SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (SITAMS)

(UGC - AUTONOMOUS INSTITUTION)

(Approved by AICTE, New Delhi & Affiliated to JNTUA, Ananthapuramu)

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Department of CSE (Artificial Intelligence)

One Day Seminar Report on "Modern Mobile Robotic Systems"

A seminar on *Modern Mobile Robotic Systems* was conducted on **24 September 2025** from **10.00 AM to 1.00 PM** for the **II year CSE (AI)** students. The session was organized under the guidance of **Principal: Dr. N. Venkatachalam**, **HOD: Prof. M. E. Palanivel**, **Coordinator: Dr. Munipraveena Rela**, and **Co-coordinator: Mr. V. Ajay**. The resource person for the seminar was **Dr. Thiyagarajan R**, Assistant Professor, IIT Tirupati, who holds a Ph.D. from **Indian Institute of Technology Madras (IIT-M)**. His expertise spans *Robotics and Automation, Dynamics and Control of Field and Service Robots, Mechatronics,* and *Additive Manufacturing*.

The seminar aimed to provide students with comprehensive insights into the fundamentals and advancements in mobile robotics. Dr. Thiyagarajan began by introducing the concept of **mobile robots and mobile manipulators**, highlighting the significance of mobility in modern autonomous systems. He elaborated on the **principles of locomotion**, discussing various types such as wheeled, legged, aerial, underwater, and surface-level robots. Students gained an understanding of how different locomotion techniques influence robot stability, maneuverability, and application suitability.

A major portion of the session focused on **sensor systems** used in mobile robot navigation. The speaker explained the working principles and applications of magnetic and optical sensors, gyroscopes, accelerometers, magnetic compasses, inclinometers, tactile and proximity sensors, ultrasound rangefinders, laser scanners, infrared systems, and vision-based sensing mechanisms. He emphasized how proper sensor integration enables accurate **state estimation, localization, and navigation**.

Further, Dr. Thiyagarajan introduced students to emerging trends in mobile robotics, including **swarm robots, cooperative and collaborative robot systems, mobile manipulators**, and fully **autonomous mobile robots**. Real-world examples and demonstration videos helped students visualize how these systems operate in industrial, service, and research environments.

The seminar successfully met its intended course outcomes. Students learned algorithmic and mathematical approaches relevant to mobile robotic control, gained exposure to modern navigation sensors, understood different motion-planning techniques, and recognized the mechanical and electrical aspects involved in robot locomotion. The session stimulated student interest in robotics research and encouraged them to explore innovative solutions in autonomous systems.

Overall, the seminar was insightful, interactive, and highly beneficial for students aspiring to build careers in robotics, AI, and advanced automation technologies

Course Outcome:
Upon completion of the course, the students should able to:
• Learn algorithmic approaches, mathematical models and computational and motion control methods applicable to mobile robotic systems
• Learn basic sensor systems related to state measurements, navigation and localization.
• Learn different motion planning and navigation schemes related to mobile robots
• Recognize and analyze the basic mechanical and electrical systems concerning robots' locomotion and manipulation
• Analyze and design the basic mobile robotic systems

Topics Covered:
Introduction to mobile robots and mobile manipulators. Principle of locomotion and types of locomotion. Types of mobile robots: ground robots (wheeled and legged robots), aerial robots, underwater robots and water surface robots.
Sensors for mobile robot navigation: magnetic and optical position sensor, gyroscope, accelerometer, magnetic compass, inclinometer, tactile and proximity sensors, ultrasound rangefinder, laser scanner, infrared rangefinder, visual and motion sensing systems.
Introduction to modern mobile robots: Swarm robots, cooperative and collaborative robots, mobile manipulators, autonomous mobile robots.

Resource Person:
Dr. Thiyagarajan R
Assistant Professor
Ph.D - Indian Institute of Technology Madras (IIT-M), Chennai, India
Areas of Interest : Robotics and automation, Dynamics and control of field and service robots, Mechatronics,Additive manufacturing
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Date of Seminar: 24.09.2025 10.00AM-1.00PM
Principal: Dr. N. Venkatachalapathi
HOD: Prof. M.E. Palanivel
Coordinator: Dr. Munipraveena Rela
Co-coordinator: Mr. V. Ajay
Target Audience: II year CSE(AI) students.