Western
Technical College

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10664111 Advanced IO Device Applications

Course Outcome Summary

Course Information

Description	This course includes coverage of Advanced PLC input and output devices. Learners will integrate smart sensors, stack lights, barcode readers, and vision systems with a PLC and HMI. All devices will be integrated and controlled with a PLC. Data from these devices will be collected and displayed on an HMI and used to control output devices.
Career Cluster	Manufacturing
Instructional Level	Associate Degree Courses
Total Credits	2
Total Hours	54

Pre/Corequisites

Prerequisite   10620164 Automation Systems Integration

Textbooks

No textbook required.

Course Competencies

1.   Investigate barcode systems

Assessment Strategies
1.1.   Written objective test
1.2.   Skill demonstration

Criteria

You will know you are successful when

1.1.   you identify components of a barcode system.
1.2.   you identify how a barcode system functions.
1.3.   you describe how a barcode system is connected and what data it provides.

Learning Objectives
1.a.   Identify components of a barcode system.
1.b.   Identify how a barcode system functions.
1.c.   Determine how to connect a barcode system and export its data.

2.   Integrate barcode systems with a PLC and HMI.

Assessment Strategies
2.1.   Written objective test
2.2.   Skill demonstration

Criteria

You will know you are successful when

2.1.   you wire communications and power to a barcode reader.
2.2.   you configure drivers, programs and hard ware settings for needed data acquisitions.
2.3.   you program a PLC to manipulate data from the barcode reader.
2.4.   you fix any problems identified.

Learning Objectives
2.a.   Wire communications and power to a barcode reader.
2.b.   Configure drivers, programs and hard ware settings for needed data acquisitions.
2.c.   Program a PLC to manipulate data from a barcode reader.
2.d.   Fix any problems identified.

3.   Investigate vision systems.

Assessment Strategies
3.1.   Demonstration
3.2.   Written Product

Criteria

You will know you are successful when

3.1.   you identify components of a vision system.
3.2.   you identify how a vision system functions.
3.3.   you describe how a vision system is connected and what data it provides.
3.4.   you describe how to properly tune an image.
3.5.   you describe how to trigger an image acquisition.
3.6.   you investigate the different inspections a vision system is capable of.

Learning Objectives
3.a.   Identify the components of a vision system.
3.b.   Identify how a barcode system functions.
3.c.   Describe how a vision system is connected and what data it provides.
3.d.   Properly tune an image using different lighting, focus, and exposure.
3.e.   Use different settings to trigger an image acquisition.
3.f.   Utilize different inspections to build a vision Job.

4.   Integrate a vision system with a PLC and HMI.

Assessment Strategies
4.1.   Written objective test
4.2.   Skill demonstration

Criteria

You will know you are successful when

4.1.   you wire communications and power from a vision system.
4.2.   you configure drivers, programs and hard ware settings for needed vision communications to a PLC.
4.3.   you download and run a program that integrates the data given from a vision system for optimal operation.

4.4.   you use an HMI program to show current Job pass and fail counts.
4.5.   you define and apply terms related to vision to PLC integration and application.
4.6.   you fix any problems identified.

Learning Objectives

4.a.   Properly wire communications and power to a vision system.
4.b.   Download and configure the drivers, programs and hard ware settings for needed for vision communications to a PLC.
4.c.   Develop, download and run a program that integrates the data given from a vision system for optimal operation.
4.d.   Create an HMI program to show current Job pass and fail counts.
4.e.   Fix any problems identified.

5.   Investigate various smart input and output devices.

Assessment Strategies

5.1.   Written objective test
5.2.   Skill demonstration

Criteria

You will know you are successful when

5.1.   you identify the smart input and output devices to be used.
5.2.   you investigate the different drivers, IOD, AOI, and AOP files necessary for proper smart device operation.
5.3.   you describe how to import the necessary drivers.

Learning Objectives

5.a.   Access product manuals and data sheets.
5.b.   Locate and download necessary drivers.
5.c.   Access Rockwell software for steps to import drivers.

6.   Integrate smart input and output devices to a PLC and HMI.

Assessment Strategies

6.1.   Written objective test
6.2.   Skill demonstration

Criteria

You will know you are successful when

6.1.   you wire communications and power to an IO Link card.
6.2.   you wire smart devices such as Rockwell smart photo sensor and Banner stack lights to a point IO Link unit.
6.3.   you develop a PLC program that integrates the point IO Link unit and the smart devices.
6.4.   you import necessary drivers to your PLC program to manipulate tags that are written from smart devices.
6.5.   you fix any problems identified.

Learning Objectives

6.a.   Properly wire communications and power to IO Link unit
6.b.   Properly wire smart devices to the IO Link unit.
6.c.   Develop a PLC program utilizing tags written from the smart devices and use those tags to make changes within these smart devices.
6.d.   Import necessary drivers, IOD, AOP, and AOI's to your PLC program to manipulate tags that are written from smart devices.
6.e.   Fix any problems identified.

7.   Explore advanced HMI functions in Factory Talk View studio including animation, alarms, and security.

Assessment Strategies

7.1.   Skill demonstration
7.2.   Written product

Criteria

You will know you are successful when

7.1.   you investigate the different animations that can be used in an HMI program
7.2.   you utilize alarm and runtime security functions in an HMI program.
7.3.   you explain how to import a faceplate to an HMI program to display VFD parameters.

Learning Objectives

7.a.   Create a HMI program that includes animated objects such as a bar graph or image that changes with sensor signal strength.
7.b.   Develop alarm notifications in an HMI program that display current events such as a disconnected sensor.
7.c.   Import a faceplate that displays VFD parameters and allows for an operator to start and stop a motor.