



Project No.
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المكتب الهندسي لخدمات التكنولوجيا والبرمجيات

Engineering office for Technology and Software Services

Industrial IoT (IIoT): Applications in Industrial Automation



Course Code: 2037-MECH/NC

Category: Industrial Control & Programming

Duration: 5 Weeks (15 sessions, 2 hours each)

Main Branch: United building – E Shams –Front NBE
, El Siouf _Alexandria

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Introduction

The Industrial Internet of Things (IIoT) is revolutionizing how factories operate, enabling smart monitoring, predictive maintenance, and data-driven decisions. This course explores the full lifecycle of IIoT deployment—from sensors and protocols to cloud integration and smart applications.



Course Description

This hands-on course equips engineers and IT professionals with the skills to design and deploy IIoT systems. It covers device connectivity, cloud communication, real-time data analysis, and smart control applications using modern tools like **Node-RED**, **AWS IoT**, and **AI-based analytics**.



Objectives

By the end of this course, participants will:

- Understand the concept and components of IIoT
- Learn key industrial communication protocols (MQTT, CoAP, OPC UA)
- Connect smart sensors and PLCs to cloud platforms
- Collect and analyze industrial data for insights and optimization
- Build complete IIoT solutions for smart monitoring and control



What You Will Learn

- Basics of IIoT and its role in Industry 4.0
- Communication protocols: MQTT, CoAP, OPC UA
- Connecting sensors and PLCs to cloud platforms
- Building dashboards with Node-RED and AWS IoT

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المعهد الهندسي لخدمات التكنولوجيا والبرمجيات

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- Real-time data collection and analytics
- Applying AI/ML to detect patterns and predict failures
- Security and encryption in industrial networks
- Developing IIoT-based web/mobile monitoring apps
- Final project implementation and performance testing

Target Audience

-  Automation & Control Engineers
-  Electronics and Communication Engineers
-  Industrial IT Specialists

Materials Included

- Protocol cheat sheets and quick-start guides
- Node-RED and AWS IoT sample projects
- Real-time data simulation tools
- AI/ML templates for predictive analytics
- Access to all recordings and course documents

Requirements

- Basic programming knowledge (Python/JavaScript preferred)
- Familiarity with PLCs or embedded systems
- Laptop with internet access

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- Optional: AWS account, Node-RED, and VS Code

Instruction Time Frame

- **Duration:** 5 Weeks
- **Sessions:** 15 live sessions (2 hours each)
- **Frequency:** 3 sessions per week
- **Support:** Weekly technical Q&A and feedback sessions

Course Format

- Live sessions via Zoom/Teams with practical demos
- Project-based learning using real data and devices
- Weekly hands-on exercises (sensor-cloud connections, data analysis)
- Final project with group presentation
- Certificate of completion

Detailed Course Content

Week 1: Introduction to IIoT and Protocols

- IIoT overview and industrial relevance
- Key communication protocols: MQTT, CoAP, OPC UA
- Introduction to smart sensors
- Setting up development environments (Node-RED, AWS IoT)

Week 2: Device Connectivity and Security

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- Connecting PLCs and sensors to cloud
- Industrial network security principles
- Data encryption and protection
- Practical Task: Connect a sensor to the cloud platform



Week 3: Industrial Data Analytics

- Real-time data collection from edge devices
- AI and ML for industrial analytics
- Predictive maintenance using sensor data
- Exercise: Analyze production data with ML



Week 4: Cloud Integration and Smart Applications

- Cloud integration using AWS IoT / Microsoft Azure
- Web and mobile app development for real-time monitoring
- End-to-end IIoT system implementation
- Performance and security testing



Week 5: Real-World Case Studies and Projects

- Industry examples: smart factories, remote monitoring, energy optimization
- Advanced project execution
- Final project presentation and evaluation

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