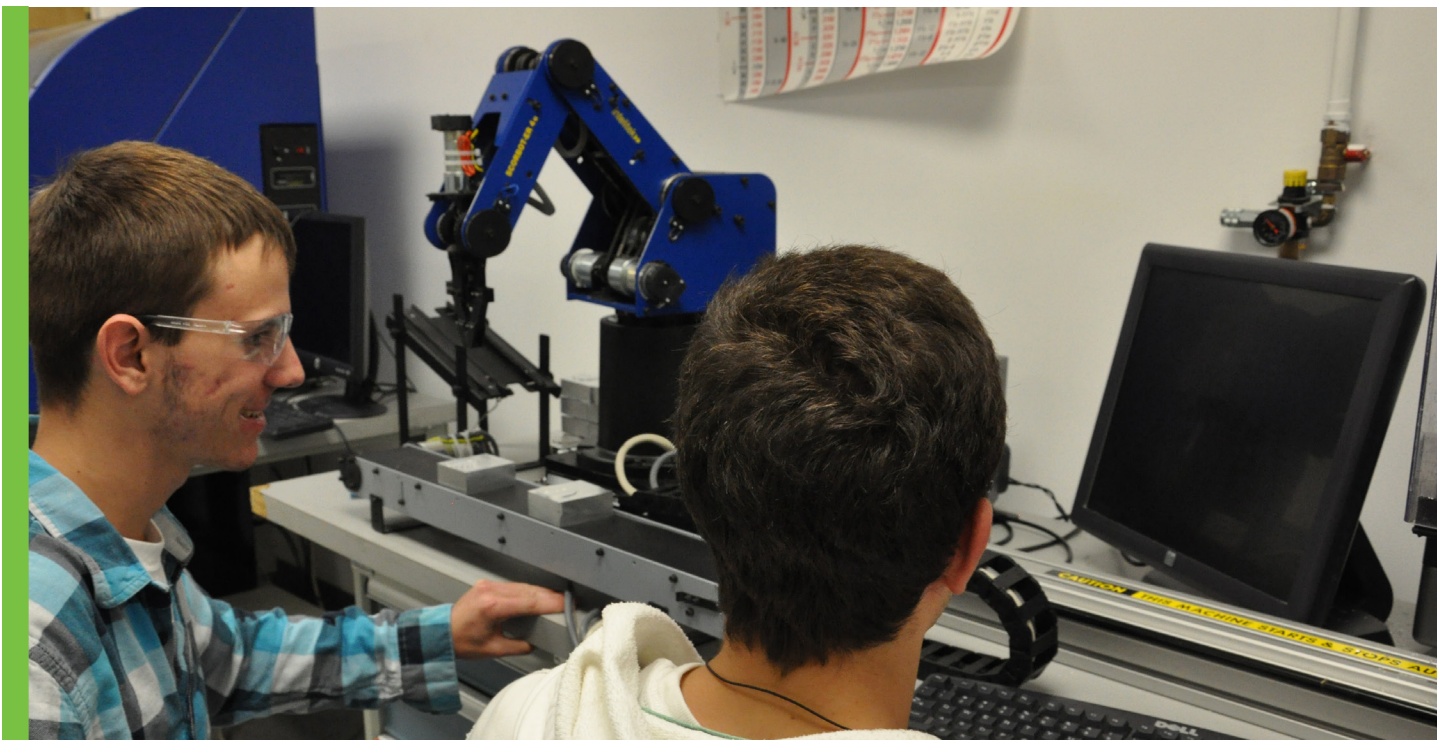# intelitek ▶▶®

ROBOTICS

Since 1982, Intelitek's unmatched and world-renowned ScorBot robotic training system, brings the exciting field of industrial robotics to your educational program.

Intelitek's skill-based curriculum include a comprehensive range of competencies that prepare students for jobs in industry.

The programs offer fundamental to advanced training using Intelitek's blended learning approach to deliver a powerful educational experience. Combining engaging e-learning content with superior quality robotic equipment and dynamic 3D simulations prepares students for rewarding careers.

intelitek ▶▶

Intelitek Pedagogic Values

Over the last few decades the face of manufacturing has changed. Globalization and automation have transformed the factory floor from an army of hardworking men and women proudly creating products with their skillful hands to an automated environment where machines do most of the work. Workers spent years learning their trade as apprentices or on the job and took pride in their respectable careers.

Today, many of those professions are non-existent. One of the reasons is the massive progress of automated manufacturing processes and specifically robotics. Robots can do many of the manual tasks faster, more accurately and safer than a human!

In the 21st century, trades are learned in high school and post-secondary colleges. Employers expect candidates to have all the experience and knowledge they need as they walk in the door.

Intelitek career and technology training programs deliver skills-based training using advanced blended learning programs to enable programs to prepare students to integrate into in-demand professions in production and manufacturing.

Robotics is one of the central programs offered and delves into the use of robots, the functionality and capabilities of robots, how to integrate and use robots in industry, and how to design and program robots in your environment. More advanced programs dig into use cases, practical projects, and specialized use cases as well.

As with all our courses the focus is not only on learning theory, but also on understanding the concepts and how to benefit from robots. Programs develop critical thinking capabilities, promote self-awareness and encourage out-of-the-box thinking and innovation. Students learn soft skills like teamwork, project management, decision making, and collaboration.

Quality Hardware

Intelitek provides exposure to industry-standard practices with hardware platforms designed for learning of industry-grade components.
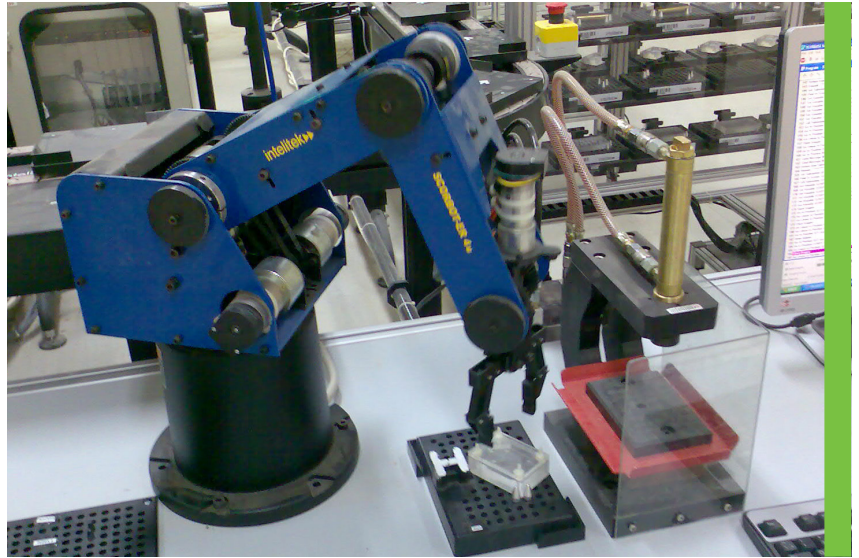

Skill-based E-learning Content

Curriculum are skill-based, developed by industry experts from Fortune 1000 companies across a wide range of sectors.

The skill-based training consists of individual exercises that reproduce essential tasks performed by robotic technicians, operators, and repairmen.
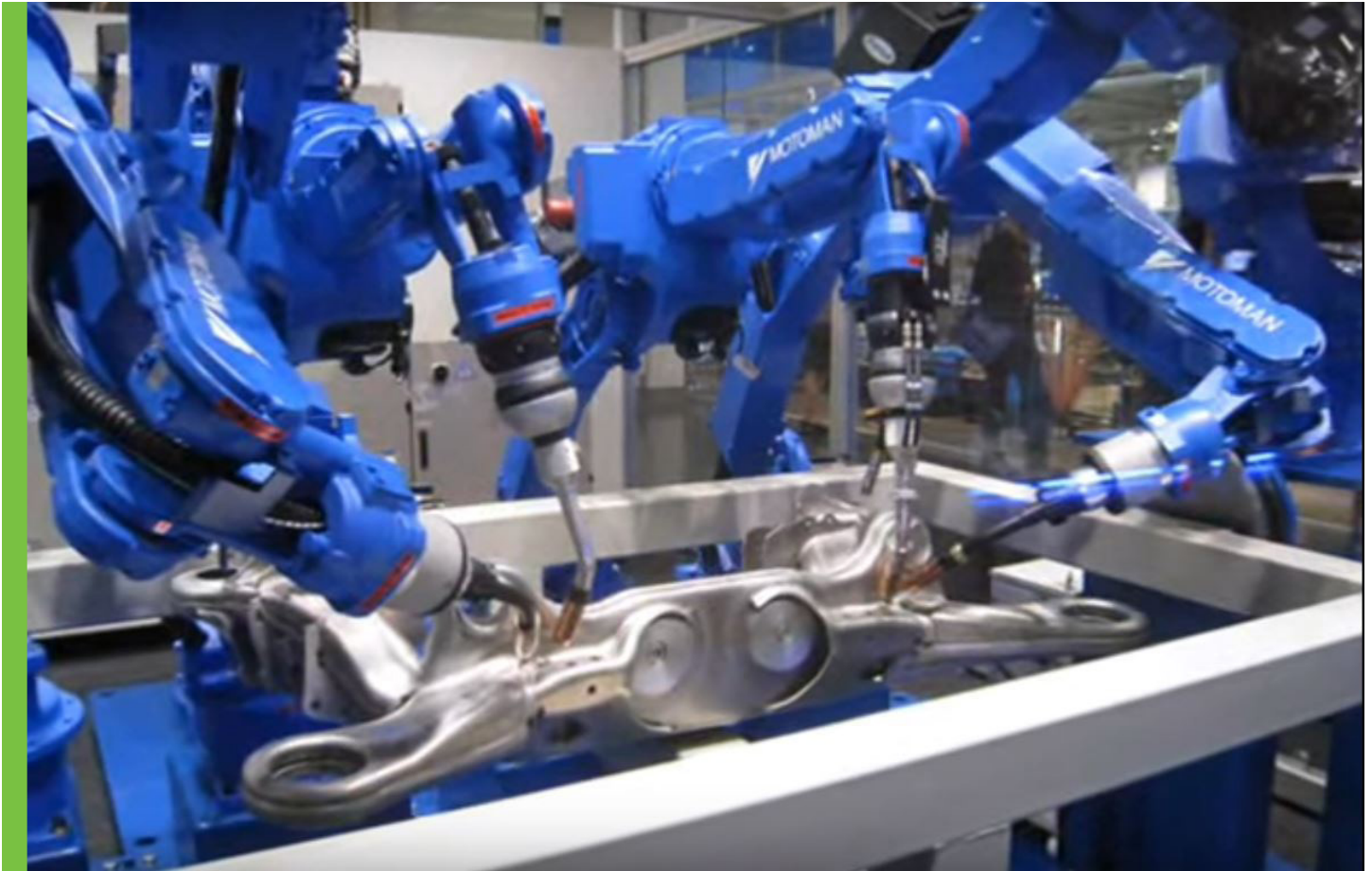

Industry Competence

Intelitek interactive and multi-disciplinary curriculum entrench values that help secure jobs and work skills that enable students to thrive in collaborative workplaces with the can-do and problem solving attitude employers seek.
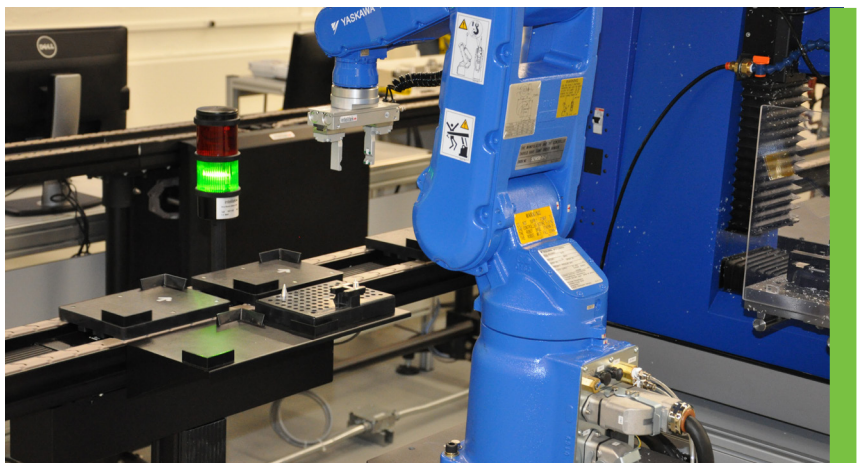
ROBOTICS CURRICULUM

Fundamentals of Robotics

HOURS OF INSTRUCTION: 15

TYPE

LANGUAGES   Es   En

The Fundamentals of Robotics courses provide students the skills needed to operate, maintain, program, and test robotic systems. The curriculum uses RoboCell, a 3D-solid modeling robotic simulation software, which allows students to develop programming skills through a variety of simulated robotic workcells.

Students will learn the core components and operating principles of robots and then develop programs that will drive the robots. Programming sections include advanced topics like variables, inputs/outputs, sensors, optimization, debugging, and will implement projects to evaluate their understanding of the skills.

COURSE OUTLINE

- Introduction to Robotics
- How Robots Work
- Using Robotic Control Software
- Recording Robot Positions
- Programming a Simple Pick and Place Task
- Absolute and Relative Positions
- Basic Robotic Programming Tools
- Block Alignment Project
- Feeders and Templates
- Peripheral Devices
- Linear Slidebase Project
- Encoders
- Roll and Pitch
- Programming the Robot to Execute Linear and Circular Movements
- Final Project: Drawing a House

Advanced Robotics

HOURS OF INSTRUCTION: 15

TYPE

LANGUAGES Es En

Building on the Fundamentals of Robotics curriculum, Advanced Robotics courses explore advanced robotic programming.

In Advanced Robotics Programming, students will use RoboCell to teach positions, write programs, debug robotic applications, and test their execution offline using a virtual robot.

COURSE OUTLINE

- Review of Robotic Fundamentals
- Programming with Subroutines
- Digital Inputs
- Digital Outputs
- Project #1 - Delivering Materials with a Conveyor
- Conditional Branching
- Project #2 - Programming with Conditional Branching
- Analog Inputs and Outputs
- Loops and Counters
- Contact and Non-Contact Sensors
- Programming a Sorting System Project
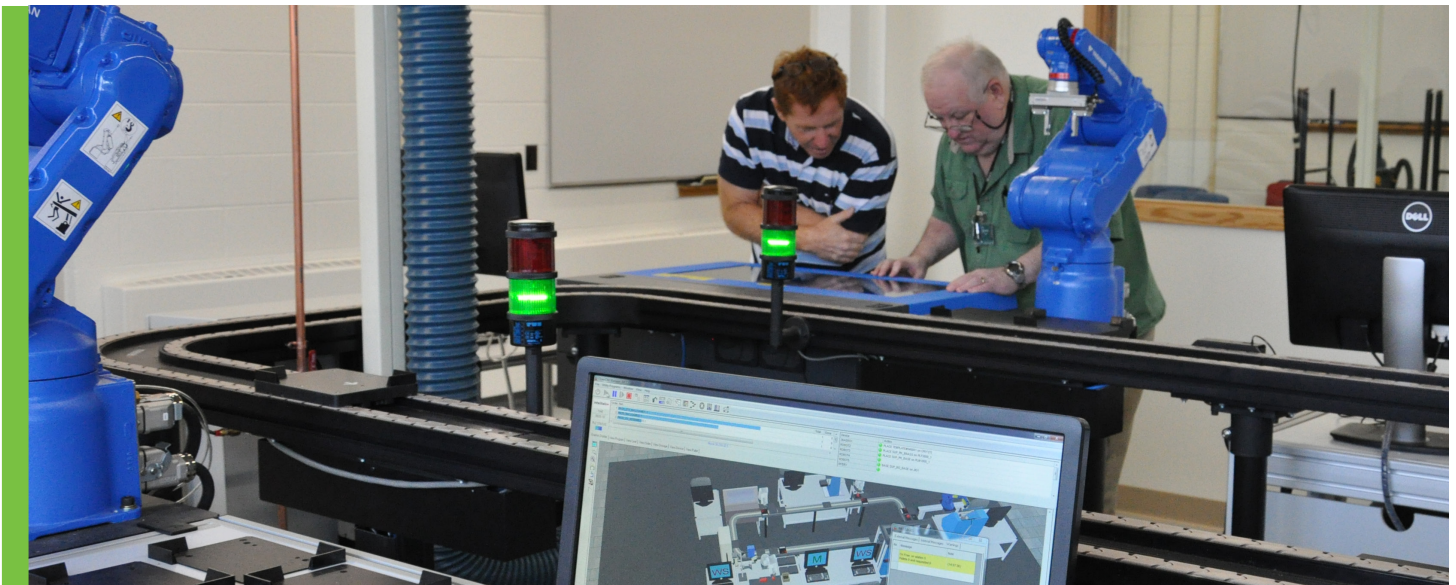
Robotics & Materials Handling 1

HOURS OF INSTRUCTION: 15

TYPE   LANGUAGES   Es   En

In Robotics and Materials Handling 1 students work with the ScorBase software to develop and write robot programs for manipulating objects and other automated tasks.

The activities challenge students to design solutions for industrial robotic applications, with emphasis on real industrial concerns, such as recording accurate positions, optimizing programming and increasing productivity.

COURSE OUTLINE

- Introduction to Robotics
- Robotic Control Software
- Recording Robot Positions
- Writing and Running a Robot Program
- Cartesian Coordinates
- Inputs and Program Jumps
- Outputs
- Joint and XYZ Coordinate Systems
- Relative Positions
- Loops, Polling, and Counters
- Subroutines
- Contact and Non-Contact Sensors
- Servo Control of the Conveyor
- I/O Control of the Conveyor

Robotics & Materials Handling 2

HOURS OF INSTRUCTION: 15

TYPE   LANGUAGES   Es   En

In Robotics and Materials Handling 2, students work with RoboCell, a 3D-solid modeling robotic simulation software, to program and operate the robot.

The activities challenge students to design solutions for industrial robotic applications, with emphasis on advanced industrial implementations, such as complicated movements, interfacing with peripherals and working with sensors.

COURSE OUTLINE

- Basic Robotic Programming Tools
- Manipulating Blocks Project
- Programming the Robot to Execute Circular Movements
- Drawing a House
- Roll and Pitch
- Block Alignment Project
- Feeders and Templates
- Peripheral Devices
- Linear Slidebase Project
- Programming Using Encoder Values
- Conditional Branching
- Analog Inputs and Outputs
- Programming a Sorting System Project
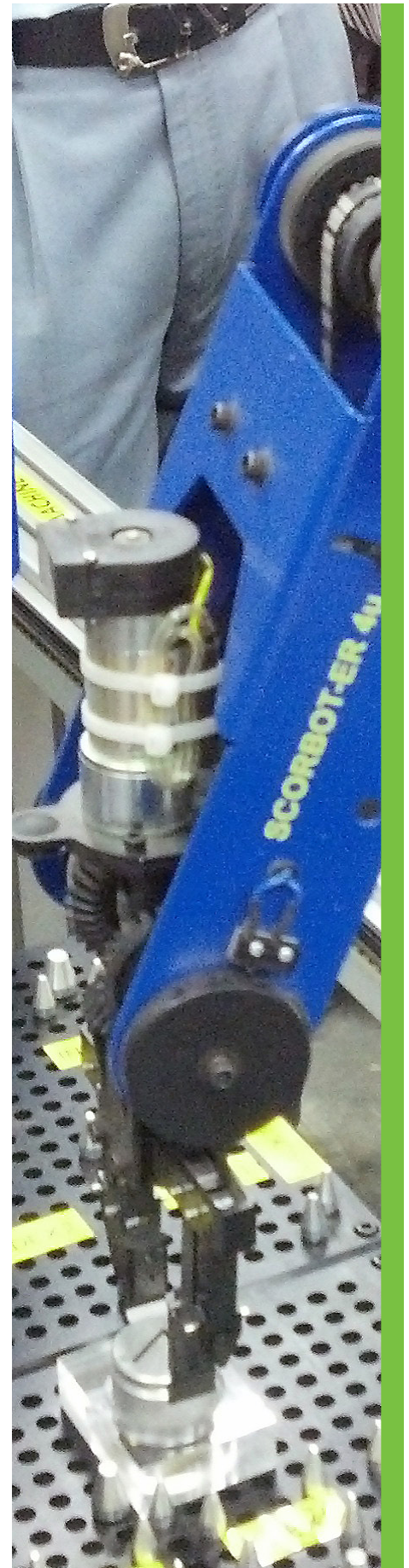
Automated Welding with Robotics

HOURS OF INSTRUCTION: 15

TYPE

LANGUAGES Es En

This turnkey automated welding station gives students training and skills in production welding methods, robotic programming, and control. Using the RoboCell simulation software, students safely perform the entire welding processes in 3D simulation before executing actual automated welding applications.

Students learn to overcome common welding problems, such as thermal deformation, by adjusting welding technique. Students also learn to improve weld quality by optimizing important welding parameters such as wire feed rate, robot speed, inert gas shield and voltage.

Safety is an integral part of the system. The robotic workbench is housed in a fire retardant metal booth with filter-plated windows for UV and eye protection. Opening a booth door automatically halts the welding operation. Pressing either of two emergency buttons immediately halts both robotic and welding operations.

WELDING BUNDLE INCLUDES:

- ScorBot ER-4U robot and controller
- RoboCell for Controller-USB software (includes ScorBase)
- MIG welder
- Welding booth
- Parts feeder
- Welding gun holder
- Gripper adapter for welding gun
- Welding jigs
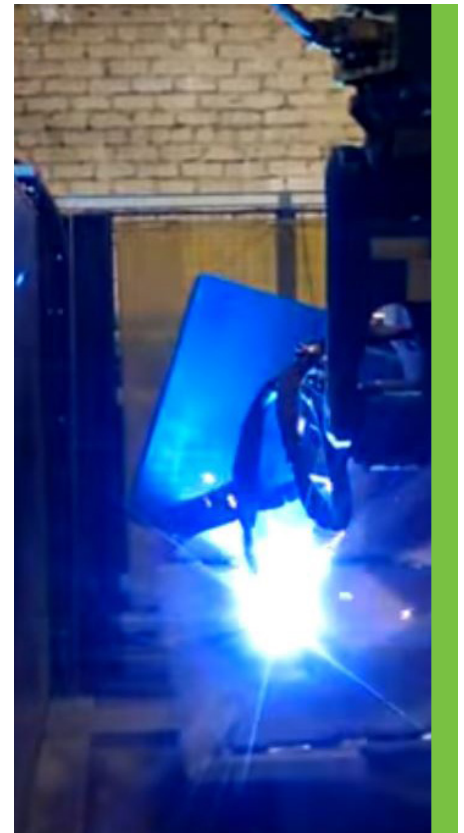
COURSE OUTLINE

- Getting Started with Automated Welding Simulation Software
- Recording Robot Positions
- Basic Robotic Programming Tools
- Advanced Robotic Programming Tools
- Programming Gravity Feeder Operations
- Programming Jig and Gun Operations
- Programming Welding Operations
- Programming a Fully Automated Welding Cycle
- Performing a T-joint Weld and Fine-Tuning
- Programming and performing a Butt Joint Weld
- Preventing Thermal Deformation
- Changing Parameters: Inert Gas Shield
- Changing Parameters: Robot Speed and Feed Rate
- Project: Welding Your Name

Machine Vision and Image Processing

HOURS OF INSTRUCTION: 15

TYPE

LANGUAGES Es En

The Machine Vision and Image Processing course introduces students to technology that connects cameras and computers to provide the image interpretation and visual feedback needed for part inspection, robotic guidance and industrial automation. Students gain skills in the concepts of complex functions required for image processing, image analysis and object identification, and use them in part inspection applications.

COURSE OUTLINE

- Machine Vision and Quality Control
- Binary and Hexadecimal, Bits and Bytes
- Camera
- Image Digitization
- Grayscale, Binary Images
- Color
- RGB, CMYK and HSL
- Introduction to Blobs
- Blob Analysis
- Image Quality and Interference Problems
- Noise
- Neighborhood and Point-to Point Operations
- Morphological and Geometric Operation
- Arithmetic Operations
- Quality Control

Exploring Machine Vision and Quality Control
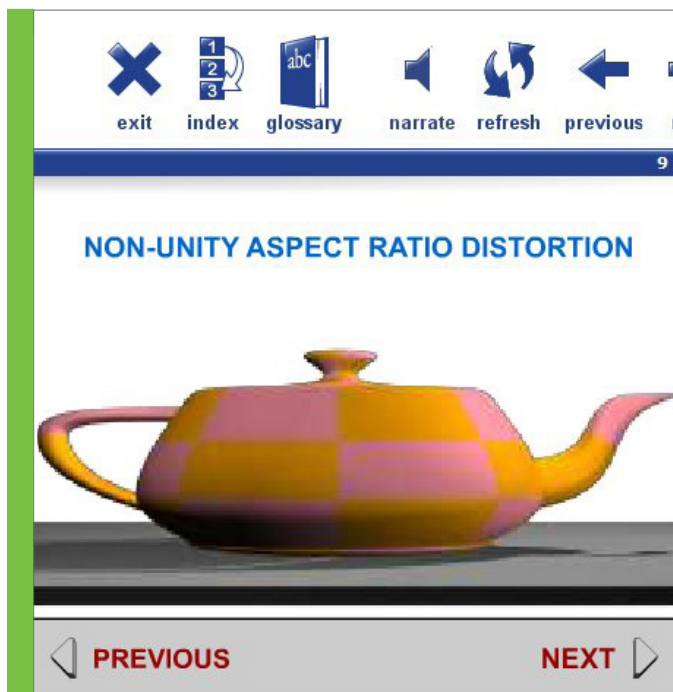
HOURS OF INSTRUCTION: 15

TYPE

LANGUAGES Es En Pt

The Exploring Machine Vision and Quality Control course introduces students to technology that connects cameras and computers to provide the image interpretation and visual feedback needed for part inspection, robotic guidance and industrial automation.

COURSE OUTLINE

- Image Calibration
- Pattern Matching and Searches
- Finding and Measuring Edges and Stripes
- Digital Images: File Types, Compression,
- Graphic Cards and Scanners
- Introduction to Remote Sensing
- Remote Sensing and Image Processing
- Machine Vision in the Medical Sector
- Analog and Digital Camcorders
- Machine Vision and Robot Guidance
- Introduction to Using Programming Languages

Machine Vision and Quality Control

HOURS OF INSTRUCTION: 15

TYPE

LANGUAGES Es En Pt

This course introduces students to technology that connects cameras and computers to provide the image interpretation and visual feedback needed for part inspection, robotic guidance and industrial automation. Students gain skills in the complex functions required for image processing, image analysis and object identification. This course gives students experience that will enable them to combine the vision system with a robotic system for vision-guided robotic applications, or to integrate it within a CIM system for part inspection and quality control.

COURSE OUTLINE

- Camera and Lighting
- Image Digitization
- Working with Images
- Image Enhancement
- Using Filters
- Object Analysis
- Pattern Matching
- Blob Analysis
- Quality Control - Flaw Detection
- Quality Control - Part Counting
- Quality Control - Measurement and Gauging
- Quality Control - Position Verification
- Executing a Machine Vision Operation

SOFTWARE FOR ROBOTICS

ScorBase

ScorBase robotics control and simulation software provides a comprehensive and intuitive tool for programming and operating robotic workcells. The software allows students to experiment with a variety of simulated workcells as part of the Intelitek curriculum or independently.

The software has several operational levels, each with progressively more functionality, making the software suitable for both novice and advanced users.

The software supports peripheral servo axes and both digital and analog I/Os, thereby providing a comprehensive tool for programming and operating an entire robotic workcell.

FEATURES:

- Intuitive user interface designed for training environments
- 3 operating modes: Online, Offline and Simulation
- Several operational levels, each with progressively more programming and operational features, allow novice and advanced users to work in environments best suited to their level of expertise.
- Manual control of robot and peripheral axes
- Position recording
- Real-time data display
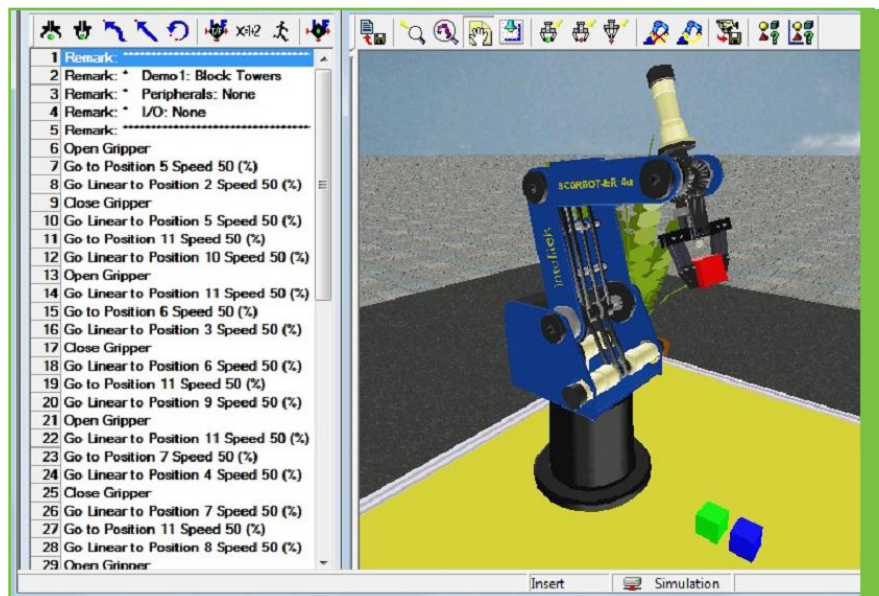
- Manipulation of 160 user-accessible parameters
- Learning optimized program editing interface
- Program execution both online and offline
- Open system: integration and support for workcell components like ViewFlex Machine Vi-sion, MIG Welding System and more.
- English, Spanish, Portuguese, German, Korean, Vietnamese, Polish Interface languages
- Comprehensive online help
- Demo projects

RoboCell

RoboCell integrates ScorBase's robotic control software with interactive 3D solid modeling simulation software. RoboCell's virtual robots and devices accurately replicate the actual dimensions and functions of Intelitek Robotic equipment. Students can teach positions, write programs and debug robotic applications offline before executing them in an actual workcell.

RoboCell allows students to experiment with a variety of simulated workcells, even if the actual workcells do not exist in the lab. Advanced students can even design 3D objects and import them into RoboCell for use in virtual workcells.
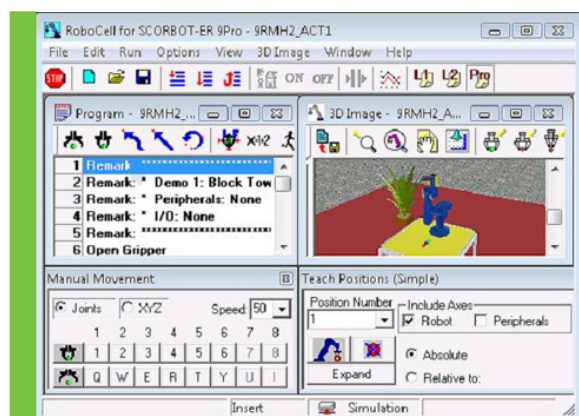
FEATURES:

- Robotic workcell setup
- Simple point and click creation of virtual robotic workcells
- Peripheral axes, connection of sensors and I/O devices, storage devices and feeders
- Programming and control of robotic workcells
- English, Spanish, Portuguese, German, Korean, Vietnamese, and Polish Interface languages
- Dynamic 3D simulation
  - Robot movements and gripper part manipulation.
  - Peripheral axes: conveyor belts, XY tables, rotary tables, linear slidebases
  - CNC mills and lathes
  - Automated welding system
  - Parts and sensors
  - Detection and response to impact conditions and axis limits
- Robocell can run ScorBase programs in 3 modes:
  - Online: Enables you to control the robotic cell
  - Simulation: Virtual robotic cell simulation in the 3D display
  - Offline: Enables debugging of ScorBase programs

EDUCATIONAL ROBOTS

ScorBot ER-4U Educational Robot
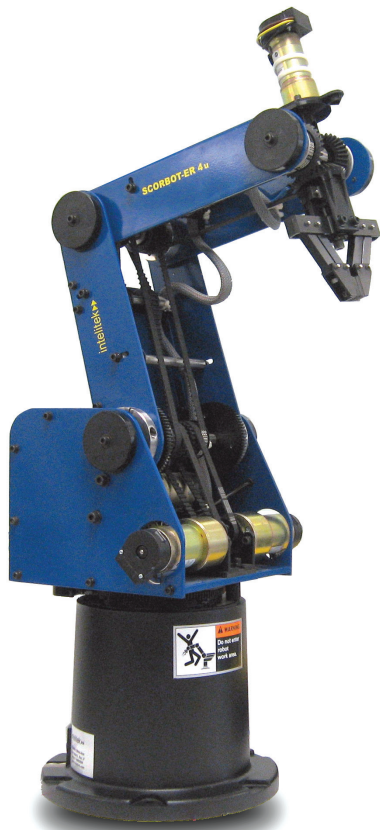
The ScorBot ER-4U robot is a versatile and reliable 5-axis robotic arm system for educational use. The ScorBot ER-4U robot arm can be mounted on a tabletop, pedestal, or linear slidebase.

The robot's speed and repeatability make it highly suited for both stand-alone operations and integrated use in automated workcell and FMS applications such as robotic welding, machine vision and CNC machine tending. Together with ScorBase control software and RoboCell 3D simulation software, the system lets students design and control industrial workcells.

STANDARD FEATURES

- 5 Axis Vertically Articulated Mechanical arm
- Controller with USB communication
- Floor-, wall- or ceiling-mounted options
- 0.18 mm (0.007") repeatability
- 1 kg (2.2 lbs) payload

OPTIONAL ACCESSORIES

- DC servo motor kit
- Gravity parts feeder
- Linear conveyor
- Linear slidebase for small robots
- MicroASRS
- Multi-purpose gripper adapters
- Rotary index table
- Teach Pendant for USB Controller
- Linear Table
- XY-Table
- Motor Kit

MotoMan MHJF Educational Robot

The ultra-light, compact MotoMan MHJF is a 6-axis, high-speed and accurate robotic arm for educational and industrial use. This highly portable and easy to install robot enables simplified system integration and requires minimal installation space.

The MHJF uses small-capacity motors for all axes allowing the robot to be used without a safety fence in the same area as students.

The MHJF features a 545 mm (21.4″) reach, weighs only 15kg (33lbs) and offers the widest work envelope in its class. Because of its small footprint, it can be floor-, wall-, or ceiling-mounted.

The MHJF supports both stand-alone applications as well as sophisticated automated workcells. The robot offers superior performance in small part applications such as assembly, dispensing, packaging, material handling, and machine tending.

STANDARD FEATURES

- Compact, powerful and economical
- 545 mm (21.4″) reach
- 0.03 mm (0.0012″) repeatability
- 1-2 kg (2.2 - 4.4 lbs) payload
- Widest work envelope in its class
- Small footprint and minimal interference radius (92.5 mm) maximizes floor space utilization
- Floor-, wall- or ceiling-mounted options
- Brakes on L- and U- axes
- Compact design and built-in collision avoidance features with multiple robot control allow up to two robots to be used together
- Internally routed cables and hoses maximize system reliability

OPTIONAL ACCESSORIES

- Pneumatic Gripper
- 1.0 m or 1.8 m linear slide base
- Automatic Tool Changer (ATC)
- Gravity parts feeder
- Linear conveyor
- Multi-purpose gripper adapters
- Rotary index table
- Linear Table
- XY-Table
- Motor kit

MotoMan GP8 Industrial Robot

The MotoMan GP8 is a 6-axis compact, high-speed robot

The MotoMan GP8 is an advanced material handling robot that offers high speeds, an 8 kg (17.64 lbs) payload, and 727 mm (28.62") reach. This robot is designed to provide easy set-up, operation, and maintenance with only a single cable needed to connect the manipulator and controller.

The GP8 offers superior performance in part applications such as assembly, dispensing, packaging, material handling, and machine tending. The robot supports both stand-alone applications as well as sophisticated automated workcells.

The compact and slim design of the GP8 has an expansive work envelope and a design to allow close proximity placement of robots. The lightweight, 32kg (71 lb) robot, supports a variety of mounting options including floor, ceiling, and wall.

The GP8 is paired with the advanced YRC1000micro controller.

STANDARD FEATURES

- Compact, high speed, powerful and economical.
- 8 kg / 17.6 lb payloads
- Slim and easy-to-use structure
- Impressive reach and horizontal reach enables robot to operate in wider work areas.
- Slim, straight, and symmetrical arm design minimizes interference with peripheral devices even in small spaces.
- Easy set-up - Only one cable required.
- Environmentally friendly - IP67 standard protection class
- Free of corrosive gasses or liquids, or explosive gasses
- Resists exposure to water, oil or dust
- No excessive electrical noise (plasma)
- Floor-, wall- or ceiling-mounted options.
- Internally routed cables and hoses maximize system reliability.

Curriculum

77-3046-0000	Fundamentals of Robotics for ScorBot ER-4U
77-3048-0000	Advanced Robotics Programming with ScorBot ER-4U
77-5001-0000	Fundamentals of Robotics for MotoMan MHJF
77-5002-0000	Advanced Robotics Programming for MotoMan MHJF
77-3001-0000	ScorBot-ER-4U Automated Welding
77-8082-0000	Robotics & Material Handling I for ScorBot ER-4U
77-8083-0000	Robotics & Material Handling 2 for ScorBot ER-4U
77-5003-0000	Robotics & Material Handling I for MotoMan MHJF
77-5004-0000	Robotics & Material Handling 2 for MotoMan MHJF

Hardware

00-0413-0000	ScorBot ER-4U Robotic Arm
ROB-MHJF-BASE	MotoMan MHJF Robotic Arm Kit
00-0440-0000	MotoMan GP8 Robotic Arm

Software

SCORBASE ROBOTIC CONTROL SOFTWARE

63-7000-0100	RoboCell virtual simulation control

Accessories

00-1710-0000	Teach Pendant for ER-4U
00-0648-0000	Pneumatic Gripper with I/O Box for MHJF
00-0649-0000	Pneumatic Gripper with I/O Box for GP8

STEM ROBOTICS PROGRAMS

Middle School and High School Engineering Programs with Robotics

Intelitek robust engineering programs for STEM (Science, Technology, Engineering and Math) motivate students, empower instructors and support administrators in the quest to equip students with career- and college-ready skills. These programs focus heavily around mobile robotics and the principles of engineering, mechanics, programming and technology, while introducing the connection between robotics and science and robotics and math.

STEM ROBOTICS PROGRAMS

Exploring Robotics: provides an introductory easy-to-implement solution for delivering early engagement and discovery of STEM topics for middle school students.

Robotics Engineering Curriculum (REC): provides a comprehensive study of engineering concepts including physics, programming, mechanical systems, electrical and electronics systems.

Introduction to Competitive Robotics: introduces students to the world of robotics competitions learning engineering concepts related to robotic design, construction and programming. The course uses team-oriented activities and classroom competitions.

Introduction to Engineering: provides students an excellent overview of the field of engineering, including the history of engineering, career choices and the engineering design process. Hands-on activities involve product design, career seeking and ethics.

Coding Robots powered by CoderZ: CoderZ is an online learning environment where students learn STEM by coding real or virtual 3D robots. The curriculum and platform offer a state-of-the-art cloud based environment to integrate STEM education into a school program.

ROBOTICS AND AUTOMATION PROJECTS

SkillsUSA® Robotics and Automation Technology

The Robotics and Automation Project is an engaging simulation of the industrial automated manufacturing process. Teams of two students layout and program a robotic production system as a solution to the project scenario.

Choose from the all-inclusive package with the ScorBot ER-4U robot, or add packages with the necessary project hardware to use with your existing robotics package. All packages require a 4' x 4' work surface on which to mount components.

Shape Sorter Project

CATALOG #: 10-7005-1000

Students are challenged to automate a sorting process, including the selection and design of a sensing and identification system, and the integration of the identification system within a robotic system.

To complete the project, students must create an effective and efficient sensing system, create a precision robot program, and integrate the sensing and robotic systems to form an automated sorting system.

All-inclusive Project Package

CATALOG #: 10-7077-1000

MATERIALS INCLUDED:
- E-learning Content: Robotics and Automation project with teacher supplement and one complete solution
- ScorBot ER-4U Robotic Package with ScorBase for USB-Controller, Teach Pendant
- All required hardware for the project workcell.

Add-on Project Package

CATALOG #: 10-7018-1001

MATERIALS REQUIRED
- Robotics and Materials Handling 1
- ScorBot ER-4U Robotic Package including the ScorBot ER-4U mechanical arm with controller and software

MATERIALS INCLUDED:
- E-learning Content: Robotics and Automation project with teacher supplement and one complete solution
- All required hardware for the project workcell

Intelitek Learning Solutions

Intelitek transforms education across the globe with comprehensive technology learning solutions. Our innovative tools and technologies empower instructors and inspire students to improve the world around them. We understand the changing needs of your career and technology classrooms and design flexible solutions that meet those needs.

With sustainable support and professional development to ensure the continued success of your programs, Intelitek programs deliver the competencies needed for in-demand careers.

At Intelitek we are producing results for students, teachers, nations and economies.