iRVision
Fully integrated plug & play vision system
Machine vision in 2D, 2½D and 3D

Efficiency tool for higher productivity
Enter the efficiency zone!
FANUC designs efficiency for your production processes in form of CNC systems, drives, robots and production machines. All produced in one of the most highly automated factories in the world. Ready to integrate and backed by unrivalled support and service. It’s how we give you a competitive edge. Manufactured Efficiency for productivity to go.

FANUC is the factory automation specialist
We’ve been automation experts for almost 60 years. With more than 24.5 million FANUC products operating worldwide – including 550,000 FANUC robots, 4.1 million FANUC CNCs and 19.6 million FANUC servomotors – we think our track record speaks for itself.*

Efficient products
All FANUC products involve manufactured efficiency. Fewer parts and lean technology make them reliable, predictable and easy to repair. They are made to run and provide you with the highest uptime on the market.

Efficient innovations
Manufactured efficiency is also at the heart of every FANUC innovation. Based on proven FANUC technologies, this is designed to increase the efficiency of your production facilities.

Efficient support and service
FANUC support and service is about manufactured efficiency, too. We listen carefully to your needs and deliver on our promises. We also take care of our products as long as they are in service. Personal and responsive, we help you achieve maximum efficiency.

*status 07/2018
We empower robots to see

iRVision is FANUC’s unique, fully robot integrated visual detection system enabling the robots to see in order to manage production settings in a faster, smarter and more reliable way. This increases the overall production flexibility and efficiency in the workplace. The iRVision application solution can be implemented without complicated programming or expert knowledge. The need to place the work piece in an exact position for the robot to grip is no longer required, as iRVision recognizes the work piece independently. This results in a high operational efficiency of the overall process. The solution is applicable to various industries (Automotive, Food, Metal, Plastic, Aeromotive, Pharma, etc.) and can be customized according to your various needs.

100% FANUC

Based on over 30 years of experience, we are specialists on the field of specifically tailored vision systems for robots. FANUC robots stand for high reliability, and our globally uniform service & support network guarantees competent troubleshooting and a timely delivery of spare parts.

FANUC iRVision supports:

• Up to 7 cameras (B/W and colour) in different resolutions connectable.
• Supported vision technologies: 2D, 2½D, 3D by laser projection and 3D map by structured light.
• Can be combined with Bin Picking and iRPickTool.
• Complete robot range, from small to large.
• Detection of non-moving and moving parts independent of their size, shape or position.
• Usage of iRVision for advanced service functions (iRCalibration Suite).
• Tools which automate calibration procedures and make manual teaching unnecessary.

Efficient ease of use

The solution is setup within a fast matter of time, as it guides you through each step along the way. A powerful vision toolbox, that is integrated in the standard iRVision package, supports any tailor-made application. Thanks to a common HMI (GUI), all vision types share the same look and feel, independent of the used software/hardware platform. The vision executions are integrated in the basic robot TPP (Teach Pendant Programming) with direct and complete access to vision process data through iPendant.

Easy simulation

All vision types of iRVision are supported in the simulation software ROBOGUIDE. This software enables a simulation of the process, allowing you to select and modify parts and dimensions as required and evaluate the feasibility and efficiency of the entire process before making a purchase decision.

Easy plug and play technology

iRVision is fully robot integrated, not requiring an interface to external devices or any additional hardware (such as PCs, monitors or side cabinets) for the set up and operation. The vision process configuration can be done directly on the robot controller itself or via the internet explorer browser. The entire range of robots - from small to large ones, as well as all controller types are compatible with the iRVision solution because the controller hardware is ready-for-vision.

Over 30 years of iRVision experience

2800 units sold per year
Cover all types of vision with iRVision

Thanks to iRVision, each robot works as precisely as a human operator. All types of vision are applicable, ranging from 2D to 3D Vision Sensor. The entire range of robots can be equipped with this technology, from the smallest to the strongest robot, also including all our controller types. Based on this vast variety, the iRVision solution is suitable to various applications and industries.

Ultimate flexibility for your production processes.

The robot equipped with iRVision is able to:
- perform visual processing
- perform picking and placing of randomly positioned and oriented parts
- sort by colour, shape or many other features
- read 1D and 2D barcodes
- control completeness and dimensions
- perform quality controls

2D vision
- Detection of objects positioned in one layer (X,Y,R)
- Picking up non-moving parts

2½D vision
- Detection of objects positioned in two or more layers (X,Y,Z,R)
- Picking up non-moving parts with different heights

3D laser vision
- Detection of object position and orientation by laser projection (X,Y,Z,W,P,R)
- Picking up non-moving parts in all 6 degrees of freedom

3D Area Sensor and 3D Vision Sensor
- Detection of objects by 3D map (structured light projection) (X,Y,Z,W,P,R)
- Can be used for high-end vision based bin picking, depalletising, and other material handling applications and functions despite the parts conditions, e.g. being dirty, rusty or oily

iRPickTool
- Detection of objects on-the-fly in conveyor tracking (X,Y,R)
- For all processes involving the need to identify, pick and place objects on a moving conveyor

iRCalibration
- iRCalibration functions are service tools based on iRVision. They simplify the initial setup, speeding up the entire integration, which results in an improvement of the application accuracy.

iRVision Weld Tip Inspection / iRTorchMate
- iRVision Weld Tip Inspection for spot welding
- iRTorchMate for arc welding
- Supports the optical wear and condition control of a WeldTip or ArcTorch during automatic production.
**iRVision overview**

- Vision software is completely embedded in the robot’s hard- and software
- 2D, 2½D, 3D and Barcode reading
- *iRPickTool* supports 2D *iRVision*
- 2 different 3D technologies (3D-map and 3D-laser projection)
- Image processing and data storage on robot controller
- Max. 7 cameras connectable to one robot controller
- Different resolutions up to 1280x1024 pixels
- Colour camera support (max. 640 x 480 pixels)
- Many vision algorithms supported such as Geometric Pattern Matching and Blob detection
- Cable length up to 50m supported
- Huge vision tool box embedded in *iRVision* standard software package
  - Over 20 different vision process types supported
  - Additionally over 50 different vision command tools could be used/combined to create a special, tailor-made *iRVision* solution
- Robot integrated camera cable for harsh environment
- 100% FANUC Product, worldwide support
- FANUC simulation-software ROBOGUIDE supports all *iRVision* types

**Pre-sales support**

Prior to the purchase of our *iRVision* solution, we offer to test the vision process with you within your environment. Through the usage of our simulation software tool – ROBOGUIDE, we are capable of evaluating the time, effort and feasibility of the entire process to implement the vision system application requirements.

**Integration and Maintenance support**

Once you have selected the *iRVision* solution, we further support you in getting started with the set-up to tailor the solution to your individual application needs. We provide you with a direct access to your entire vision process, enabling you to identify further vision needs. Furthermore, our 24/7 real-application support hotline is available worldwide, where technicians provide their help in troubleshooting the entire setup.
iRVision 2D

iRVision finds parts and their precise positioning and part orientation (X,Y, Z and R). As a result, the production flexibility increases due to the eliminated need for expensive positioning fixtures. 2D vision is suited for any material handling applications, palletising and depalletising applications, as well as for vision inspections.

- **3D Tri-View Vision process,**
  - X,Y,Z robot coordinates for non-moving parts
- **2D Calibration Free Vision process,**
  - X,Y,Z robot coordinates for non-moving parts
- **2D Multi-View Process,**
  - X,Y,Z robot coordinates for non-moving parts
- **2½D Depalletising Vision process,**
  - X,Y,Z robot coordinates for non-moving parts
- **2D Single-View Inspection process,**
  - X,Y,Z robot coordinates for non-moving parts
- **2D Single-View Visual Tracking process,**
  - X,Y,Z robot coordinates for non-moving parts
- **2D Multi-View Vision process,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D Cylinder Locator tool,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D Box Locator tool,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D GF Locator tool,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D Blob Locator tool,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D Peak Locator tool,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D COG Measurement tool,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D Plane Measurement tool,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D Obstruction Measurement tool,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D Plane View Process,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D Peak Locator tool,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D Blob Locator tool,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D Cylinder Locator tool,**
  - X,Y,Z robot coordinates for non-moving parts
- **3D One-Sight Model Locator tool,**
  - X,Y,Z robot coordinates for non-moving parts
- **3DA/1300 for euro pallet format (1340 x 1000 x 1000 mm),**
- **3DV/400 for smaller field of view (400 x 300 x 300 mm),**
- **3DA/1300 for euro pallet format (1340 x 1000 x 1000 mm),**
- **3DV 3DA Sensor and 3D Area Sensor use a projector unit for 3D measurements, 3D data are measured in a wide area by projecting structured light very quickly for reliable detection. 3DA Sensor can be mainly used for depalletising and bin picking. 3DV Sensor can also be used for kitting, tote picking in logistics, presence/absence check, 3D visual line tracking and many more.**

**DIFFERENT 2D PROCESS TYPES AVAILABLE**

- **2D Single-View Vision process,**
  - X,Y,Z robot coordinates for non-moving parts
- **2½D Depalletising Vision process,**
  - X,Y,Z robot coordinates for non-moving parts
- **2D Multi-View process,**
  - X,Y,Z robot coordinates for non-moving parts
- **2D Single-View Visual Tracking process,**
  - X,Y,Z robot coordinates for non-moving parts
- **Gaze Line Offset Vision Process,**
  - X,Y,Z robot coordinates for non-moving parts
- **Single View Inspection process,**
  - X,Y,Z robot coordinates for non-moving parts
- **Calibration Free Vision process,**
  - X,Y,Z robot coordinates for non-moving parts
- **Tri-View Vision process,**
  - X,Y,Z robot coordinates for non-moving parts
- **Barcode Reader Vision process,**
  - X,Y,Z robot coordinates for non-moving parts
- **Image to Points Vision process,**
  - X,Y,Z robot coordinates for non-moving parts
- **Floating Frame Vision process,**
  - X,Y,Z robot coordinates for non-moving parts
- **Camera View Line for non-moving parts,**
  - X,Y,Z robot coordinates for non-moving parts
- **RPickTool to pick parts from a moving conveyor,**
  - X,Y,Z robot coordinates for non-moving parts

**DIFFERENT 3D TOOLS AND FUNCTIONS AVAILABLE**

- **3D Area Sensor**
  - 3D data are measured in a wide area by projecting structured light very quickly for reliable detection. 3DA Sensor can be mainly used for depalletising and bin picking. 3DV Sensor can also be used for kitting, tote picking in logistics, presence/absence check, 3D visual line tracking and many more.

- **3D Peak Locator tool,**
  - X,Y,Z robot coordinates for non-moving parts
  - Locally, it finds the highest position in the 3D map
- **3D Blob Locator tool,**
  - X,Y,Z,W,P,R robot coordinates for non-moving parts
  - It delivers normal vector of plane positions of the gravity centre of blobs
- **3D GF Locator tool,**
  - finds the grip position of a work piece using real grippers,
  - In case a part needs to be picked up with a gripper (no vacuum or magnet), additional space around the part is mandatory. GF locator tool uses a gripper model to find the best pick position
- **3D Box Locator tool,**
  - finds boxes which are palletized orderly. It uses the size of boxes to find their upper surface by referring to a 3D map and a camera image
- **3D Cylinder Locator tool,**
  - finds some cylinder parts from a 3D map
- **3D One-Sight Model Locator tool,**
  - finds a 3D model which has been taught in advance for one face of a workpiece from 3D data and outputs the 3D position and posture
- **Interference avoidance**
  - takes all mechanical interference contours in account and plans all mandatory positions for the robot approach, the pick and retract movements. Complete robot movement is planned by the system itself

**Bin Picking Support (optional)**

Bin picking system enables the vision system to recognize the position and orientation of all parts, which are randomly placed inside a container. This option contains all mandatory functions required for a successful bin picking application. Bin picking supports all types of iRVision Sensor, and provides two important functions:

- **Part list manager**
  - organizes all detected parts in accordance to their position and orientation, reachability and other part-relevant information
- **Interference avoidance**
  - takes all mechanical interference contours in account and plans all mandatory positions for the robot approach, the pick and retract movements. Complete robot movement is planned by the system itself
**iRVision 3D by 3DL sensor head**

iRVision 3D uses a hybrid sensor head (FANUC development) for the 3D vision function. 3DL head uses structured laser light projections for reliable detections. The projection of structured light makes the system robust against various surface conditions (e.g. flat metal, rust, wet, discolorations, etc.). Through this hybrid technology, FANUC’s 3DL Sensor can detect 3 dimensional position and posture of a part.

**DIFFERENT 3DL PROCESS TYPES AVAILABLE**

- **3DL Multi-View Vision process**, X,Y,Z,W,P,R robot coordinates for non-moving parts. Provides increased accuracy for huge parts based on at least two camera snaps
- **3DL Cross Section Vision process**, X,Y,Z,W,P,R robot coordinates for non-moving parts, linked to UTool or UFrame. Laser slit beam projection generates a black and white image of the contour of the part
- **3DL Curved Surface Vision process**, X,Y,Z,W,P,R robot coordinates for non-moving parts, combines CSM. Locator Tool and laser beam projection to locate parts with a cylindrical surface

**Bin Picking Support [optional]**

Bin picking system enables the vision system to recognize the position and posture of all parts, which are randomly placed inside a container. This option contains all mandatory functions required for a successful bin picking application. Bin picking supports all types of iRVision Sensors, and provides two important functions:

- **Part list manager** organizes all detected parts in accordance to their position and posture, reachability and other part-relevant information
- **Interference avoidance** takes all mechanical interference contours in account and plans all mandatory positions for the robot approach, the pick and retract movements. Complete robot movement is planned by the system itself

**iRCalibration**

iRCalibration functions are based on iRVision, but it is a stand-alone service tool to simplify the initial setup and to speed up the entire integration, which results in an improvement of the application accuracy. Additional solutions based on vision systems are the iRVision Weld Tip Inspection, which prevents wear and tear of the weld tip, and the iRTorchMate, which inspects the ArcTorch, calculates and corrects a possible misalignment.

**DIFFERENT iRCALIBRATION FUNCTIONS AVAILABLE**

- **iRCalibration vision mastering /mastering recovery function**
  Supports quicker and simpler mastering/ remastering of FANUC robots, independent of the operator’s skills
- **iRCalibration vision tool center point (TCP) setting**
  Supports simpler and more accurate setting of the robot TCP, independent of the operator’s skills
- **iRCalibration vision frame setting**
  Supports simpler and more accurate setting of robot UFRAME. Function is available as a manual, one time setup function or as an automated UFRAME setting, independent of the operator’s skills
- **iRCalibration vision multi group calibration**
  Supports simpler and more accurate setting of relationships between two robots, or between a robot and a positioner coordinated by a single controller, independent of the operator’s skills

**iRVision Weld Tip Inspection for spot welding**

Supports the optical wear and condition control of a WeldTip during automatic production. Based on the result, the tip can be reworked or replaced without a production interrupt

**iRTorchMate for arc welding**

Supports the optical control of an e.g. ArcTorch during automatic production. Based on the result ArcTorch offset can be added or other actions can be executed

**iRTorchMate**

Prevents alignment issues from occurring by keeping the tool centre point exactly on the tool path, ensuring consistent weld quality
**Efficient supply:**

- **Lifetime OEM spare parts**
  As long as your machine is in service, we will provide you with original spare parts for a minimum of 25 years. With more than 20 parts centres all over Europe, dedicated service engineers and direct online access to FANUC stores, availability checks and ordering, we keep you running whatever happens.

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**Efficient long-time productivity: FANUC Maintenance Services**

To minimise impact on production and get the most out of your machine, we offer maintenance services designed to lower your machine’s TCO. Whatever your production scenario, FANUC solutions keep your machine running via dedicated preventive, predictive and reactive maintenance procedures that maximise uptime and keep downtime to a bare minimum.

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**Efficient training: FANUC Academy**

The FANUC Academy offers everything you need to upskill your teams and increase productivity – from introductory programs for beginners through to courses tailored to the needs of expert users and specific applications. Fast and effective learning, on-site training or cross machine training, make up the extensive educational offering.

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**Efficient FANUC service worldwide**

Wherever you need us, our comprehensive FANUC network provides sales, support and customer service all around the world. That way, you can be sure you have always got a local contact that speaks your language.

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**Different 2D Process Types available:**

- **2D Single-View Visual Tracking, X,Y,R robot coordinates for moving parts**
- **2D Multi-View Visual Tracking, X,Y,R robot coordinates for moving parts. Increased accuracy for huge parts based on more than 1 camera snap**
- **iRPickTool’s highly functional software package includes:**
  - Various system layouts by default supported
  - Linear and Circular conveyor systems by default supported
  - Multiple robots by default supported, connected by TCP/IP
  - Queue Management by default integrated in the standard iRPickTool software package
  - Load balancing by default integrated. Amount of parts to be handled by each robot can easily be manipulated during runtime
  - Recipe management by default supported to quickly switch between different production scenarios
  - Tray function (Box or blister) by default integrated. Completeness check of outgoing tray and tray management is easy to setup, fully supported by load balance and additional special functions
  - Conveyor stop/start function by default integrated. Indeed part check and outgoing tray completeness check could be combined with the conveyor stop/start and/or ejector function to eject incomplete trays
  - Different sorting functions by default integrated
  - Wide conveyors can be equipped with several parallel mounted cameras to increase part detection accuracy
  - Pre-Grouping by default integrated. Creation of pre-groups on the same conveyor to save time when complete groups can be picked and placed in downstream area
  - Sensor task customization can be performed by users to have full control over complex detection methods and queue feed. This is supported by default
  - Servo conveyor and Indexer function by default supported in order to control conveyor by FANUC servo motor

**iRVision functions**

**iRPickTool**

iRVision 2D functionality can be added to iRPickTool to support the detection of randomly placed parts on a moving conveyor. This way, the iRPickTool equips single or multiple robots with the ability to identify, pick and place items in linear and/or circular conveyor tracking. This is supported by a wide range of features including advanced queue management, buffering and tray functionality.

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**iRVision functions**

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MANUFACTURED EFFICIENCY: 5 PRODUCT GROUPS – ONE COMMON SERVO AND CONTROL PLATFORM

- ROBODRILL Compact CNC Machining Centres
- ROBOSHOT Electric CNC Injection Moulding Machines
- ROBOCUT CNC Wire-Cut Electric Discharge Machines
- ROBOTS Industrial Robots, Accessories and Software
- FA CNCs, Servo Motors and Lasers

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