

Introduction to Robotics and Internet of Things (IoT)

(40 hours)

Course Description

The Introduction to Robotics and IoT course provides an engaging and comprehensive overview of the exciting fields of Robotics and the Internet of Things (IoT). Participants will explore the fundamental principles and applications of robotics, learn about IoT technology, and discover how these two domains intersect to create intelligent and autonomous systems. Through hands-on activities and real-world projects, participants will gain practical experience in designing, building, and programming robots and IoT devices, enabling them to unleash their creativity in the world of emerging technologies.

Audience

This course is designed for individuals who are interested in exploring the world of Robotics and IoT. It is suitable for:

- Students seeking to expand their knowledge in emerging technologies
- Engineers and professionals interested in robotics and IoT applications
- Hobbyists and enthusiasts looking to build and program robots and IoT devices
- Anyone curious about the potential of Robotics and IoT and their impact on various industries

Pre-requisite Knowledge/Skills

To fully benefit from this course, participants should have the following prerequisites and skills:

- Basic knowledge of programming in any language (e.g., Python, Java, C++)
- Familiarity with electronics and basic circuitry concepts

Hardware Requirement

Arduino Uno, Robotic Gripper, L298 Motor Driver, MG995 Servo motor x 6, 12v DC gear motor x 2, DC to DC buck converter, hc-05 Bluetooth module, Battery 7.4v to 12v, Power on off switch

Course Objectives

The primary objective of this course is to provide participants with a solid foundation in Robotics and IoT. By the end of the course, participants will be able to:

- Understand the principles and applications of robotics in various fields

- Comprehend the fundamentals of IoT technology and its role in connecting devices
- Design, build, and program robots and IoT devices
- Implement real-world projects to apply Robotics and IoT concepts
- Consider ethical considerations and societal impacts related to emerging technologies
- Explore opportunities and challenges in the integration of Robotics and IoT

Course Outline

The course comprises 40-hours of theory and labs.

Module 1: Introduction to Robotics

- What is Robotics?
- Evolution of Robotics: Past, Present, and Future
- Key Components of a Robot
- Types of Robots and Their Applications
- Robot Sensing and Perception

Module 2: Robot Programming Fundamentals

- Basics of Robot Programming
- Programming Paradigms: Procedural, Object-Oriented, and Event-Driven
- Introduction to Robot Operating Systems (ROS)
- Hands-on: Simple Robot Programming Exercise

Module 3: Robot Mechanics and Kinematics

- Understanding Robot Anatomy and Mechanical Design
- Robot Kinematics: Forward and Inverse Kinematics
- Robot Motion Planning and Control

Module 4: Sensors and Actuators for Robotics

- Types of Sensors Used in Robotics (Proximity, Ultrasonic, Infrared, etc.)
- Actuators for Robot Movement (Motors, Servos)
- Interfacing Sensors and Actuators with Microcontrollers

Module 5: Introduction to IoT

- Understanding the Internet of Things (IoT)
- IoT Architecture and Ecosystem
- IoT Connectivity Protocols: Wi-Fi, Bluetooth, Zigbee, etc.

- IoT Sensors and Actuators
- Real-world IoT Use Cases

Module 6: Building IoT Systems

- IoT Device Management and Security
- Cloud Computing and IoT Data Analytics
- Integrating IoT with Web and Mobile Applications
- Hands-on: Creating a Basic IoT System

Module 7: Robotics and IoT Integration

- Role of Robotics in IoT
- Smart Robotics and Intelligent Automation
- IoT-enabled Robotics Applications
- Challenges and Opportunities in Robotics and IoT Integration
- Future Trends in Robotics and IoT

Module 8: Ethical and Social Considerations

- Ethical Issues in Robotics and IoT
- Privacy and Security Concerns
- Impact on Society and the Environment
- Responsible Design and Development