Western Technical College

10664120 Introduction to Industrial Internet of Things

Course Outcome Summary

Course Information

Description	In this course, learners are introduced to theoretical and practical topics of the Industrial Internet of Things (IIoT). The learner investigates the range of sensor and actuator devices available, ways in which they communicate and compute, methods for getting information to and from IIoT-enabled devices, and ways of visualizing and processing data acquired from the IIoT. Upon completion, learners will utilize hardware and software to construct a sensor network within an existing system and utilize industry standard tools to visual the data captured.
Career Cluster	Manufacturing
Instructional Level	Associate Degree Courses
Total Credits	2
Total Hours	54

Textbooks

No textbook required.

Course Competencies

1. Explore the technology used in the Industrial Internet of Things (IIoT).

Assessment Strategies

1.1. Discussion
1.2. Written product
1.3. Observation
1.4. Skill demonstration

Criteria

You will know you are successful when

1.1. you explain how the Industrial Internet of Things (IIoT) influences manufacturing operations.
1.2. you relate the components of IIoT to contemporary manufacturing processes.
1.3. you explain the value added benefits of IIoT to manufacturing applications.

Learning Objectives

1.a. Discover the history of IIoT.
1.b. Define the Industrial Internet of Things (IIoT).
1.c. Describe the benefits of IIoT.
1.d. Identify the components of Industrial Internet of Things (IIoT).
1.e. Identify industry sector applications of IIoT.
1.f. Describe manufacturing applications of Industrial Internet of Things (IIoT).

2. Examine smart sensor technology.

Assessment Strategies

2.1. Discussion
2.2. Written product
2.3. Observation
2.4. Skill demonstration

Criteria

You will know you are successful when

2.1. you analyze the configuration of a smart sensor according to instructor-provided scenario
2.2. you differentiate among photoelectric, distance, proximity, and pressure/vacuum/flow smart sensors

Learning Objectives

2.a. Describe the function of a smart sensor.
2.b. Describe the operation and configuration of a smart photoelectric sensor.
2.c. Describe the operation and configuration of a smart distance sensor.
2.d. Describe the operation and configuration of a smart proximity sensor.
2.e. Describe the operation and configuration of a smart pressure/vacuum/flow Sensors.

3. Investigate components of the industrial network.

Assessment Strategies

3.1. Discussion
3.2. Written product
3.3. Observation
3.4. Skill demonstration

Criteria

You will know you are successful when

3.1. you determine IP address to assign communication protocol within the IIoT system
3.2. you configure Ethernet network switch to enable data communication within the IIoT system
3.3. you relate the operation of the virtual LAN to data communication within the IIoT system
3.4. you explain how to keep an industrial network secure within the IIoT system

Learning Objectives

3.a. Discuss the basic operation of serial communication.
3.b. Describe Ethernet network topologies.
3.c. Describe the function and operation of a barcode identification system.
3.d. Describe the basic operation and configuration of an Ethernet-to-serial interface module.
3.e. Describe the function and operation of an RFID system.
3.f. Describe the function and operation of IO-Link Master Communications.
3.g. Describe types of Ethernet hardware connectors.
3.h. Describe the basic operation of an industrial managed Ethernet switch.
3.i. Describe DHCP automatic assignment of IP addresses.
3.j. Describe the basic operation of a virtual LAN.
3.k. Describe the functions and basic components of an industrial network security.
3.l. Explain how to configure the port security of an industrial managed Ethernet switch.

4. Use cloud-based technology to collect internal data.

Assessment Strategies

4.1. Discussion
4.2. Written product
4.3. Observation
4.4. Skill demonstration

Criteria

You will know you are successful when

4.1. you collect manufacturing system cloud-based data
4.2. you organize collected manufacturing system cloud-based data
4.3. you operate a manufacturing system using cloud-based data as input to the manufacturing system

Learning Objectives

4.a. Discuss cloud computing and its benefits.
4.b. Explain edge (fog) computing and its benefits.
4.c. Define Supervisory Control and Data Acquisition (SCADA).
4.d. Describe the operation and configuration of a cloud-based SCADA system.
4.e. Describe the operation and configuration of a cloud-based maintenance management system.

5. Explore data analytic tools.

Assessment Strategies

5.1. Discussion
5.2. Written product
5.3. Observation
5.4. Skill demonstration

Criteria

You will know you are successful when

5.1. you explain the function of data analytics in an industrial manufacturing system
5.2. you differentiate among basic database types and structures used in an industrial manufacturing system
5.3. you create a database query according to instructor specifications

Learning Objectives

5.a. Discuss data analytics.
5.b. Explain the benefits of data analytics.
5.c. Describe database use for manufacturing applications.
5.d. Describe basic database types and structures.
5.e. Describe elements of database queries
5.f. Differentiate among database queries.

6. Investigate the use of collected data to influence manufacturing processes.

Assessment Strategies

6.1. Discussion
6.2. Written product
6.3. Observation
6.4. Skill demonstration

Criteria

You will know you are successful when

6.1. you identify manufacturing systems inefficiencies
6.2. you explain the function of cloud-based data acquisition systems to track OEE
6.3. you use exported spreadsheet application data as inputs to modify PLC output instructions according to instructor specifications

Learning Objectives

6.a. Discuss manufacturing operational systems efficiencies.
6.b. Define a production bottleneck.
6.c. Identify barriers to manufacturing Overall Equipment Effectiveness (OEE).
6.d. Discuss how cloud-based data acquisition systems track OEE.
6.e. Explain how to export data to a spreadsheet applications.
6.f. Explain how PLC instructions feed cloud-based data acquisition systems.