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THE LEADING TRAINING PROVIDER

Digital Transformation and Innovation

Internet Of things (IOT) – Manufacturing

Course Introduction

The Internet of Things (IoT) is revolutionizing the manufacturing industry by enabling smart devices and machines to collect, share, and act on data in real-time.

Through this program, participants will gain an in-depth understanding of how IoT technologies are transforming manufacturing operations, enhancing productivity, and optimizing processes.

Target Audience

1. IoT Engineer
2. Manufacturing Engineer
3. Industrial Automation Specialist
4. Smart Factory Manager
5. Embedded Systems Engineer
6. Data Analyst
7. Supply Chain Manager
8. IT/OT Integration Specialist
9. Cybersecurity Specialist
10. Maintenance Engineer

Learning Objectives

- Define IoT and its role in manufacturing.
- Identify key IoT technologies and components, including sensors, actuators, cloud services, and communication protocols.
- Understand how IoT drives smart manufacturing and Industry 4.0.
- Gain hands-on experience with various types of IoT sensors, such as touch sensors, temperature sensors, pressure sensors, and motion sensors.
- Understand the concept of sensor fusion and its applications in IoT systems.
- Configure and collect data from IoT sensors to monitor manufacturing processes.
- Understand the role of embedded systems, robots, drones, wearables, and machine vision in IoT-enabled manufacturing.
- Apply IoT-enabled devices for real-time process monitoring, inspection, and automation.
- Explore the role of Edge Computing vs Cloud Computing in IoT.
- Learn how IoT devices communicate via LAN, WAN, and other networking protocols.
- Understand key network architectures such as smart gateways, edge/fog computing, and how to secure IoT networks.
- Apply security protocols to ensure the safety and privacy of IoT deployments in manufacturing.

- Understand the different cloud deployment models (public, private, hybrid) and how they relate to IoT.
- Use IoT platforms (e.g., Microsoft Azure, IBM Watson IoT) for device management, data analytics, and application development.
- Understand Big Data analytics in IoT and its role in predictive maintenance and real-time decision-making.
- Use real-time data to implement predictive maintenance systems and minimize downtime in manufacturing operations.
- Understand the use of RFID, GPS, and asset tracking for real-time monitoring in the manufacturing floor.
- Explore the integration of IoT with ERP and MES systems for a seamless flow of data across business operations.
- Gain insights into the future of IoT in manufacturing, including AI, machine learning, 5G, and autonomous systems.
- Stay ahead of emerging trends like autonomous robots and smart factories powered by IoT.

Course Outline

- **Day 01**

  Introduction to IoT in Manufacturing

  What is IoT?

  History and evolution of IoT technologies.

IoT’s role in the manufacturing industry (Smart Manufacturing, Industry 4.0).

Key drivers of IoT in manufacturing: Efficiency, Automation, Predictive Maintenance, Real-Time Monitoring.

Basic IoT Concepts and Technologies:

Sensors and actuators in IoT.

Data collection and real-time analytics.

Communication protocols (MQTT, HTTP, CoAP).

Role of cloud computing in IoT systems.

Case Studies.

IoT System Architecture and Building Blocks:

Primary Building Blocks of IoT

Things: Devices, sensors, and actuators.

Connectivity: Types of connections (Wi-Fi, Bluetooth, Zigbee, LPWAN, etc.).

The Cloud: Data storage, processing, and analysis.

Sensor Technologies in IoT:

Sensor Fusion.

Types of Sensors in Manufacturing.

Interactive Activity: Explore IoT sensor kits and configure basic sensors for data collection.

- **Day 02**

  Advanced Sensor Technologies

  Resistive Touch Sensors: Function and applications.

  Capacitive Touch Sensors: Advantages and use cases.

  Surface Acoustic Wave (SAW) Sensors: How they work and where they are used.

  Proximity, temperature, and vibration sensors.

  Pressure sensors for process control.

  Motion sensors and their role in robotics and automation.

  Interactive Activity: Hands-on activity: Configuring a touch sensor in an IoT environment.

  IoT Devices and Intelligent Machines:

  Edge devices vs. cloud-based processing.

  Embedded systems and microcontrollers (e.g., Raspberry Pi, Arduino).

  Robots and Drones: Applications in manufacturing, inspection, and logistics.

  Wearables: How wearables enhance worker safety and productivity.

Biometrics: Role in access control and personalized experiences.

Computer and Machine Vision: Quality inspection, defect detection, and automation.

Applications of VR and AR in training, maintenance, and remote assistance.

Interactive Activity: Set up a simple machine vision system for product inspection.

- **Day 03**

Energy Harvesting and Sustainability in IoT

Overview of energy harvesting (e.g., solar, vibration, thermal).

Use of energy harvesting in IoT devices for low-power, autonomous operations.

How IoT enables energy efficiency and waste reduction in manufacturing.

Smart grid systems and energy management.

Interactive Activity: Demonstration of energy harvesting devices in an IoT setup.

Networking Technologies for IoT:

Local Area Network (LAN): How LAN supports IoT devices in manufacturing.

Wide Area Network (WAN): IoT in global manufacturing environments.

IoT Network Architecture: Smart gateways, edge and fog computing.

Smart gateways: Connecting IoT devices to the cloud.

Virtualization: Optimizing IoT device communication.

Edge and Fog computing: Benefits of decentralized processing.

Securing data communication in IoT.

Security protocols and encryption methods.

Practical application.

- **Day 04**

  Cloud Technologies for IoT:

  Versions of the Cloud: Public, private, hybrid clouds.

  On-Premises Data Centers: When and why they are used in IoT deployments.

  Virtual Chaining and vCPE (Virtual Customer Premises Equipment).

  Big Data Analytics in IoT: Collecting, processing, and analyzing large volumes of data.

  IoT service management platforms (e.g., AWS IoT, Microsoft Azure IoT).

Credentials management and authentication for IoT devices.

Security and threat intelligence in cloud-based IoT systems.

Practical Application.

IoT Platforms and Device Management:

Key IoT platforms: IBM Watson IoT, Microsoft Azure IoT, Google Cloud IoT.

Role of IoT platforms in device management, data analytics, and application development.

Provisioning, configuration, and monitoring of IoT devices.

Firmware updates and remote management of devices.

Integrating IoT applications with ERP and MES systems.

Developing custom IoT apps for specific manufacturing needs.

Practical Application.

- **Day 05**

Advanced Applications of IoT in Manufacturing:

How IoT enables predictive maintenance through real-time monitoring and data analysis.

Case study: Predictive maintenance in a manufacturing plant.

Using IoT for real-time location tracking of assets and inventory.

RFID and GPS-based tracking systems in manufacturing.

The role of IoT in achieving a smart factory: automation, machine learning, and process optimization.

Interactive Activity: Simulate a predictive maintenance system using real-time sensor data.

IoT Security, Privacy, and Future Trends:

Securing IoT devices and networks.

Privacy concerns and regulations (e.g., GDPR, CCPA).

Risk management strategies for IoT deployments.

The future of AI and machine learning in IoT systems.

Integration of 5G networks and IoT.

The rise of autonomous machines and robotics in manufacturing.

Interactive Activity: Design a security protocol for an IoT-enabled manufacturing system.

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
April 14, 2025	April 18, 2025	5 days	4250.00 $	UAE - Dubai
Sept. 22, 2025	Sept. 26, 2025	5 days	4950.00 $	Italy - Rome
Dec. 22, 2025	Dec. 26, 2025	5 days	4250.00 $	UAE - Dubai