



Robotics & IoT

Course Modules & Topics

□ Module 1: Introduction to Robotics & IoT

- What is Robotics? What is IoT?
 - Difference between Embedded Systems, Robotics, and IoT
 - Applications in Industry, Healthcare, Agriculture, Smart Cities
 - Introduction to Microcontrollers and Sensors
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Module 2: Electronics & Hardware Basics

- Basic Electronics: Voltage, Current, Resistance
 - Breadboarding, Soldering, Circuit Diagrams
 - Digital vs Analog Signals
 - Power Supply and Batteries
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Module 3: Microcontrollers – Arduino & Raspberry Pi

- Setting up Arduino IDE
 - Arduino Pin Configuration and Programming
 - Introduction to Raspberry Pi and Raspbian OS
 - GPIO Programming Basics
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Module 4: Sensors & Actuators

- IR Sensor, Ultrasonic Sensor, Temperature Sensor (DHT11/22)
 - Light Sensor (LDR), Gas Sensor (MQ-series)
 - Servo Motor, DC Motor, Stepper Motor
 - Motor Drivers (L293D, L298N)
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Module 5: IoT Communication Protocols

- Wired vs Wireless Communication
 - Wi-Fi, Bluetooth, Zigbee, LoRa, GSM
 - MQTT, HTTP, WebSockets
 - NodeMCU/ESP32 for Wi-Fi-enabled IoT Projects
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Module 6: Cloud Integration & Data Visualization

- Sending Sensor Data to Cloud (ThingSpeak, Blynk, Firebase, Google Sheets)
 - Building IoT Dashboards
 - Real-Time Monitoring
 - Trigger-based Automation
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Module 7: Robot Design & Control

- Basic Robot Types: Line Follower, Obstacle Avoider, Bluetooth Robot
 - Chassis Assembly and Wiring
 - Logic Design and Control Algorithms
 - Manual and Autonomous Modes
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📁 Module 8: Advanced Robotics Concepts

- Path Planning Algorithms (Intro)
 - Object Detection using Sensors
 - Intro to Computer Vision (OpenCV)
 - Edge AI in Robotics
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📱 Module 9: Mobile & Web App Control

- Bluetooth App Development with MIT App Inventor
 - Controlling Robots via Smartphone
 - IoT Dashboards for Control
 - Voice-Controlled Robot (Google Assistant)
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📁 Module 10: Capstone Projects

- Smart Home Automation
- IoT Weather Monitoring System
- Surveillance Robot with Live Camera Feed
- Line Follower or Maze Solver Robot
- Cloud-Connected IoT Device