

## IoT, Robotics & Automation Training Program with Live projects

### Month 1: Foundations of IoT & Robotics

#### Week 1-2: Introduction to IoT

- Basics of IoT (Architecture, Components, Protocols: MQTT, HTTP, CoAP)
- Sensors & Actuators (Types, Interfacing with Arduino/Raspberry Pi)
- Embedded Systems for IoT (Microcontrollers vs. Microprocessors)
- Hands-on: Sensor data collection & cloud upload (ThingSpeak, Blynk)

#### Week 3-4: Robotics Fundamentals

- Introduction to Robotics (Types, Applications)
- Robot Kinematics & Dynamics (Basic Concepts)
- Motor Control (DC, Servo, Stepper Motors) & Driver Circuits (L293D, L298N)
- Hands-on: Building a simple wheeled robot (Obstacle avoidance)

#### Live Project 1: Smart Weather Station (IoT)

- Build a weather station with DHT11, BMP180 sensors.
  - Transmit data to cloud (ThingSpeak) via Wi-Fi/ESP8266.
  - Visualize data on a dashboard.
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### Month 2: Automation & Advanced IoT

#### Week 5-6: Industrial Automation

- PLC Basics (Ladder Logic, Siemens/Allen Bradley)
- SCADA Systems & HMI Design
- Pneumatics & Hydraulics in Automation
- Hands-on: PLC simulation (LogixPro, TIA Portal)

#### Week 7-8: Advanced IoT & Wireless Protocols

- IoT Communication Protocols (LoRa, Zigbee, NB-IoT)
- Edge Computing vs. Cloud Computing
- IoT Security Challenges & Solutions
- Hands-on: MQTT Broker setup (Mosquitto) for device communication

### Live Project 2: Home Automation System (IoT + Robotics)

- Control appliances via NodeMCU + Relay module.
  - Voice control using Google Assistant/Alexa (IFTTT).
  - Integrate a robotic arm (servo motors) for physical switches.
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## Month 3: Robotics & Integration

### Week 9-10: Autonomous Robotics

- Introduction to ROS (Robot Operating System)
- SLAM (Simultaneous Localization & Mapping)
- Computer Vision for Robotics (OpenCV, Object Detection)
- Hands-on: Autonomous robot navigation (Raspberry Pi + Ultrasonic sensors)

### Week 11-12: AI in IoT & Robotics

- Machine Learning for Predictive Maintenance
- AI-driven Robotics (Path Planning, Reinforcement Learning)
- Hands-on: Train a model for anomaly detection in sensor data.

### Live Project 3: Smart Warehouse Robot (IoT + Robotics)

- AGV (Automated Guided Vehicle) with RFID/QR code navigation.
  - IoT integration for inventory tracking (Cloud database).
  - Real-time monitoring via a web dashboard.
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Additional Components:

- Tools Used: Arduino, Raspberry Pi, ESP8266/ESP32, PLC Simulators, ROS, Python/C++.
- Assessment: Weekly quizzes, project presentations, hackathons.
- Certification: Upon completion of all 3 projects.