intelitek►►

INDUSTRY 4.0

Robotics, Automation, and Integration for Industry 4.0

COURSE OUTLINE

Course Name	Robotics, Automation, and Integration for Industry 4.0	
Catalogue Number	88-3300-0002	
Category	Industry 4.0, Automation, and IIoT	
Duration	30 Hours + Projects	
Required Prerequisites	Course Name	Catalog Number
	Fundamentals of Robotics with YRC Controllers	88-5005-0000
	Advanced Robotics Programming with YRC Controllers	88-5006-0000
	Robotics and Material Handling with YRC Controllers	88-5007-0000
	Robot Grippers (Recommended)	88-5009-0000
	Fundamentals of PLCs with the Allen-Bradley CompactLogix	88-8230-0010
	PLC Technology 2 with the Allen-Bradley CompactLogix	77-8230-0020
	PLC Technology 3 with the Allen-Bradley CompactLogix	88-8230-0030
	PLC Technology 4 with the Allen-Bradley CompactLogix	88-8230-0040
	Smart Devices for Industry 4.0	88-3300-0001
	Machine Vision and Quality Control with the Cognex In-Sight 2000 (Lab Course #1)	88-8087-0000
	Machine Vision and Quality Control with the Cognex In-Sight 2000 (Lab Course #2)	88-8089-0000
	Introduction to Industry 4.0 (Recommended)	88-3301-0010
	Introduction to Internet of Things and Connectivity (Recommended)	88-3301-0011

Section 1: Meet Your SmartCart 4.0

Activity 1-1 (Video): Welcome to Robotics, Automation, and Integration for Intelitek 4.0

Welcome to the Course

Prelude to the First Project Application

Activity 1-2: Introducing the SmartCart 4.0

Course Introduction

Robotics, Automation, and Integration for Industry 4.0|Course Outline

Activity 3-2: Networking with the SmartCart

Defining Device Networks

LANs and WANs

Communication Protocols

Ethernet and Industrial Ethernet

Activity 3-3: Device Identifiers

Network Identifiers

MAC and IP Addresses

Types of IP Addresses

Subnets

Managing IP Addresses

Command Prompt Ping Test

Activity 3-4 (Lab): Conceiving the SmartCart 4.0 Network

Identifying the Workstation's IP Address

Changing the Workstation's IP Address

Configuring the PLC's IP Address

Confirming Connectivity with the PLC

Activity 3-5: PLC Programming Projects

PLC Programming Project Creation

Firmware

I/O Configuration

I/O Connection Troubleshooting

Activity 3-6 (Lab): PLC Project Setup

Creating a New PLC Programming Project

Firmware Installation

Downloading the Project

Activity 3-7 (Lab): Configuring the Robot

Identifying the Robot's IP Address

Modifying the Robot's IP Address

Testing Network Connectivity

Configuring the EtherNet/IP CPU Board

Activity 3-8 (Lab): Creating the Robot I/O Module

Creating the Robot Hardware Module in the PLC Project

Downloading and Confirming Connection

Activity 3-9: PLC-Robot Data Exchange

PLC / Robot Data Exchange

Digital Memory Units

Monitoring and Initiating Robot Jobs

Activity 3-10 (Lab): PLC-Operated Robot Jobs

Downloading and Confirming Connection

Identifying Robot Input and Output Groups for Data Exchange

Adding DOUT and WAIT Instructions to a Robot Job

Creating the Logic Routine

Running the Job

Activity 3-11 (Lab): The Main Job

Zeroing Output Groups

The "Alive" Bit and Other Notes about Robot Jobs

Adjusting Pick-and-Place Jobs

Adjusting a Digital Output Job

Building the Main Job

Activity 3-12 (Lab): The Logic Sequencer

Creating the Logic Routine

Testing the Sequence

Summary and Next Steps

Section 4: HMIs

Activity 4-1: Designing an HMI

Review of HMI Concepts

HMIs in Industry 4.0

HMI Networking

Screen Hierarchy and Design

Activity 4-2 (Lab): Building the SmartCart Interface

Adding the HMI Screen to the LAN

Creating a New HMI Project

Screen Navigation

Binding Tags

Testing the System

Screen Security

Section 5: Smart Sensors and IIoT

Activity 5-1: Introduction to Smart Devices and IO-Link

Smart Devices on the SmartCart

Advantages of IO-Link

Your IO-Link Devices

Integrating Smart Devices

Activity 5-2 (Lab): Configuring the IO-Link Devices

Configuring the IO-Link Master for Ethernet Communication

Resetting Device Settings Using the LR Device Application

Adjusting Device Parameters

Testing the Slave Devices

Activity 5-3 (Lab): Integrating Smart Devices - Part 1

Installing the Device Description Files

Adding the IO-Link Master Module to the PLC Project

Testing Data Exchange with the Smart Sensors and RFID Head

Testing the Signal Lamp

Activity 5-4 (Lab): Integrating Smart Devices - Part 2

Introducing the Application

Integrating Sensor Memory Addresses into PLC Logic

Integrating RFID Values

Integrating Smart Devices into the HMI Project

Guidelines for Overall Process, Robot Jobs, PLC Logic, and HMI Screen

Activity 5-5 (Lab): Remote Monitoring and Bluetooth

Adding the IO-Link Master's IoT Port to the SmartCart LAN

IFM Moneo and Sensor Value Monitoring

Building a Navigator and Dashboard

The Moneo Blue Application

Section 6: Machine Vision

Activity 6-1: Introduction to Machine Vision

Applications of Machine Vision

Machine Vision in Industry 4.0

The SmartCart Vision System

Integrating Vision Systems

Vision Jobs in PLC Logic

Activity 6-2 (Lab): Integrating the Camera

Adding the Camera to the LAN

Updating Camera Firmware

Creating a Job with EasyBuilder – Initial Steps

Activity 6-3 (Lab): SmartCart Vision - Part 1

Installing the Add-On Profile

Creating the Cognex Module in Logix Designer

Building a Vision Routine

Readying the Camera

Testing the Vision Sequence

Activity 6-4 (Lab): SmartCart Vision - Part 2

SmartCart Inspection Application

Process Guidelines

Other Guidelines, Warnings, and Tips

Section 7: SmartCart 4.0 Projects

Activity 7-1: The Chocolate Box Project

Flexible Manufacturing

Custom Design

Project Specifications

The Customer Interface

SmartCart 4.0 Storage

Hints and Tips

Activity 7-2: The Smart Logistics Project

The Value Chain and Asset Management

Industrial Robots in the Logistics 4.0 World

Part Sorting

Quality Control

Project Specifications, Guidelines, and Tips

Activity 7-3: The Palletizing Project

Palletizing in Industry 4.0

Programming a Palletizing System

Project Specifications

Tips and Suggestions

ⓘ *Important Note: This outline is subject to change.*