Mech-Mind Robotics

AI+3D Vision Solutions for Manufacturing Industry

Mech-Mind has deployed nearly 1000 real-world use cases in the automotive, steel, home appliance industries, etc.

Mech-Mind
AI+3D Vision Pioneer in Manufacturing Industry

Aiming to drive the ubiquity of intelligent robots, Mech-Mind is committed to leveraging technical strength to pioneer the next frontier of manufacturing. Mech-Mind has made an unparalleled commitment to R&D and its product portfolio including Mech-Eye industrial 3D cameras, Mech-Vision graphical machine vision software, Mech-DLK offline training tool, Mech-Viz intelligent robot programming environment, etc.

Mech-Mind provides complete and cost-effective intelligent industrial robot solutions to customers in the manufacturing industry, with **attractive products, intimate service and supporting software tools.**

We have already provided more than **1000** our intelligent industrial robot solutions in many industries, such as manufacturing, automobiles, steel, home appliances, and other fields.

Solution Advantages

- **High Intelligence:** Our solutions can handle various objects (including crankshafts, steel plates, metal bars, track links, valve blocks, track shoes, wheels, engine rods, rotors, crankcases, etc.).
  Support complex situations like randomly-placed metal parts, parts with a certain degree of reflection, dark surfaces, etc.

- **Competitive Price:** The price is only half of the same type of typical products.

- **Easy to Deploy and Use:** The plug-and-play solutions save a lot of deployment time. The fully visualized, code-free programming interface provides simple operation and dramatically reduces deployment costs.

- **Easy Integration:** Our products can be adapted to various mainstream and support integrating with various systems.

- **Wide-range Application Cases:** Previous applications cover machine tending, path planning, locating, assembling, industrial inspection/measuring, etc.
  Our solutions have been successfully applied in hundreds of leading companies in China, the United States, South Korea, Japan, Germany, Spain and other countries.
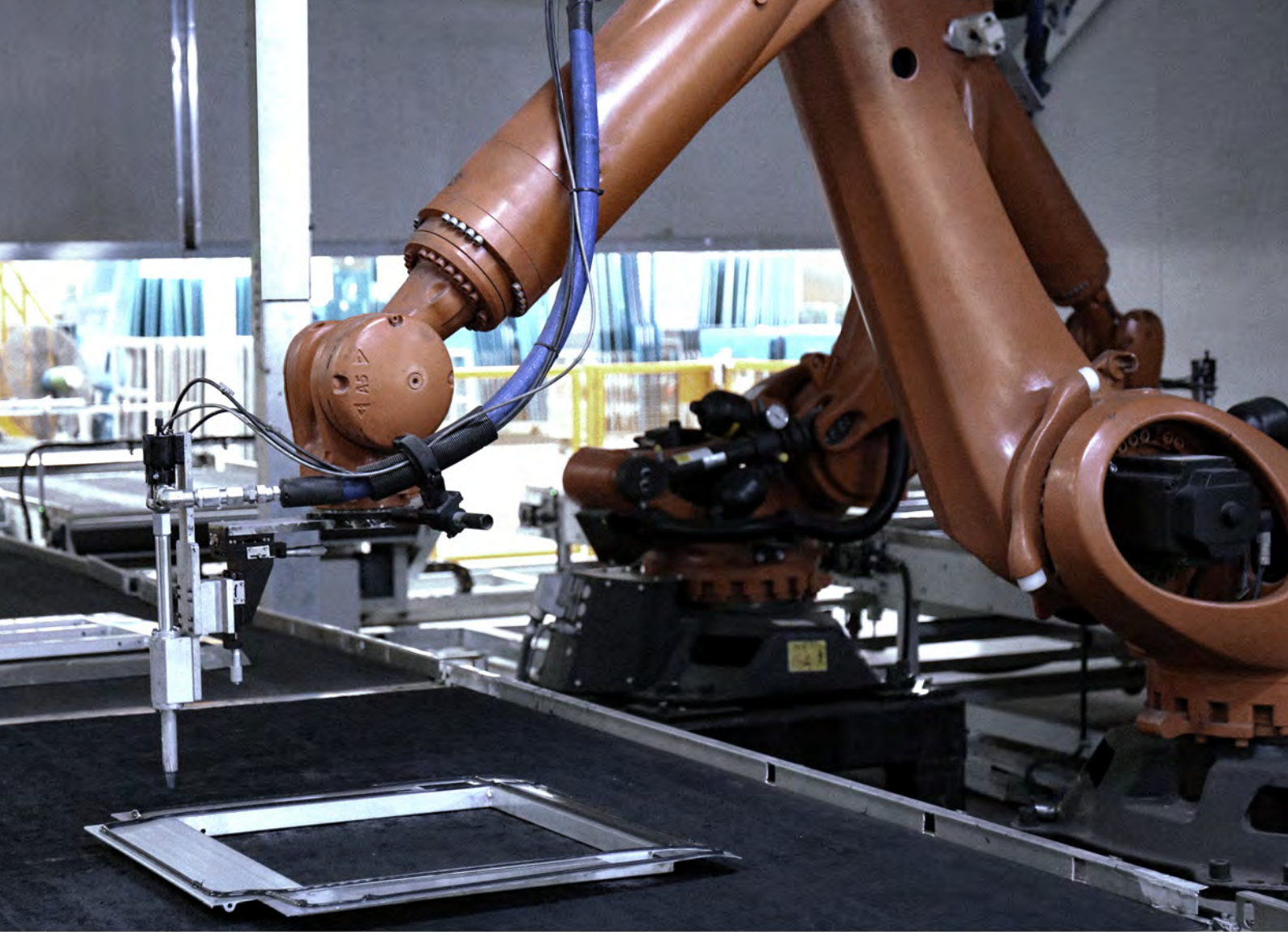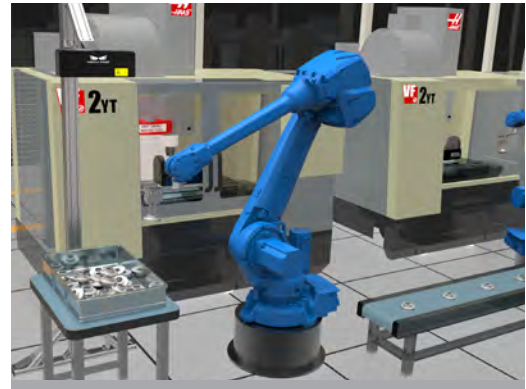
Typical Solutions

Vision-Guided Machine Tending

Vision-guided robot grabs randomly-placed workpieces in the bin one by one and places them on the machine tool or conveyor belt. The solution can be applied in the fields of automotive, machinery, steel, etc.

Solution Advantages

- Our self-developed industrial 3D vision camera is dust and water proof with IP65 enclosures standards. It can operate long hours in complex and real factory environment.

- The intelligent grabbing algorithm can guide robots to choose the most proper grabbing position, ensuring stability and safety.

- Able to handle reflective and complex structured workpieces in different sizes, and workpieces of new specifications.

- Support unlimited object status. Able to recognize tightly-packed or randomly-placed workpieces.
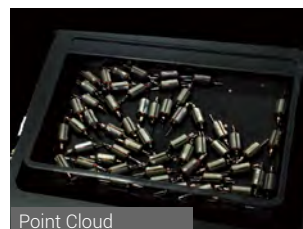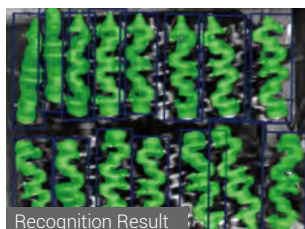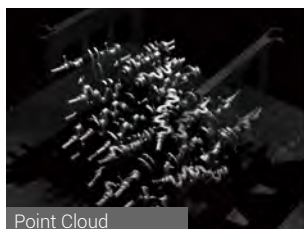

Specification

Accuracy	Up to 0.1 mm @ 1 m
Speed	Single cycle time can reach 3 s (the actual speed is related to the layout and end effector).
FoV	Up to 3 m × 2.4 m @ 3 m
Flexibility	Able to handle a certain degree of reflection, black surfaces, complex structures, closely fitting or overlapping, etc; Intelligent path planning and grabbing algorithms ensure stability.
Major Application Fields	Automotive, machinery, steel, home appliances, etc.
Objects	Support various object status like dark or reflective surface, tightly- and randomly-placed workpieces.
Robot Brands	Adaptable to various major robot brands, such as ABB, KUKA, YASKAWA, Kawasaki, Rokae, Peitian, Techman, Estun, etc.
Common Camera Models	Mech-Eye Laser, Mech-Eye Enhanced Series

Point Cloud and Recognition Result

Randomly-Placed Metal Parts (e.g., Engine Rods, Crankshafts, Rotors)

Point Cloud

Recognition Result
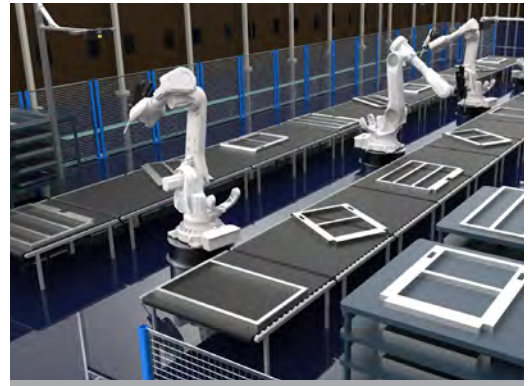

Point Cloud

Recognition Result

Typical Solutions

Vision-Guided Automatically Locating and Path Recognizing

Vision-guided robot recognizes specified materials/workpieces (such as steel plates, glass, vehicle doors, etc.) as required in real time.

Solution Advantages

- Support workpieces in various shapes and sizes(including steel plates, side window, crankshafts, etc.).

- With high precision and an extended field of view, Mech-Eye can meet the scanning range and accuracy requirements in typical scenarios, such as track gluing, oiling, painting, cutting, etc.

- Scanning speed and cycle time can meet the requirements of users.

- With quick self-calibration, our solution can easily handle parts in various types.

- The communication between vision systems and mainstream brand robots/truss robots is done via TCP/IP using Mech-Mind native command.

- Seamless integration with logistic equipment such as AGV.


Specification

Accuracy	Up to 0.1 mm @ 2.5 m
Speed	Single cycle time can reach 3s
FoV	Up to 3 m × 2.4 m @ 3 m
Typical Scenarios	Cutting, gluing, spraying, oiling, etc.
Common Camera Models	Mech-Eye Laser, Mech-Eye Enhanced Series
Maturity	Thousands of our solutions have been well applied in manufacturing, automobile, home appliance industries, etc.

Point Cloud and Recognition Result

Workpieces in Various Shapes and Sizes (e.g., Steel Plate, Glass)
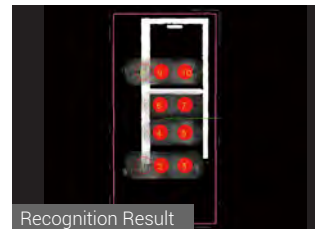

Point Cloud
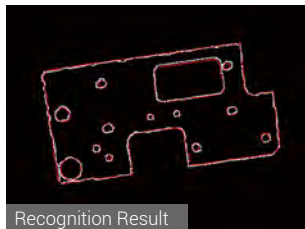
Recognition Result

Point Cloud

Recognition Result

Typical Solutions

Vision-Guided Assembly & Locating

Vision-Guided Assembly

Vision-guided robot grabs randomly-placed workpieces and assembles them on the designated position.
The solution is suitable for manufacturing, automobile, home appliance industries, etc.

Vision-Guided Locating

The 3D vision-guided robots can locate randomly-placed objects. The solution is suitable for manufacturing, automobile, home appliance industries, etc.

Solution Advantages

- Our solution is suitable for picking objects in manufacturing industry such as tyres and shells.

- Randomly-placed, dark, or reflective parts can be well handled.

- With high precision and an extended field of view, our solution can accurately locate the assembly position.

- The production line system can be seamlessly integrated with upstream and downstream processes to improve efficiency.

Solution Advantages

- Support objects in various shapes and sizes

- Built-in collision detection, path planning, and other advanced algorithms ensure stability.

- Complex situations like randomly-placed metal parts with a certain degree of reflection, dark surfaces, or complex structures, etc. can be well handled.

- The production line system can be seamlessly integrated with upstream and downstream processes to improve efficiency.

Specification

Accuracy	Up to 0.1 mm @ 1 m
Speed	Single cycle time can reach 3s (the actual speed is related to the actual scene and object status).
Typical Scenarios	Peg-in-hole assembly, screw tightening, rebar marking.
Common Camera Models	Mech-Eye Laser, Mech-Eye Enhanced Series
Maturity	Thousands of our solutions have been well applied in manufacturing, automobile, home appliance industries, etc.

Point Cloud and Recognition Result

Tire Assembly (Positioning Hole)

Steel Bar

Point Cloud

Recognition Result

Point Cloud

Recognition Result
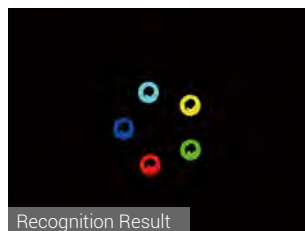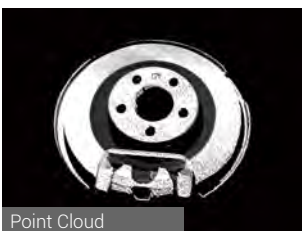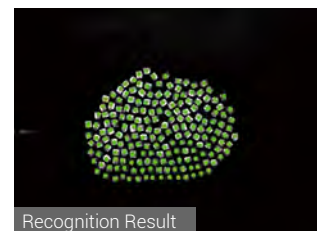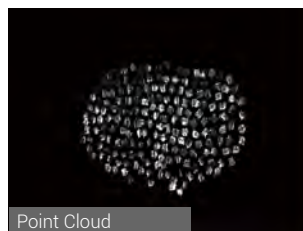
Typical Use Cases

A Large Machinery Factory
Vision-Guided Machine Tending (Track Links)

Background

The customer is a private construction machinery giant. Its factory was once full of noise and dust, which damaged the health of workers. While to improve productivity, the factory often operated 24 hours a day. Unfortunately, it also led to higher labor costs.
Therefore, this customer decides to automate the production line with our products to uplift productivity while decreasing labor costs.
Besides, the customer hopes that the external light interference at the workshop can be well handled by using our products.

Parts are stacked in the deep bin, accompanied by severe ambient light interference in the workshop.

Highlights

- The robot precisely grabs the randomly-placed track links in a deep bin. Then it places the track links in designated positions with correct orientations.

- Mech-Eye Laser L 3D camera can better cope with the ambient light interference in factory, and significantly reduce the demand for shading facilities.

- Using TCP fixtures, multi-grabbing strategy, and intelligent path planning algorithm to ensure stability and avoid collision.

- The robot guided by 3D vision can be seamlessly integrated to the upstream and downstream of the production line.

Point Cloud

Performance

- Dozens of robot cells have been deployed. The daily output of each station has been increased to **1000+**.

- Labor costs are significantly reduced. Speed and stability can meet customers' needs.

Recognition Result

Typical Use Cases

A Large Bus Factory
## Vision-Guided Adhesive Applying (Side Windshield)

Background

Our customer is a giant bus manufacturer in China. Adhesives applying is very common in its factory. For optimum results, the correct consistency and quantity of the adhesive medium must be ensured at all times, which is difficult for human labor to accomplish. To cut operation and labor cost, and improve quality and efficiency, our customer decides to automate the process of glass and windshields installing.


Highlights

- The robot with a dispensing head is able to apply adhesive along the outer edge of a randomly-placed side windshield.
- The system supports different types of glasses and windshields.
- Path Planning and collision checking algorithms help to avoid collision, which ensure the operational stability of robot station.
- The robot station supports various adhesive applying technics, greatly improving the flexibility of the whole production line.
- Performance (precision, FoV, cycle time, etc.) of the robot system easily meets the requirements of the customer.
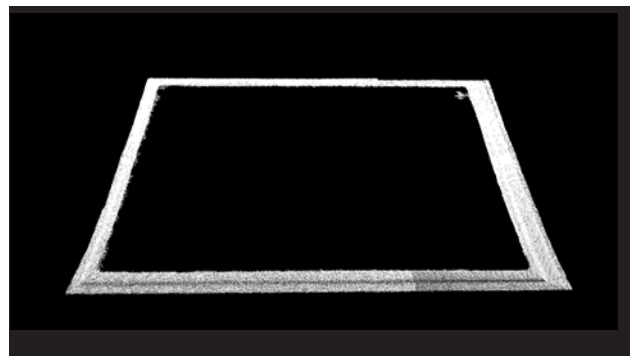
Point Cloud

Performance

- Labor and operation costs are dramatically decreased.
- The robot system has been deployed in many bus factories to automate the process of adhesive applying.
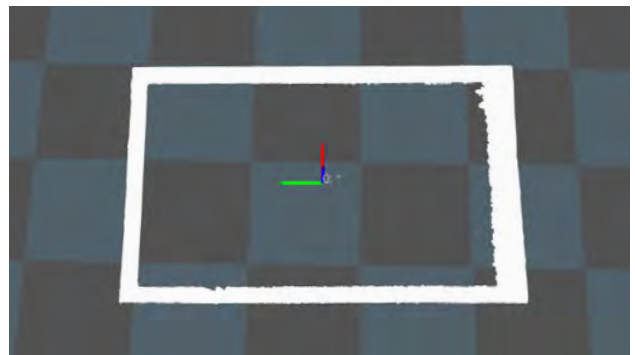

Recognition Result

Typical Use Cases

## A Large Steel Mill
Vision-Guided Rebar Locating (Labeling)

Background

The customer is a leading enterprise in the steel industry. Rebar labeling is a necessary process before each bundle of rebar is delivered. In order to improve work efficiency and reduce the risks of manual operations, our customer hopes to automate the rebar labeling process. This robot station must be adapted to rebar labeling (including single label, double label, etc.) and counting work under different application scenarios.
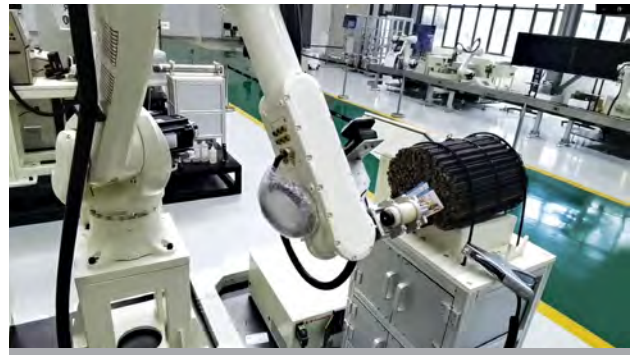

Highlights

- With high intelligence, the robot can ensure the label do not exceed the cross section of the steel bar while labelling, which avoids falling caused by external force to improve stability.

- Deep learning algorithms help calculate the number of rebars at the same time.

- Suitable for marking different sizes of steel bar bundles (8-30 mm in diameter).

- With high flexibility, our solution supports free switching of single/ double-label mode; The re-shooting function can assist in confirming the situation of card drop.

- Our industrial 3D camera can easily cope with the harsh working environment such as high temperature and dusty air.
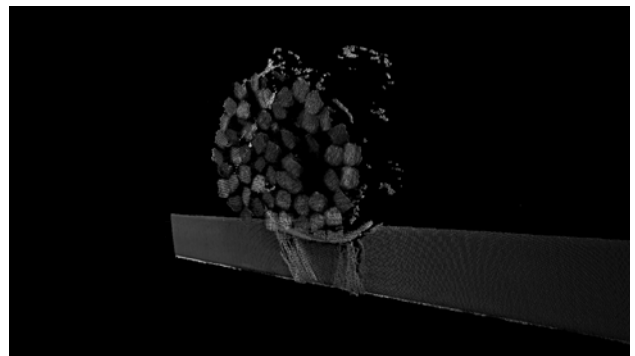
Point Cloud

Performance

- 24-hour production greatly improved the on-site production efficiency of the customer.

- Our solution can easily cope with hundreds of newly added bundles per day.

- Our solution has been running stably for several months.
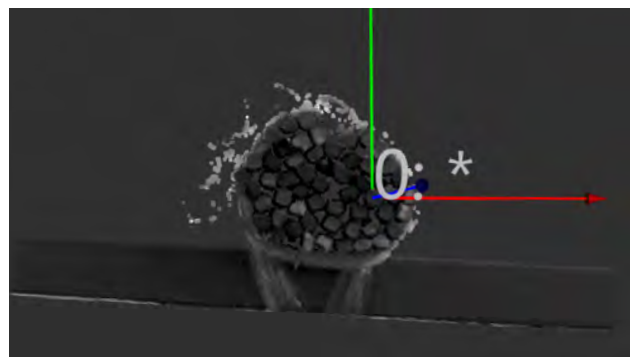
Recognition Result

Typical Use Cases

A Large Air-conditioning Company
Vision-Guided Machine Tending

- Cycle time reaches 3 s/piece.
- It can identify black objects with complex structure in deep bins.
- Intelligent grabbing planning algorithm calculates the appropriate grabbing location to ensure stability.

A Large Auto Parts Factory
Vision-Guided Machine Tending

- Our solution can handle situations such as randomly-placed parts, considerably reflective or dark objects.
- Intelligent path planning algorithm guides the robots to avoid collision.
- Can be seamlessly integrated to the upstream and downstream of the production line.
- Intelligent grabbing planning algorithm automatically calculates the appropriate grabbing location to ensure stability.

A Large Bus Factory
Vision-Guided Machine Tending

- Support parts in various shapes and sizes.
- Support randomly-placed metal parts, parts with complex structures etc.
- The performance such as precision, the field of view, and cycle time can fully meet customers' needs.
- High-quality gluing without wasting.

A Large Automotive OEM
Vision-Guided Machine Tending

- Can identify engine rods of different specifications.
- Randomly-placed parts, considerably reflective and dark objects can be well handled.
- Can be seamlessly integrated to the upstream and downstream of the production line.
- The intelligent path planning algorithm guides robots to avoid collisions.

Typical Use Cases

A Large Car Plant

Vision-Guided Wheel Assembly

- Support for wheels in various shapes and sizes.
- Support for accurate wheel bolting and assembly on continuous flow production line.
- Ability to locate the threaded hole on the wheel hub with high precision.
- Support for seamless integration with other systems and equipment on the production line.

A Large Air-conditioning Company

Vision-Guided Compressor Assembly

- Support for compressors in various shapes and sizes.
- Support for compressors with pure black or considerably reflective surface.
- Advanced technologies including path planning and collision checking help to avoid collision.
- Support for identify the orientation of compressor accurately.

A Large Engineering Machinery Plant

Vision-Guided Plate Edge Beveling

- High precision with excellent stability.
- Support for considerably reflective steel plates in different sizes.
- Built-in collision detection, path planning and other advanced algorithms can avoid collision.
- The cycle time can fully meet customers' needs.

A Large Furniture Factory

Vision-Guided Adhesive Spraying

- Support for various seatback parts.
- Seatback parts can be randomly placed on the conveyor belt.
- High precision with excellent stability.
- The robot is able to recognize the orientation of the randomly located seatback parts and adjust the path to spray adhesive.

Mech-Eye Industrial 3D Camera
A Perfect Combination of Excellent Performance and Cost Effectiveness

Specification Sheet	Pro S Enhanced	Pro M Enhanced	Laser L	Deep
Optimal Scanning Range (mm)	500 - 1000	800 - 2000	1500 - 3000	1200 - 3500
Near FoV (mm)	350 × 220 @ 0.5 m	500 × 350 @ 0.8 m	1500 × 1200 @ 1.5 m	970 × 1160 @ 1.2 m
Far FoV (mm)	690 × 430 @ 1.0 m	1360 × 860 @ 2.0 m	3000 × 2400 @ 3.0 m	2830 × 3320 @ 3.5 m
Resolution	1920 × 1200	1920 × 1200	2048 × 1536	2048 × 1536
Megapixels (MP)	2.3	2.3	3.0	3.0
Z Repeatability (σ)	0.05 mm @ 1 m	0.2 mm @ 2 m	0.5 mm @ 3 m	1.0 mm @ 3 m
Accuracy	0.1 mm @ 1 m	0.2 mm @ 2 m	1.0 mm @ 3 m	3.0 mm @ 3 m
Typical Capture Time	0.5 - 0.8	0.5 - 0.8	0.5 - 0.9	0.7 - 1.1
Baseline (mm)	150	280	400	400
Dimensions (mm)	270 × 72 × 130	387 × 72 × 130	459 × 89 × 145	481 × 98 × 145
Weight (kg)	2.2	2.4	3.7	4.3
Operating Temperature	0 - 45°C		-10 - 45°C	0 - 45°C
Communication Interface	Ethernet			
Image Sensor	Sony CMOS for High-end Machine Vision			
Power Supply	24V DC			
Safety and EMC	CE/FCC/VCCI			
Protection Class	IP65			
Cooling	Passive			

| Mech-Eye Pro S Enhanced	Mech-Eye Pro M Enhanced	Mech-Eye Laser L	Mech-Eye Deep

Field of View (mm)
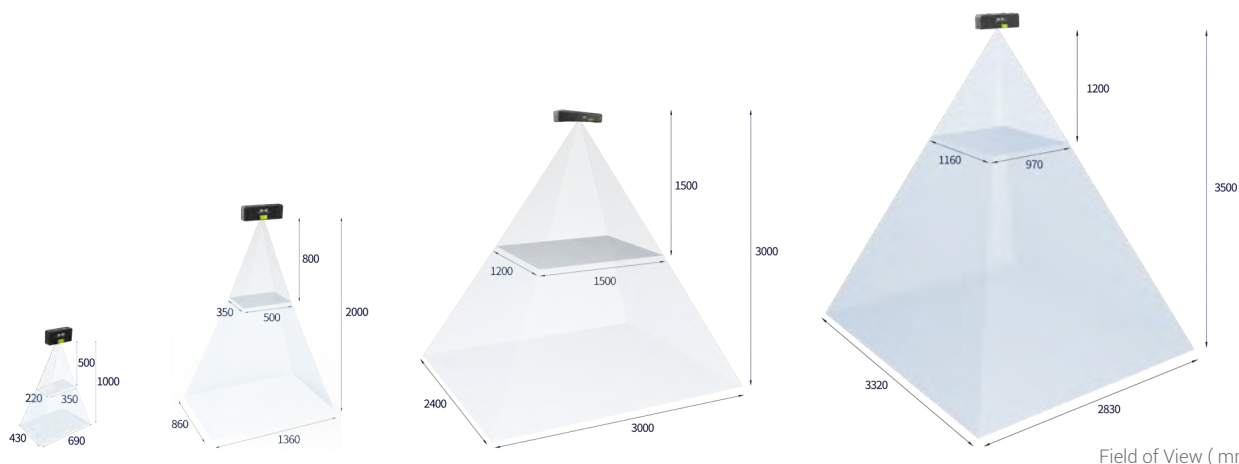
Mech-Vision

Graphical Machine Vision Software

Mech-Vision is the new generation machine vision software, which can complete depalletizing, machine tending, registration-free order picking, gluing/spraying, precise locating, defect detection, size measurement, etc. through a code-free graphical interface. The built-in advanced algorithm modules such as 3D vision and deep learning can meet complex and diverse practical needs.
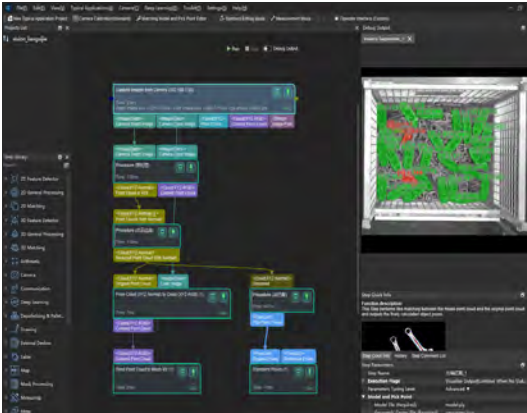
Code-free Graphical Interface, Easy to Use

Code-free graphical interface, concise UI design, and clearcut functional partitions. Professional programming skills are not required for users to realize visual engineering construction. The software enables integrator to develop models autonomously.

Built-in Advanced Algorithm Modules Such as Deep Learning

Built-in advanced algorithm modules such as deep learning can meet complex and diverse practical needs, handle situations such as randomly-placed real objects, considerably reflective or dark objects. Visual functions such as recognition, positioning, and measurement also can work well under various complex situations.

Various Built-in Typical Application Plug-ins

With integrated various application plug-ins such as random feeding, carton depalletizing, express parcel feeding, registration-free goods grasping, high precision positioning, guided gluing, etc., users can easily deploy multiple typical applications of intelligent robots.

Mech-DLK

Deep Learning Software

Mech-DLK is a newly launched deep learning autonomous training tool, which integrates the entire process of data collection, screening, importing, labeling, model training, verification, and deployment of deep learning model training. The software is user-friendly, which improves training efficiency while ensuring data security throughout the process.

All-in-one Solution

It makes Mech-DLK well suited for complex materials and components for mobile, electronics, and automotive industries.

### Consistently Reliable & Validated Results

Its highly consistent inspections archives images that can be reviewed offline, enabling end-users to understand and quickly rectify anomalous results.

Easy to Develop and Use

End-users can operate Mech-DLK by controlling a few parameters offline, rather than repeated manual setting and wide parameter operation.

Smaller Image Sets Required

The deep learning algorithm's internal analysis process enhances upstream to reduce overkill and underkill rates to optimize quality and yield.
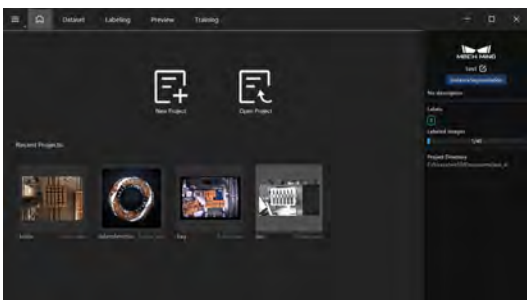
Mech-Viz

Intelligent Robot Programming Environment

The new generation intelligent robot programming environment is equipped with a visualized and code-free programming interface which can realize one-click simulation. Intelligent algorithms such as path planning, collision detection and picking planning are built in. The environment can be adapted to various mainstream robot brands.

### Process-Oriented Interface, One-Click Simulation, Easy to Operate

Visualized and code-free programming interface which can realize one-click simulation. Code programming experience is not required for users to operate the robot.

Built-in Intelligent Algorithms Such as Path Planning, Etc.

Intelligent algorithms such as path planning, collision detection and picking planning are built in to improve stability.

Adapted to Various Mainstream Robot Brands.

The programming environment can be adapted to various mainstream robot brands in China and abroad. The adaption of a new brand robot only needs 3-5 days.
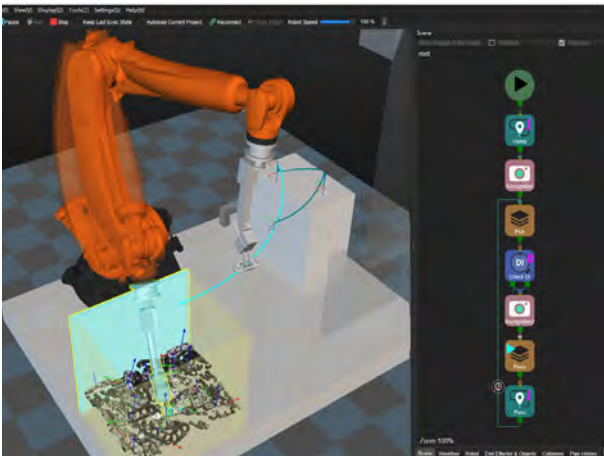
Intelligent Path Planning Algorithm

With built-in advanced algorithm modules, Mech-Viz can automatically select the appropriate robot motion path and entry angle to avoid collision. It can ensure stability and smooth production line.
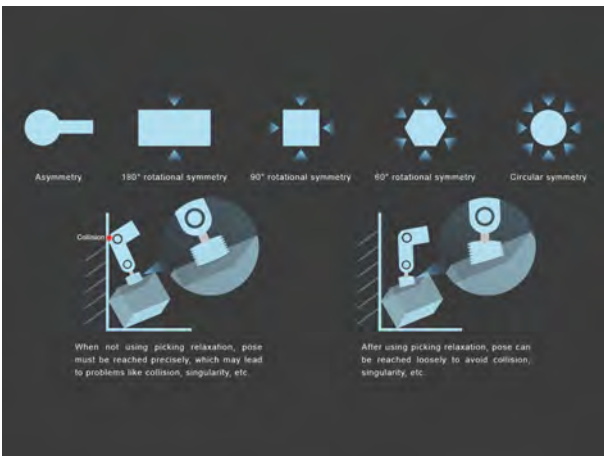
Grasping Planning

The software supports multiple grab points for workpieces, grab margin and symmetry settings, multiple TCP and other functions. With combining motion simulation and collision checking, Mech-Viz can guide the robot to accurately grasp the target under the premise of no collision.

Aiming to drive the ubiquity of industrial robots, Mech-Mind was founded in 2016, based in Beijing (Product Center) and Shanghai (Sales and Deployment) with branch offices in Munich, Tokyo, Shenzhen, Hangzhou, Guangzhou, Changsha, Qingdao, and Jinan.

Fast Growth

Mech-Mind has launched a full infrastructure and products portfolio and exhibited at 2020 CIIF at Shanghai and iREX2019 at Tokyo. Mech-Mind has been selected as 2019 Intel AI 100 Best Innovation Incentive Program and Microsoft Scaleup Member Enterprise. We have also received multiple rounds of funding from IDG Capital, Meituan, Sequoia Capital China, Source Code Capital, Intel, Qiming Venture Capital, Delian Capital, and China Growth Capital.

World-Class Team

We currently have more than 600 members, including engineers who graduated from Tsinghua University, Beihang University, Zhejiang University, Harbin Institute of Technology, Carnegie Mellon University, Munich University of Technology, Delft University of Technology, California Institute of Technology, The University of Tokyo, and other top universities in China and abroad. We have deep technical accumulation in 3D sensing, vision and robotics algorithms, robotics software, and industry application solutions. Mech-Mind has dozens of patent and software copyright applications that are filed or under review.

Recognition from Industry-Leading Enterprises

We have already deployed solutions for automotive plants, home appliance plants, steel plants, food plants, logistic warehouses, pharmacy, and banks. The applications include depalletizing, palletizing, bin-picking, machine tending, assembly, gluing, and locating, etc. We have successfully deployed over 1000 solutions in for clients and partners from China, Japan, South Korea, Singapore, Germany, Italy, Switzerland, the United States, Turkey, Thailand, and other countries.

Compatible with Most Mainstream Robot Brands Globally

Customers and Partners

DRIVE THE UBIQUITY OF INTELLIGENT ROBOTS

Mech-Mind Robotics Technologies Ltd.

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