

Machine Vision Technology with Cognex



Bridging the Gap Between Classroom and Industry

Intelitek Machine Vision Technology training courses introduce students to smart automation technology by connecting cameras and computers to provide the image interpretation and visual feedback needed for part inspection, robotic guidance and industrial automation. Deployed by the world's top logistics companies, manufacturers and machine builders, machine vision solutions are proven to cut costs, improve efficiencies, and maximize throughput.

Machine vision are a critical part of automation systems in Industry 4.0. As data analytics capabilities progress, the high volume of data accessible through vision equipment will be used to identify and flag defective products, understand their deficiencies and enable fast and effective intervention in the Industry 4.0 factory.

Factories that implement smart automation technologies, such as machine vision, often see fewer errors on the manufacturing floor which equates to reduced costs and higher customer satisfaction. Manual inspection can be slow, prone to errors, and often impossible considering the product size, lighting conditions, or line speed. Companies in a wide range of industries rely on vision sensors to perform simple pass/fail inspections or much more sophisticated inspections that help ensure products and packaging are error-free and meet strict quality guidelines.

Standard Features:

- ✔ Simple for both new and existing users to meet their automated inspection challenges
- ✔ Monochrome and color sensor models solve presence/absence applications, including color verification
- ✔ Proven, reliable Cognex In-Sight vision hardware and software
- ✔ Compact, modular design with field-changeable, integrated optics and lighting
- ✔ Capable to manually set the lens focus based on the mounting height of the sensor with different lab activities

Course Information

In the Machine Vision and Quality Control course, students acquire skills in the complex functions required for image processing, image analysis and object identification. They gain experience that will enable them to combine a vision system with any manufacturing process for parts inspection and quality control as well as with robotic systems for vision-guided robotic applications.

The Machine Vision and Quality Control lab course uses a Cognex Vision Sensor and Cognex In-Sight Explorer software with the embedded image processing engine in the camera. Students learn to operate and program the technology and connect cameras and computers to provide the image interpretation and visual feedback needed for vision systems. The curriculum provides instruction on the use and setup of the Cognex digital color camera and integration of the vision system into quality control and manufacturing processes.

The solution can be used for vision operations, can be integrated into Intelitek's CIM and FMS systems for vision-based quality control applications, or coupled with SCORBOT and MotoMan robots for vision-guided robotic tasks and QC processes.

Type	Lab
Units of measurement	Imperial; Metric
Languages	English
Hours of instruction	15 hrs per course

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Course Outline

- Activity 1: Introduction to Vision Systems
- Activity 2: How Cameras Work
- Activity 3: (Lab) Getting to Know Your Device
- Activity 4: Digitalization
- Activity 5: (Lab) Introduction to In-Sight Explorer
- Activity 6: Analytical Tools
- Activity 7: Image Types
- Activity 8: (Lab) EasyBuilder
- Activity 9: Optics and Lighting
- Activity 10: Lighting Techniques
- Activity 11: (Lab) Image Setup, Lighting, and Calibration
- Activity 12: Image Enhancements and Operations
- Activity 13: Filters and Noise Elimination
- Activity 14: Blobs
- Activity 15: (Lab) Counting Tools

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Course Outline

- Activity 1: Types of Vision Systems
- Activity 2: Vision Systems and Manufacturing
- Activity 3: The Color Tool
- Activity 4: I/O and Communication
- Activity 5: Deployment
- Activity 6: Setting Up an Emulator
- Activity 7: Calibration
- Activity 8: Vision Tools and the Emulator
- Activity 9: Introduction to Spreadsheet Viewer
- Activity 10: Spreadsheet Logic
- Activity 11: Image Analysis with the Emulator
- Activity 12: Image Enhancements with the Emulator

Activity 3 (Lab): Getting to Know Your Device

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Vision Sensor Anatomy

Your vision sensor has three main components:

- ✓ The lighting and optics module
- ✓ The main module
- ✓ The I/O Connector module

Hover your cursor over the modules of the camera to learn more.

The I/O connector module connects the main module to a power source, input devices, output devices, and Ethernet.



Ethernet

Power and I/O

I/O Connector Module

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Machine Vision Certification for Education

Intelitek has partnered with Cognex, the global leader in Machine Vision, to develop a machine vision and quality control training program to assist high schools, community colleges, and technical schools offer an industry recognized certification based on the Cognex In-Sight 2000 series vision sensors. The training program delivers skills-based training and blended learning programs to prepare students for in-demand professions in industry.



Cognex In-Sight 2000-130C ¹ Camera Specifications		
User Interface	In-Sight Explorer EasyBuilder, Cognex VisionView PC Software	
1/3" CMOS Imager	Color	
S-Mount/M12 Lenses	Standard: Manual focus 8 mm	
	Optional: Manual focus 3.6 mm, 12 mm, 25 mm	
Image Modes	640 x 480 (standard)	
	640 x 480 (2x magnification)	
	800 x 6000 (2x magnification)	
Lighting	Standard:	Diffuse white LED ring light
	Options:	Polarized Light Cover
Maximum Acquisition Speed²	55 fps	
Relative Processing Speed	2x	
Location Tools	Pattern	✓
	Edge, Circle	✓
Inspection Tools	Pattern	✓
	Pixel Count	Color
	Brightness & Contrast	✓
	Edges	✓
Measurement & Counting Tools	Distance, Angle & Diameter	✓
	Patterns & Edges	✓
Networking & I/O	Protocols	EtherNet/IP, PROFINET, SLMP, SLMP Scanner, Modbus TCP, TCP/IP, UDP, FTP, Telnet (Native Mode), RS-232
	Connectors	(1) Industrial M12 Ethernet, (1) M12 Power & I/O
	Inputs & Outputs	(1) Acquisition trigger, (1) General purpose input, (4) General purpose outputs ³
Mechanical	Dimensions	In-line configuration: 92 mm (3.61 in) x 60 mm (2.38 in) x 52 mm (2.05 in)
		Right-angle configuration: 61 mm (2.42 in) x 60 mm (2.38 in) x 52 mm (2.05 in)
	Weight	200 g (7.05 oz)
	Material & Protection	Painted aluminum, IP64-rated housing
Operating	Power	24 VDC ±10%, 48 W (2.0 A) maximum when the illumination is on
	Temperature	0°C to 40°C (32°F to 104°F)

¹ Standard Intelitek bundle is supplied with the In-Sight 2000 130C model camera. Optionally, more advanced cameras are available and can be supplied. Contact your sales partner for more details.

² Maximum framerate with minimum exposure; no vision tools; and 640 x 480 image with 2x image magnification enabled (for 2000-120/130 models).

³ (7) general purpose inputs and (8) general purpose outputs when using optional CIO-1400 I/O Expansion Module.

Cognex In-Sight Explorer Software

Cognex In-Sight Explorer software features easy to use but powerful vision tools and In-Sight software interface. A spreadsheet view makes the user experience very simple for maximum control over your optical inspection applications. The In-Sight Explorer software also includes an EasyBuilder configuration environment for deploying reliable applications quickly, with no programming required. This easy-to-use interface walks you through the process of setting up your vision application, step by step.

Students can use this software in the Lab with PC's that are connected to main Lab camera and also to use Cognex emulator to learn other advanced camera features.

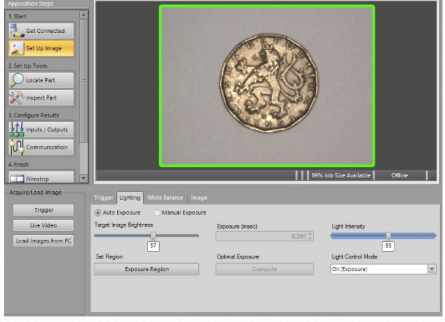
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Task: Optimizing Image Acquisition

10. Place the coin on top of the paper.

11. Using the options in the Lighting tab and the Image tab, try each of the following to get the most accurate acquisition of the coin. (Click the links to watch an example):

- ✓ [Optimize lighting using Auto Exposure.](#)
- ✓ [Optimize lighting using Manual Exposure.](#)
- ✓ [Optimize exposure with ambient lighting \(ring light off\).](#)
- ✓ [Increase the magnification.](#)
- ✓ [Adjust the focus \(using live video and turning the focus knob\).](#)



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Ordering Information

Curriculum

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with Cognex, LearnMate Course (Lab)

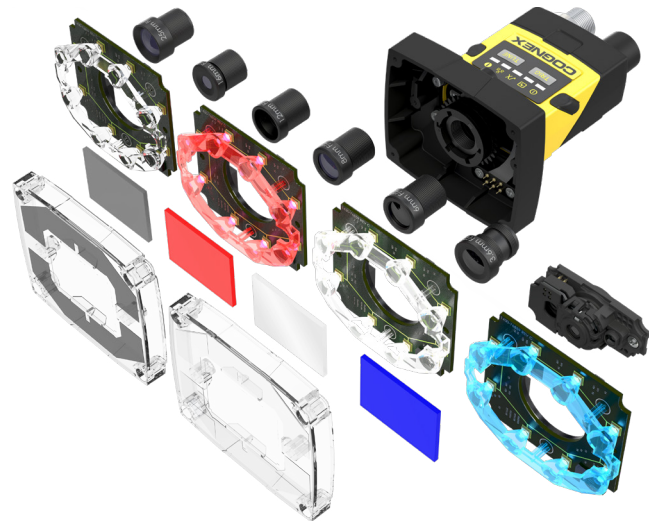
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Certification

Machine Vision Cognex Certification 00-1430-0000
for Education (per Student)

Lab Hardware Kit

Bundle for Machine Vision & Quality Control with Cognex - Includes hardware and software 00-1430-0000



About Intelitek

Intelitek transforms education across the globe through innovative learning solutions that empower instructors and inspire students. We understand the changing needs of STEM and CTE classrooms, and design flexible solutions that meet those needs within the framework of any budget. Our sustainable support and professional development ensure the continued success of your programs. By helping to deliver the skills needed for in-demand careers, we are producing results for students and teachers.

Lab Hardware Includes:

Qty.	Description
1	Cognex In-Sight 2000-130C Camera w/Mount and In-Sight Explorer Software
1	Machine Vision Stand (1000mm)
1	24v Power Supply

Contact Us:



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