EET-1620: INDUSTRIAL PROTOCOLS AND MACHINE CONNECTIVITY FOR SMART MANUFACTURING

Cuyahoga Community College

Viewing: EET-1620 : Industrial Protocols and Machine Connectivity for Smart Manufacturing

Board of Trustees:
March 2021

Academic Term:
Fall 2021

Subject Code
EET - Electrical/Electronic Engineer

Course Number:
1620

Title:
Industrial Protocols and Machine Connectivity for Smart Manufacturing

Catalog Description:
Implement and troubleshoot the most common industry-standard protocols for machine connectivity and wireless and security technologies in today's converged industrial networks. The focus will be on achieving competency and the skills needed to configure, maintain, and troubleshoot industry-standard network protocols.

Credit Hour(s):
3

Lecture Hour(s):
1

Lab Hour(s):
4

Requisites

Prerequisite and Corequisite
EET-1600 Industrial Routers, Switches, and Operating Systems for Manufacturing; or departmental approval.

Outcomes

Course Outcome(s):
Apply knowledge of standard protocols for machine connectivity in modern manufacturing settings and configure, maintain, and troubleshoot industry-standard network.

Objective(s):

a. Troubleshoot using industrial networking concepts and components.
b. Identify general troubleshooting issues.
c. Identify ethernet/IP.
d. Identify common ethernet/IP issues.
e. Identify ethernet/IP troubleshooting methods and tools
f. Describe PROFINET functionality and connection method.
g. Describe basic PROFINET devices.
h. Enabling and prioritizing PROFINET at Layer 2.
i. Integrate Cisco industrial ethernet switches.
j. Identify PROFINET troubleshooting methods.
k. Explore PROFINET troubleshooting tools.
l. Explore an overview of Defense-in-Depth Strategy.
m. Explore controlling access and network traffic.

n. Understand 802.11 networks.
o. Explore Industrial WLAN design considerations.

Course Outcome(s):

Learn how to use current infrastructures in today's modern manufacturing while developing a converged platform for flexibility to support future business outcomes.

Objective(s):

a. Describe the functions of the OSI layers and TCP/IP model.
b. Recognize the difference between enterprise and industrial networks.
c. Troubleshoot common issues found in Layers 1, 2, and 3 of the OSI model.

Course Outcome(s):

Utilize sound troubleshooting processes to support manufacturing operations.

Objective(s):

a. Examine network availability and reliability and internet security and to understand the multiple industrial network technologies being used in today's connected plants and enterprises.
b. Evaluate current infrastructures while developing a converged platform for flexibility.
c. Manage industrial networks for manufacturing with Cisco technologies.

Methods of Evaluation:

a. Tests
b. Quizzes
c. Laboratory Reports
d. Homework
e. Projects

Course Content Outline:

a. Industrial networking concepts and components
    i. The functions of the OSI Layers and TCP/IP model
    ii. Difference between enterprise and industrial networks
b. General troubleshooting issues
    i. Troubleshooting common issues found in Layers 1, 2, and 3 of the OSI model
    ii. The functions and components of ethernet/IP protocols
    iii. ethernet/IP
    iv. Identifying common ethernet/IP Issues
c. PROFINET functionality and connection method
    i. Configuration of PROFINET protocols on industrial ethernet devices
    ii. Troubleshooting common PROFINET issues
d. Overview of Defense-in-Depth Strategy
    i. Common network threats and resolutions
    ii. Configuration of basic security components
    iii. Configuration of a wireless network within an industrial environment
e. Use the OSI and TCP/IP models and their associated protocols to explain how data flows in a network

Resources

Roberts, RIchard M. and Chuck Easttom. *Networking Fundamentals*. 3rd ed. Goodheart-Willcox, 2020. https://www.g-w.com/networking-fundamentals-2020

Hanes, David, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, and Jerome Henry. *IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things* . 1st ed. Cisco Press, 2017. https://www.ciscopress.com/store/iot-fundamentals-networking-technologies-protocols-9781587144561

Lammle, Todd. *Understanding Cisco Networking Technologies, Volume 1: Exam 200-301*. John Wiley & Sons, 2019. https://www.wiley.com/en-us/Understanding+Cisco+Networking+Technologies%2C+Volume+1%3A+Exam+200+301-p-9781119659020

Odom, Wendell. *CCNA 200-301 Official Cert Guide, Volume 1*. 1st ed. Cisco Press, 2020. https://www.ciscopress.com/store/ccna-200-301-official-cert-guide-volume-1-9780135792735

Odom, Wendell. *CCNA 200-301 Official Cert Guide, Volume 2*. 1st ed. Cisco Press, 2020. https://www.ciscopress.com/store/ccna-200-301-official-cert-guide-volume-2-9781587147135

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