IoT for Renewable Energy Monitoring Training Course

Professional Development Training Course Outline

Category	Renewable Energy	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

IoT for Renewable Energy Monitoring Training Course provides a practical, industry-focused pathway for understanding how Internet of Things (IoT), smart sensors, edge computing, cloud platforms, artificial intelligence (AI), data analytics, and real-time monitoring are transforming renewable energy systems. Participants explore how connected technologies can collect, transmit, visualize, and analyze operational data from solar PV, wind, battery energy storage, microgrids, and hybrid renewable energy systems. The course connects IoT architecture with smart energy management, predictive maintenance, energy efficiency, remote asset monitoring, and digital transformation, enabling learners to understand how data-driven technologies can improve renewable-energy performance and reliability.

Through hands-on learning and real-world case studies, participants develop the skills needed to design and evaluate IoT-enabled renewable energy monitoring solutions. The training covers sensor networks, communication protocols, cloud and edge architectures, dashboards, cybersecurity, data analytics, anomaly detection, and AI-enabled insights. By the end of the course, learners can translate renewable-energy operational requirements into scalable smart monitoring systems that support better decision-making, asset visibility, performance optimization, and sustainable energy management.

Programme Curriculum

IoT for Renewable Energy Monitoring Training Course

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Course Duration

5 days

Course Objectives

By the end of the training, participants will be able to:

1. Understand IoT architecture and smart energy monitoring for renewable-energy applications.
2. Identify and configure IoT sensors and connected devices for solar, wind, and battery systems.
3. Apply real-time data acquisition and telemetry techniques for renewable-energy assets.
4. Understand edge computing and cloud IoT platforms for energy-data processing.
5. Work with relevant IoT communication protocols and wireless technologies.
6. Develop renewable-energy monitoring dashboards and data visualizations.
7. Apply data analytics and AI-driven anomaly detection to energy-system data.
8. Explore predictive maintenance strategies for connected renewable-energy assets.
9. Evaluate energy efficiency and performance optimization using IoT-generated data.
10. Implement fundamental IoT cybersecurity and data protection practices.
11. Design scalable monitoring architectures for microgrids and distributed energy resources.
12. Analyze real-world IoT renewable-energy case studies and identify implementation lessons.
13. Develop a practical framework for smart, connected, and data-driven renewable-energy monitoring.

Target Audience

1. Renewable Energy Engineers
2. Electrical and Electronics Engineers
3. IoT and Embedded Systems Professionals
4. Energy Managers and Sustainability Professionals
5. Solar PV and Wind Energy Technicians
6. Smart Grid and Microgrid Specialists
7. Data Analysts and Energy Data Scientists
8. Technical Managers, Consultants, Researchers, and Project Developers

Course Modules

Module 1: Foundations of IoT for Renewable Energy

- IoT concepts, architecture, components, and **smart energy ecosystems**.
- Renewable-energy monitoring requirements and operational challenges.
- Sensors, actuators, gateways, controllers, and connected energy assets.

- IoT data flow from field devices to edge and cloud platforms.
- **Case Study:** IoT architecture for monitoring a distributed solar PV portfolio.

Module 2: Sensors, Devices, and Data Acquisition

- Selection of sensors for **voltage, current, temperature, irradiance, wind speed, vibration, and power quality**.
- Sensor calibration, installation, sampling, and data acquisition.
- Microcontrollers, gateways, smart meters, and industrial IoT devices.
- Device connectivity and asset identification.
- **Case Study:** Sensor-based monitoring of solar-panel temperature and performance.

Module 3: IoT Connectivity and Communication Protocols

- **MQTT, HTTP/HTTPS, Modbus, LoRaWAN, Wi-Fi, cellular, and industrial communication** concepts.
- Choosing connectivity based on range, bandwidth, reliability, and power requirements.
- Gateway architectures for distributed renewable-energy installations.
- Device-to-cloud and device-to-edge communication.
- **Case Study:** LoRaWAN-enabled remote monitoring for geographically distributed renewable assets.

Module 4: Edge Computing, Cloud IoT, and Data Platforms

- Fundamentals of **edge computing and cloud-based energy monitoring**.
- Data ingestion, storage, processing, and device management.
- Real-time telemetry and scalable IoT architectures.
- Cloud dashboards, alerts, APIs, and integration concepts.
- **Case Study:** Edge-to-cloud architecture for a solar microgrid monitoring platform.

Module 5: Renewable Energy Data Analytics and AI

- Energy-data preparation, aggregation, visualization, and interpretation.
- **AI, machine learning, anomaly detection, and predictive analytics** fundamentals.
- Performance indicators for solar, wind, and battery systems.
- Identifying abnormal operating conditions through data patterns.
- **Case Study:** AI-assisted detection of declining solar PV performance.

Module 6: Predictive Maintenance and Performance Optimization

- IoT-enabled **condition monitoring and predictive maintenance**.
- Detecting equipment anomalies and performance degradation.
- Maintenance alerts, asset health indicators, and operational workflows.
- Using historical data to improve renewable-energy availability.
- **Case Study:** Predictive monitoring of wind-turbine components using vibration and temperature data.

Module 7: IoT Cybersecurity and Smart Energy Integration

- IoT security risks across devices, networks, gateways, and cloud platforms.
- **Authentication, encryption, access control, secure communications, and data governance**
- Cybersecurity considerations for connected renewable-energy infrastructure.
- Integration with **smart grids, microgrids, battery energy storage systems, and distributed energy resources**.
- **Case Study:** Security framework for an IoT-connected renewable-energy microgrid.

Module 8: Capstone Design and Real-World Implementation

- Developing an end-to-end **IoT renewable-energy monitoring architecture**.
- Defining requirements, selecting technologies, and designing data flows.
- Creating monitoring KPIs, dashboards, alerts, and reporting structures.
- Evaluating scalability, reliability, cybersecurity, and operational value.
- **Case Study:** Capstone design for a smart solar-plus-battery monitoring system.

Training Methodology

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price

23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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