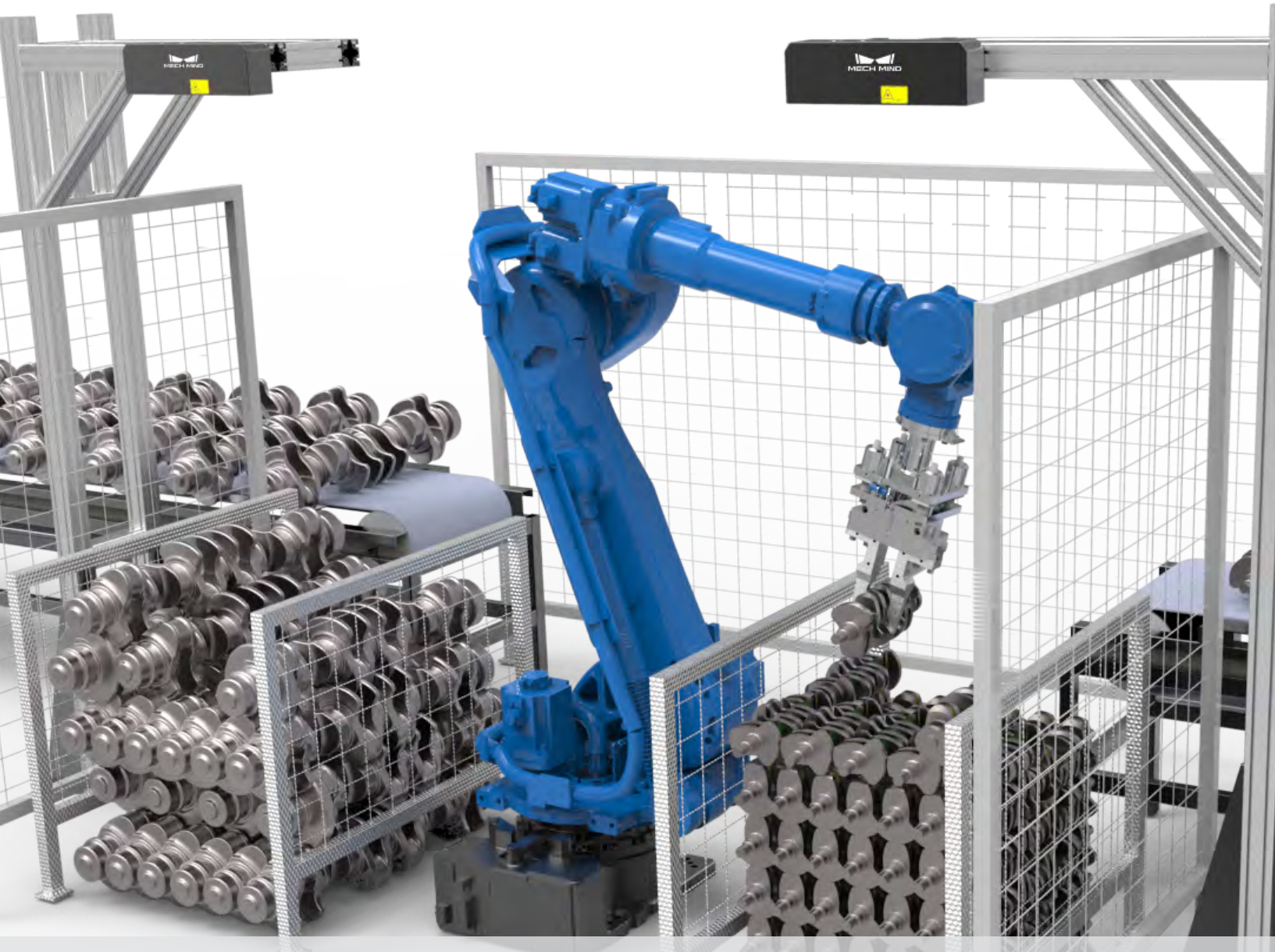
Mech-Mind Robotics

AI+3D Vision Solutions for Manufacturing Industry



Mech-Mind has implemented nearly **1,000** actual projects in the fields of automobiles, manufacturing, steel, home appliances, etc.

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

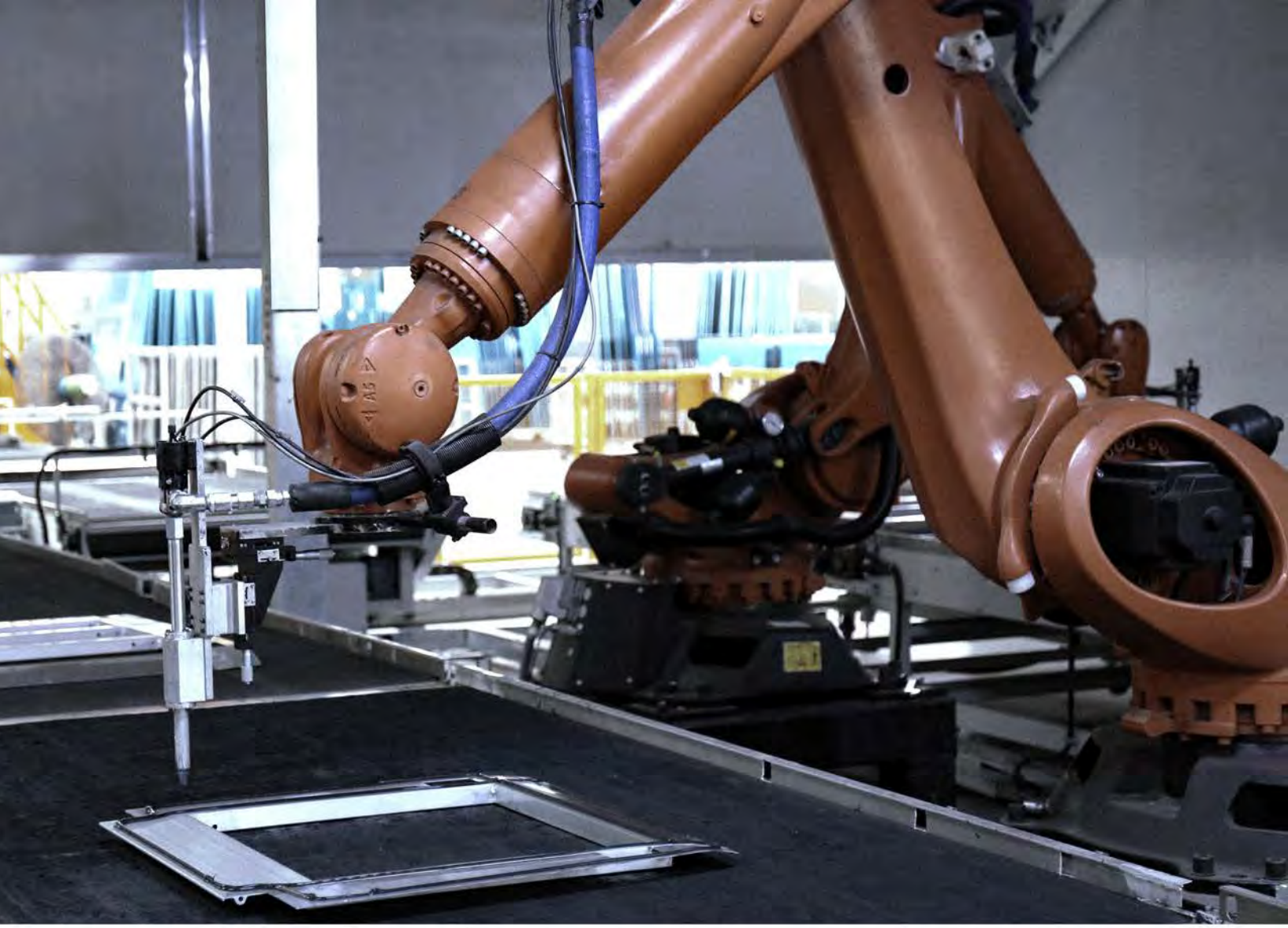
Aiming to drive the ubiquity of intelligent robots, Mech-Mind is committed to leverage technical strength to pioneer the next frontier of manufacturing. Mech-Mind has developed a full R&D infrastructure and product portfolio including 3D cameras, machine vision algorithms and software, Mech-DL Kit Offline Deep Learning Tool, and intelligent robot programming environment.

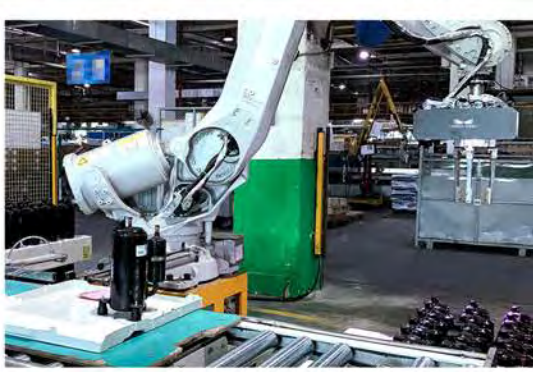
Mech-Mind provides complete and cost-effective intelligent industrial robot solutions to customers in the manufacturing industry, with attractive products, perfect service and supporting software tools.

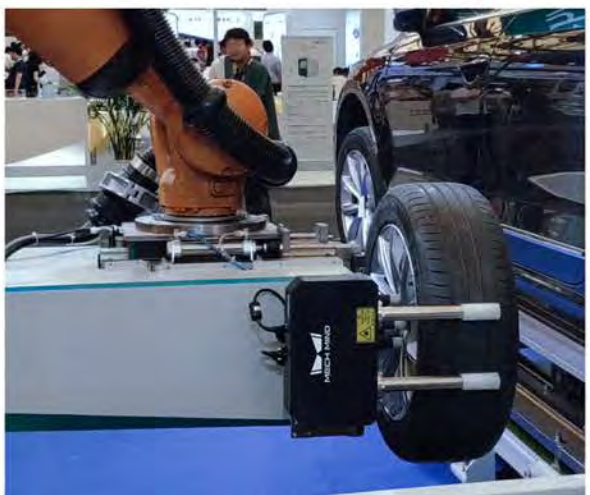
We have already deployed thousands of our intelligent industrial robot solutions in many industries, such as manufacturing, automobiles, steel, home appliances, and other fields.

Solution Advantages

- **High Intelligence:** It can handle various objects (including crankshafts, steel plate, metal bar, track links, valve block, track shoes, wheels, engine rods, rotors, crankcase, etc.).
  Support complex situations like randomly-placed metal parts, 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 dramatically reduces the usage difficulty and deployment costs.
- **Easy Integration:** Our products can be adapted to various mainstream robot brands and support integrating with various systems and the secondary software development.
- **Wide-range application cases:** Previous applications cover machine tending, path planning, locating, assembling, industrial inspection/ measuring, etc.
  Our solution has been successfully deployed in hundreds of leading companies in China, the United States, South Korea, Japan, Germany, Spain and other countries.







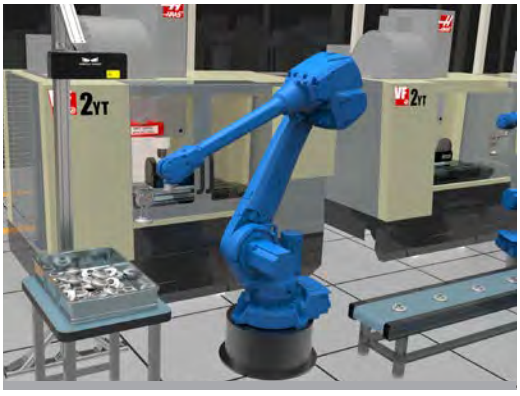
Typical Solutions and Applications

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, which 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 in in complex and real factory environment.
- The intelligent grabbing algorithm can guide robots to choose the most proper grabbing position and ensuring stability and safety.
- Able to handle workpieces of different sizes, reflective surface or complex structures, workpieces with new specifications.
- Support unlimited object status, tightly-packed or randomly-placed workpieces do affect recognition.



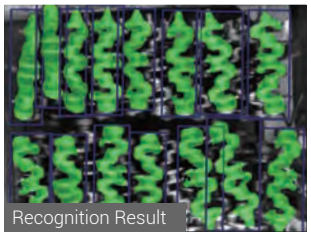
Specification

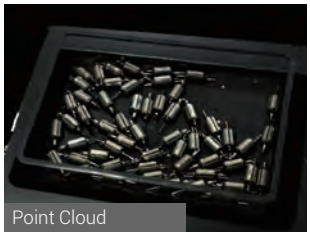
Accuracy	Up to 0.1 mm @ 1 m
Speed	Single cycle time can reach 3 s (the actual speed is related to the layout and end effector).
FOV	Up to 3 m × 2.4 m @ 3 m
Flexibility	Able to handle a certain degree of reflection, black surfaces, complex structures, closely fitting or overlapping, etc; Intelligent path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

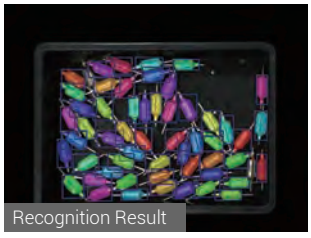
Point Cloud and Recognition Result

Randomly-Placed Metal Parts (e.g., engine rods, crankshafts, rotors)


Point Cloud


Recognition Result


Point Cloud


Recognition Result

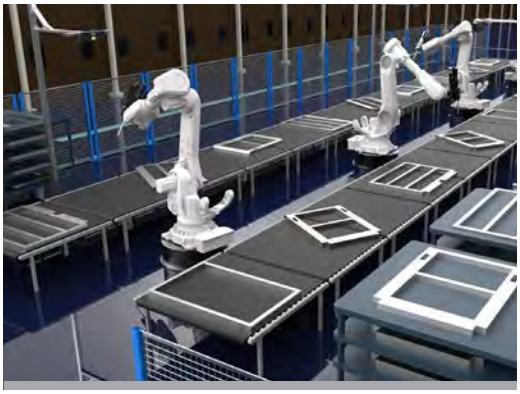
Typical Solutions and Applications

Vision-Guided Automatically Path Planning

Vision-guided robot recognize specified materials/workpieces (such as steel plates, glass, vehicle doors, etc.), as required in real time, and guide the robot to perform the next process.

Solution Advantages

- Support workpieces of various shapes and sizes(including steel plates, side window, crankshafts, etc.).
- High precision, extended field of view, can meet the vision and accuracy requirements in typical scenarios, such as track gluing, oiling, painting, cutting, etc.
- Fast scanning, the working beat can meet the requirements of users.
- Quickly and automatically calibrated, easy to handle workpieces with new specifications.
- 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 to improve efficiency.

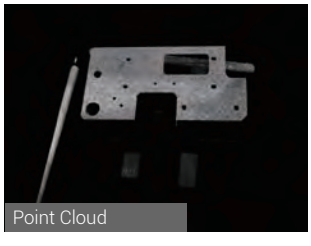


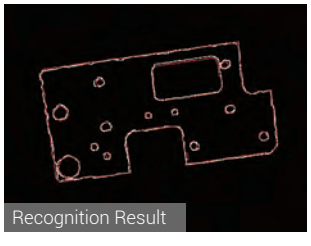
Specification

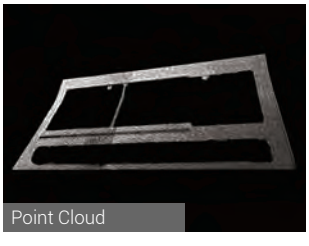
Accuracy	Up to 0.1 mm @ 1 m
Speed	Meet the requirements of typical scenarios.
FOV	Up to 3 m × 2.4 m @ 3 m
Typical Scenarios	Cutting, gluing, spraying, oiling, etc.
Common Camera Models	Mech-Eye Laser, Mech-Eye Enhanceds
Maturity	Thousands of our solutions have been deployed in industries like manufacturing, automobiles, home appliances,etc.

Point Cloud and Recognition Result

Workpieces of various shapes and sizes (e.G., Steel plate, glass)


Point Cloud


Recognition Result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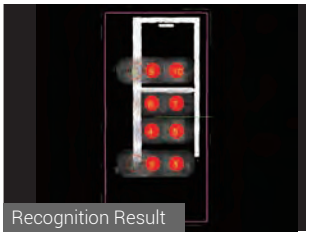

Recognition Result

Typical Solutions and Applications

Vision-Guided Assembly & Locating

Vision-Guided Assembly

Vision-guided robot grabs randomly-placed workpieces and assembles them on the designated position.
Suitable for industry such as manufacturing, automobiles, home appliances, etc.

Solution Advantages

- Handle various different objects in manufacturing industry (including tyre, shell, etc.).
- Handle randomly-placed, dark or reflective workpieces.
- High precision, extended field of view, can accurately locate the assembly position to complete high-precision assembly.
- The production line system can be seamlessly integrated to cooperate with upstream and downstream processes to improve production efficiency.

Vision-Guided Locating

3D-vision is used to locate randomly-placed objects.
Suitable for industry such as manufacturing, automobiles, home appliances, etc.

Solution Advantages

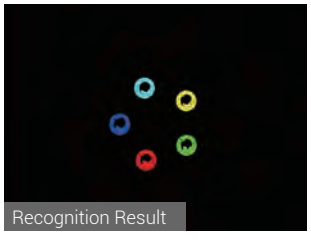
- Support objects of various shapes and sizes.
- Built-in collision detection, path planning, and other advanced algorithms to ensure stability.
- Support complex situations like randomly-placed metal parts, a certain degree of reflection, dark surfaces, or complex structures etc.
- The production line system can be seamlessly integrated to cooperate with upstream and downstream processes to improve production efficiency.

Specification

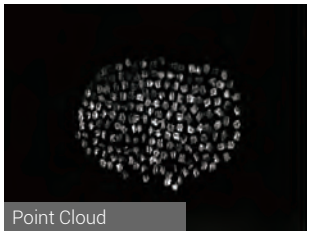
Accuracy	Up to 0.1 mm @ 1 m
Speed	Single cycle time can reach 3s (the actual speed is related to the actual scene and object status).
Typical Scenarios	Shaft hole assembly, screw tightening, steel bar marking.
Common Camera Models	Mech-Eye Laser, Mech-Eye Enhanced Series
Maturity	Thousands of our solutions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

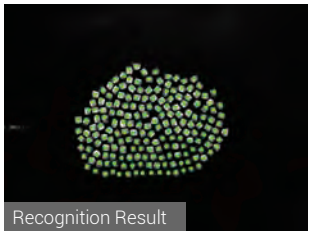
Point Cloud and Recognition Result

Tire assembly (positioning hole)



Steel bar





Typical Solutions and Applications

A large machinery factory

Vision-Guided Automatic Machine Tending (Track Links)

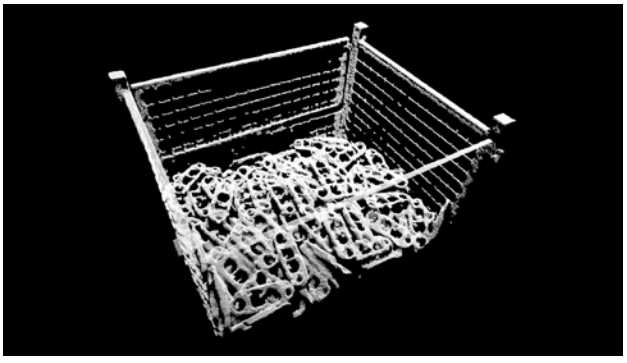
Background

This project serves domestic private construction machinery giants, whos' working environment is harsh, full of noise and dust pollution, which is harmful to the health of workers. At the same time,to meet the production efficiency and reduce the equipment depreciation rate, the workshop often produces 24 hours a day, and the labor cost is relatively high.Tto solve the above problems, the customer plans to use industrial robots and 3D vision to automate the loading of the track links, and hope that our products can solve the problem of ambient light interference.

Severe stacking of workpieces, accompanied by typical ambient light interference in the workshop, and deep baskets.

Project Highlights

- The robot can grab the randomly-placed track links in the deep basket one by one, and after identifying the front and back side of the workpiece, coordinate the upstream and downstream process to place the track links in the designated position.
- Our self-developed high-precision Mech-Eye Laser L 3D camera, which can better cope with the ambient light interference in typical factory, and significantly reduce the demand for shading facilities.
- Using variable TCP fixtures and multi-grabbing strategy, intelligent path planning algorithm to ensure stability and avoid collision.
- Can be seamlessly connected to the upstream and downstream of the production line.



Point Cloud

Project Performance

- Completed the automation line transformation of dozens of stations, and the daily output of each station has been increased to **1000+**.
- Labor costs are significantly reduced, and parameters such as basket clearance rate, tempo, and stability can meet customer needs.

Recognition Result

Typical Solutions and Applications

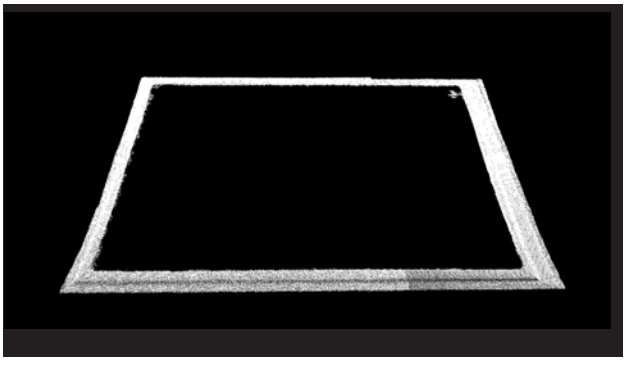
A large bus factory
Vision-Guided Gluing

Background

The service target of this project is a domestic giant bus factory. At the customer's factory site, the glue on the side window glass was manually operated, and there were problems such as uneven glue and uncontrollable quality. On-site cleaning and repairing work is heavy, the glue is easy to be wasted, and the labor cost is large. In order to reduce raw material costs and labor costs, and improve production quality, the customer decided to use industrial robots and 3D vision to automate the transformation of glue application

Project Highlights

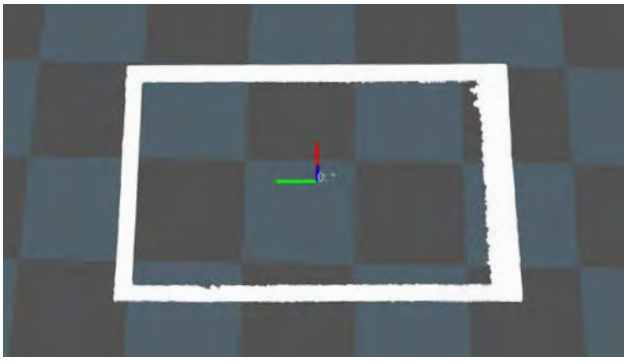
- It can identify the side window glass of thousands of specifications, and guide the industrial robot to finish the glass gluing. New added workpieces are registration-free.
- Real-time recognition and automatic avoidance of various profile structures on the side window glass to avoid collisions.
- Can easily cope with various gluing processes, greatly improving the flexibility and intelligence of the production line.
- High precision, large field of view, fast beat, meeting the accuracy of the side window glass coating of 0 - 2.5 mm, field of view 1.6 m × 2.5 m, 45 s/piece.



Point Cloud

Project Performance

- Effectively reduce the cost of labor and raw materials.
- Multiple production lines have been successfully copied to improve customer production efficiency and ensure the quality of glue application



Recognition Result

Typical Solutions and Applications

A large steel mill

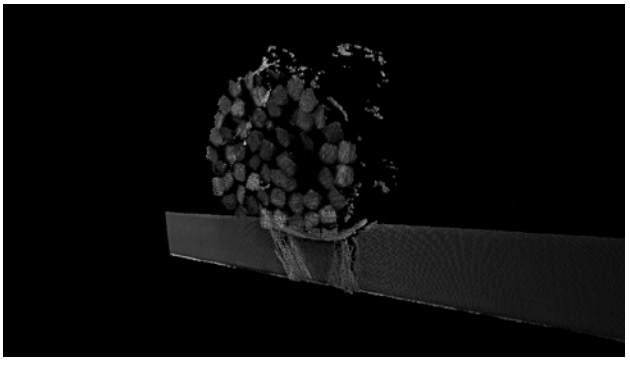
Vision-Guided Rebar Locating (Labeling)

Background

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

Project Highlights

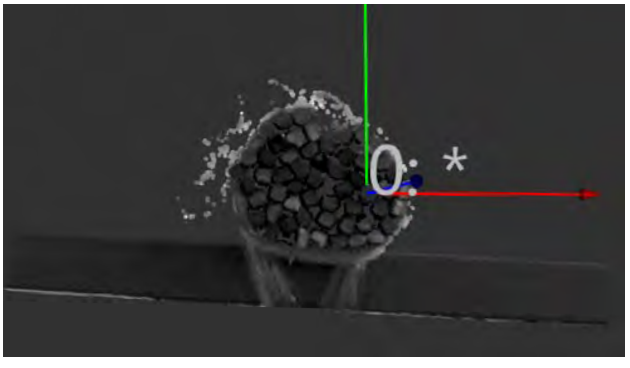
- The precision is super high, and the four corners of the mark do not exceed the cross section of the steel bar while marking, in order to avoid separation caused by external force and improve stability.
- Deep learning algorithms help calculate the number of rebars at the same time.
- Suitable for marking different sizes of steel bar bundles (8-30 mm diameter).
- High flexibility, support free switching of single/ double label mode; with re-shooting function to assist in confirming the situation of card drop.
- Industrial 3D camera, can easily cope with the harsh working environment such as high temperature and dust.



Point Cloud

Project Performance

- Improve the production efficiency of the customer's site, which can cope with 24-hour production.
- Can easily cope with production increments of hundreds of bundles per day.
- The project site has been running stably and trouble-free for several months.



Recognition Result

Typical Solutions and Applications

A large air-conditioning company

Vision-Guided Machine Tending

- Beats can reach up to 3 s/piece.
- It can identify black objects with complex structure in deep baskets.
- Intelligent grabbing planning automatically selects the appropriate grabbing location to ensure stability.

A large auto parts factory

Vision-Guided Machine Tending

- Handle situation such as randomly-placed workpieces, considerably reflective or dark objects.
- Intelligent path planning algorithm to avoid collision.
- Can be seamlessly connected to the upstream and downstream of the production line.
- Intelligent grabbing planning automatically selects the appropriate grabbing location to ensure stability.

A large air-conditioning company

Vision-Guided Machine Tending

- Support workpieces of various shapes and sizes.
- Support complex situations like randomly-placed metal parts, complex structures etc.
- High precision, large field of view, fast beat, can fully meet customer needs.
- Stable glue quality without wasting.

A large automotive OEM

Vision-Guided Machine Tending

- Can identify engine rods of different specifications.Support quick addition of order specifications.
- Handle situation such as randomly-placed workpieces, considerably reflective or dark objects.
- Can be seamlessly connected to the upstream and downstream of the production line.
- Intelligent path planning algorithm to avoid collision.

Typical Solutions and Applications

A large machine tool plant

Vision-Guided Machine Tending (Wheel)

- Support various different specifications of wheels.
- Accompany equipment while the production line is running continuously.
- High precision, can accurately locate the threaded hole on the wheel hub.
- Can be seamlessly connected to the upstream and downstream of the production line

A large air-conditioning company

Vision-Guided Machine Tending (Compressor)

- Support workpieces of various shapes and sizes.
- Support complex situations like pure black surface and strong reflection of the compressor, etc.
- Intelligent path planning algorithm to avoid collision.
- Accurately identify the direction of the compressor and assemble it at the installation position.

A engineering machinery plant

Vision Guided Groove Cutting

- High precision with high speed, stable and reliable.
- Handle considerably reflective or steel plate with different sizes, etc.
- Built-in collision detection, path planning and other advanced algorithms to avoid problems such as self-collision and environmental collision.
- The beat can fully meet customer needs.

A large furniture factory

Vision-Guided Gluing

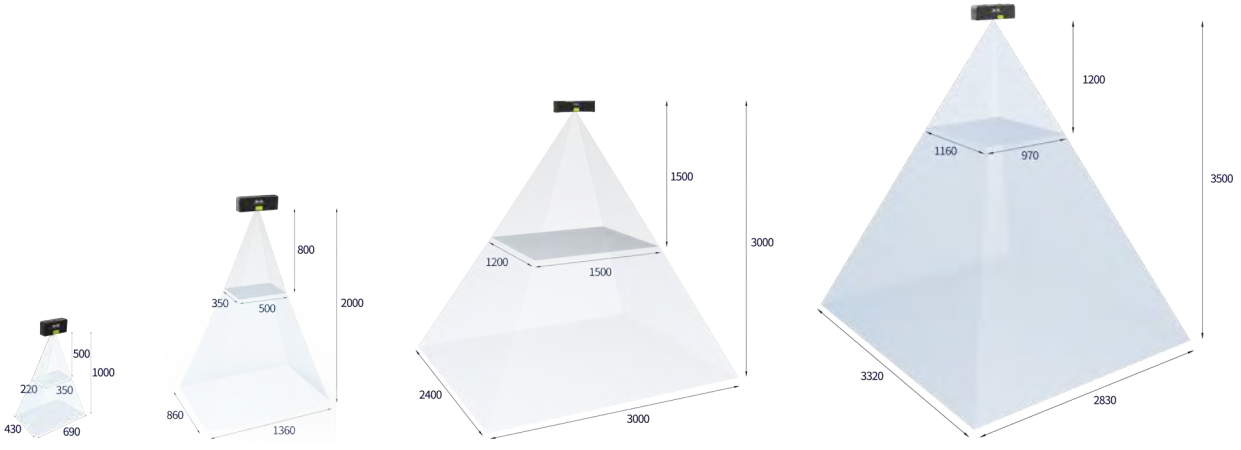
- Adapt to various different specifications of chair backs.
- Workpieces can be placed randomly on the conveyor belt without affecting identification.
- High precision with high speed, stable and reliable.
- The glue spraying path can be adjusted automatically and timely according to the shape and position of the product, with high flexibility.

Mech-Eye Industrial 3D Camera

Delicate Offering with High-performance and Cost-effectiveness

Product Parameters	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	0.6 - 1.3	0.8 - 1.3
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			
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, who 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.

Graphical Interface with No Code, Easy to Use

Graphical interface with no code, 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, which can meet complex and diverse practical needs, handle situation such as randomly-placed real objects, considerably reflective or dark objects. and complete visual functions such as recognition, positioning, and measurement under complex conditions.

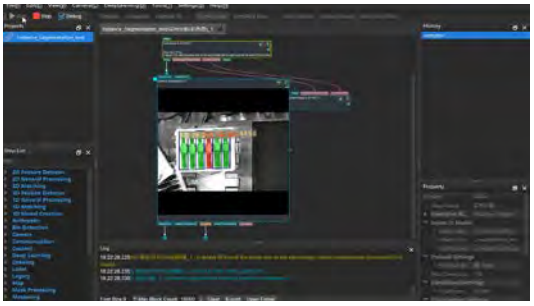
Various Built-in Typical Application Plug-ins

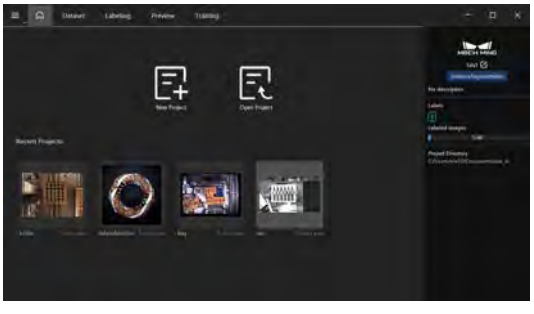
With integrated various application plug-ins such as random feeding, carton depalletizing, express parcel feeding, registrationfree goods grasping, high precision positioning, guided gluing, etc., users can easily deploy multiple typical applications of intelligent robots.

Mech-DL Kit

Offline Training Tools for Deep Learning

Mech-DL Kit is a newly launched deep learning autonomous training tool, which integrates the entire process of data collection, screening, import, 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-DL Kit 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-DL Kit by controlling a few parameters offline, rather than repeated manual setting and wide parameter operation.

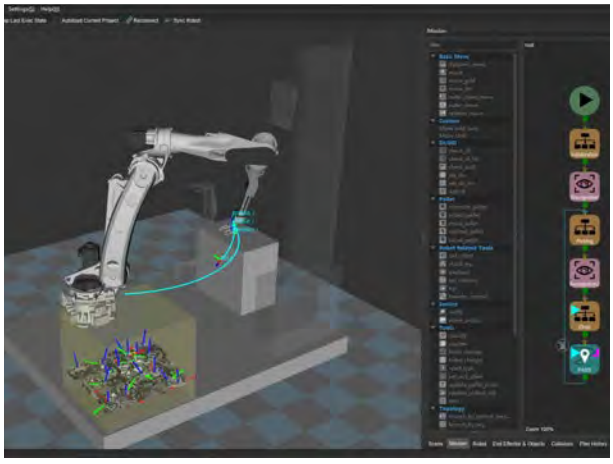
Smaller Image Sets Required

The deep learning algorithm's internal analysis process enhances quality upstream to reduce overkill and under kill 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 in China and abroad.



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

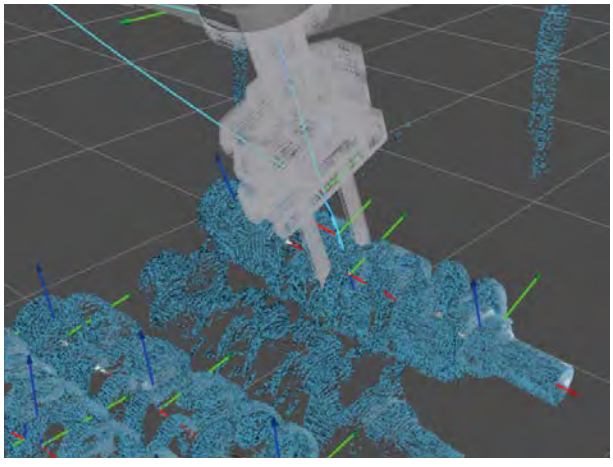
Visualized and code-free programming interface which can realize one-click simulation. Code programming experience is not required for users to operate the robot.

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.

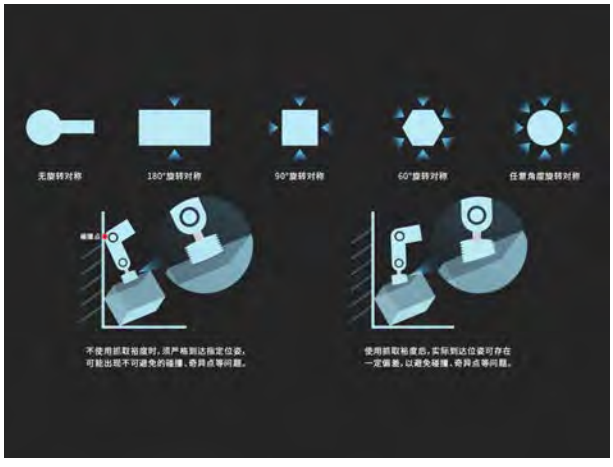
Adapted to Various Mainstream Robot Brands.

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.



Grabbing Strategy 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 (R&D) and Shanghai (Sales and Deployment) with branch offices in Munich and Tokyo.

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, TOP3 Enterprise in AI Field in 2020 Zhongguancun International Frontier Technology Innovation Competition, 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 almost 500 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 partnership

DRIVE THE UBIQUITY OF INTELLIGENT ROBOTS

Mech-Mind Robotics Technologies Ltd.

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