

## **RO8701 FIELD AND SERVICE ROBOTICS**

### DETAILED SYLLABUS

#### **OBJECTIVES:**

- To study the various parts of robots and fields of robotics.
- To study the various kinematics and inverse kinematics of robots.
- To study about the localization, planning and navigation.
- To study the control of robots for some specific applications.
- To study about the humanoid robots.

#### **UNIT I INTRODUCTION**

History of service robotics – Present status and future trends – Need for service robots - applications- examples and Specifications of service and field Robots. Non-conventional Industrial robots.

#### **UNIT II LOCALIZATION**

Introduction-Challenges of Localization- Map Representation- Probabilistic Map based Localization- Monte carlo localization- Landmark based navigation-Globally unique localization- Positioning beacon systems- Route based localization.

#### **UNIT III PLANNING AND NAVIGATION**

Introduction-Path planning overview- Road map path planning- Cell decomposition path planning-Potential field path planning-Obstacle avoidance - Case studies: tiered robot architectures.

#### **UNIT IV FIELD ROBOTS**

Ariel robots- Collision Avoidance-Robots for agriculture, mining, exploration, underwater, civilian and military applications, nuclear applications, Space applications.

#### **UNIT V HUMANOIDS**

Wheeled and legged, Legged locomotion and balance, Arm movement, Gaze and auditory orientation control, Facial expression, Hands and manipulation, Sound and speech generation, Motion capture/Learning from demonstration, Human activity recognition using vision, touch, sound, Vision, Tactile Sensing, Models of emotion and motivation. Performance, Interaction, Safety and robustness, Applications, Case studies.

#### **TEXT BOOKS:**

1. Roland Siegwart, Illah Reza Nourbakhsh, Davide Scaramuzza, „Introduction to Autonomous Mobile Robots”, Bradford Company Scituate, USA, 2004
2. Riadh Siaer, „The future of Humanoid Robots- Research and applications”, Intech Publications, 2012.

**REFERENCES:**

1. Richard D Klaffer, Thomas A Chmielewski, Michael Negin, "Robotics Engineering – An Integrated Approach", Eastern Economy Edition, Prentice Hall of India P Ltd., 2006.
2. Kelly, Alonzo; Iagnemma, Karl; Howard, Andrew, "Field and Service Robotics ", Springer, 2011