of object
- To be familiar about the applications regarding vision
- To know about the components used for vision