

Mech-Mind Robotics



AI+3D Vision Solutions for Construction Machinery Industry



Mech-Mind has deployed more than **300** real-world use cases in lighthouse factories worldwide.

Mech-Mind AI+3D Vision Pioneer in Construction Machinery 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 construction machinery industry, with **attractive products, attentive service and supporting software tools.**

Mech-Mind has delivered more than **1000** intelligent industrial robot solutions worldwide. In the field of construction machinery, we have deployed more than **300** successful cases at world-famous factories. Mech-Mind has become one of the AI+3D vision companies with the largest number of successful applications in construction machinery industry worldwide.

Solution Advantages

- **High Intelligence:** It can handle various objects (including steel plates, steel rods, track links, valve blocks, planet carriers, pinion gears, creeper treads, etc.). Support tightly-packed steel plates, randomly-placed metal parts, parts with considerably reflective surfaces, etc.
- **Competitive Price:** The price is only half of the same type of typical products.
- **Easy Deployment:** The plug-and-play solutions save a lot of deployment time. The fully visualized, code-free programming interface dramatically lowers the threshold for operators to deploy .
- **Easy Integration:** Our products can be adapted to various mainstream brands' robots and support integrating with various systems.
- **Various Application Cases:** The scope of application covers mixed case palletizing and depalletizing, order picking, logistic parcels picking, and assembly. Our solutions have been successfully applied in hundreds of leading companies in China, the United States, South Korea, Japan, Germany, Spain, Singapore, Australia and other countries.





Typical Solutions

Vision-Guided Randomly Piled Parts Picking

Robot picks randomly piled metal sheets from bins and places them on the conveyor.

Solution Advantages

- With high precision and an extended field of view, our self-developed industrial 3D vision camera can provide high-quality 3D data.
- Dust and water proof with IP65 standards. It can operate long hours in complex and hush factory environment.
- Able to handle complex situations such as considerably reflective parts, part with dark surfaces, and tightly-packed.
- The robot system can analyze the nesting layout in advance and handle various metal sheets.
- Built-in path planning and collision detection algorithms ensure flexibility and stability.
- Convenient communication with robots via TCP/IP.
- Self-calibration and fast adaptation to new types of sheets.

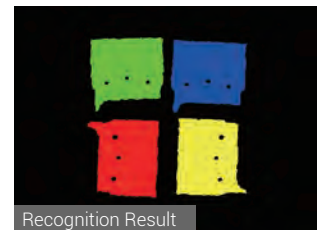
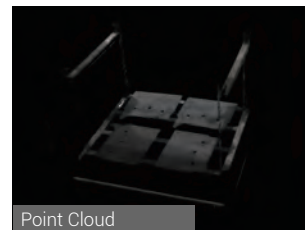


Specification

Accuracy	Up to 0.1 mm @ 1 m
Speed	Single cycle time can reach 3 s (actual speed is related to layout and objects)
Success Rate of Recognition	> 99.9%
FoV	Up to 3 m × 2.4 m @ 3 m
Typical Scenarios	Metal sheets picking.
Common Camera Models	Mech-Eye Laser, Mech-Eye Pro Enhanced
Maturity	Hundreds of our solutions have been deployed in construction machinery industry.

Point Cloud and Recognition Result

Randomly Located Metal Sheets



Typical Solutions

Vision-Guided Randomly Placed Workpieces Sorting

The vision-guided robot picks tightly packed workpieces from the material bin one by one, and place them on the conveyor belt.

Solution Advantages

- Able to handle various workpieces (including track links, planet carriers, steel rods, crankshafts, connecting rods, steel track shoes, valve blocks).
- Able to handle randomly placed objects with considerably reflection, dark surfaces, complex structures, or rich details.
- With high precision and an extended field of view, our solution is suitable for picking workpieces from large and deep material bins.
- Mech-Eye Laser 3D camera is able to deal with problems such as ambient light interference to ensure stability.
- Built-in advanced algorithms including motion planning and collision detecting help to improve operating stability.
- Production line can be seamlessly integrated with the upstream and downstream processes.

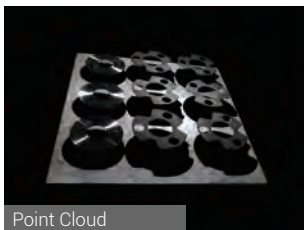


Specification

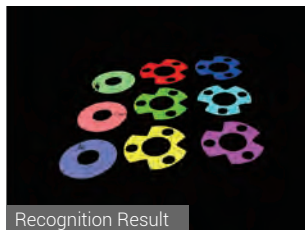
Accuracy	Up to 0.1 mm @ 1 m
Speed	3 s / piece (from taking pictures to giving poses)
Success Rate of Recognition	> 99.9%
FoV	Up to 3 m × 2.4 m @ 3 m
Robot Reachability	Meet the requirements of typical scenarios.
Typical Scenarios	Machine tending, double-sided milling, etc.
Common Camera Models	Mech-Eye Laser, Mech-Eye Pro Enhanced
Maturity	Lots of our solutions have been deployed in construction machinery industry.

Point Cloud and Recognition Result

Randomly Placed Workpieces (Planet Carriers)



Point Cloud

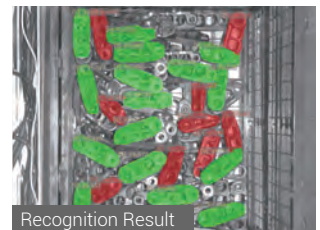


Recognition Result

Randomly Placed Workpieces (Track Links)



Point Cloud



Recognition Result

Typical Solutions

Vision-Guided Assembly

Vision-guided robot can identify and pick randomly-placed workpieces and assemble them to the specified positions as required. With Mech-Eye Industrial 3D Camera, robots can quickly locate the assembly positions, and accurately assemble the workpieces without damaging them.

Highlights

- Able to identify a variety of parts and workpieces (e.g. hubs, tires, creeper treads, longeron, pins).
- Able to handle large-size, complex structured, considerably reflective, dark, or deformable workpieces.
- Mech-Eye Laser 3D camera can well handle ambient light interference at workshops.
- Equipped with high precision and an extended field of view, our solution can locate assembly positions accurately.

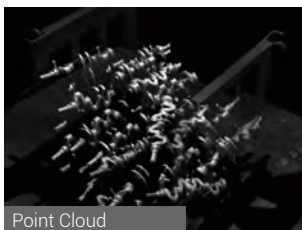


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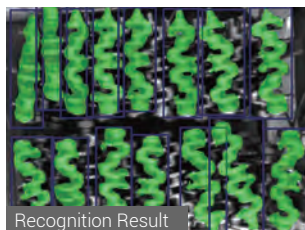
Accuracy	Up to 0.1 mm @ 1 m
Speed	Single cycle time can reach 3 s
Success Rate of Recognition	> 99.9%
FoV	Up to 3 m × 2.4 m @ 3 m
Typical Scenarios	Assembly creeper treads, track links, hubs, tires, etc.
Common Camera Models	Mech-Eye Laser, Mech-Eye Pro Enhanced
Maturity	Our solutions have been deployed in automobiles, construction machinery, home appliance industry, etc.

Point Cloud and Recognition Result

Tightly-Packed Crankshafts



Point Cloud

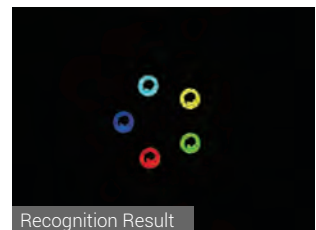


Recognition Result

Wheel Assembly Position



Point Cloud



Recognition Result

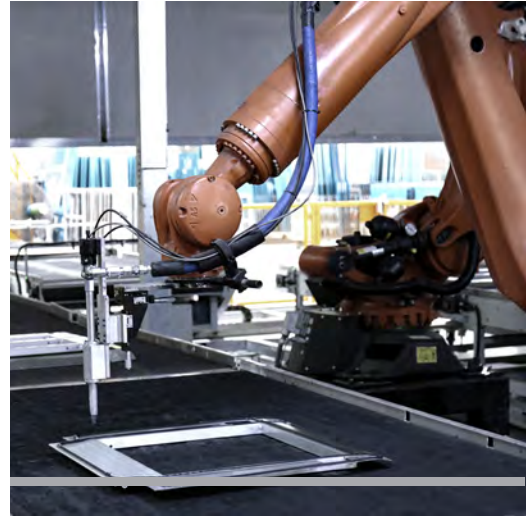
Typical Solutions

Vision-Guided Path Generation

Vision-guided robots identify specified materials/workpieces (such as car doors, outer edges of steel plates, slew bearings), generate the path in real time according to the recognition result.

Solution Advantages

- Support for various large parts in different sizes and shapes.
- Support for complex-structured parts with dark or considerably reflective surface. Resistance to strong ambient light.
- The speed can meet the requirements of customer.
- Convenient communication with robots via TCP/IP.
- Seamlessly integration with common logistic devices including AMR.

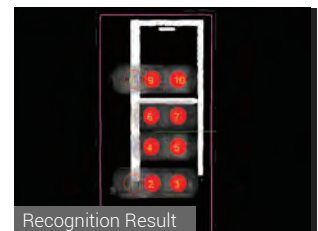
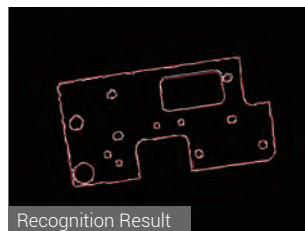


Specification

Accuracy	Up to 1.0 mm @ 2.5 m
Success Rate of Recognition	> 99.9%
FoV	Up to 3 m × 2.4 m @ 3 m
Typical Scenarios	Beveling, gluing, etc.
Common Camera Models	Mech-Eye Laser, Mech-Eye Enhanced
Maturity	Hundreds of our solutions have been deployed in industries such as automobiles, construction machinery, home appliance, etc.

Point Cloud and Recognition Result

Different Parts



Typical Use Cases

A Large Machinery Factory

Vision-Guided Machine Tending of Track Links

Challenges

The customer hopes to improve efficiency and guarantees 24 hours uninterrupted production. Besides, they need product to cope with problem of ambient light interference in the workshop.



Workpieces are severely stacked in a deep bin, accompanied by typical ambient light interference in the workshop.

Highlights

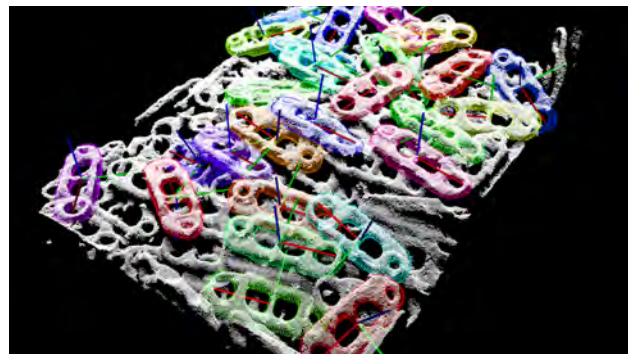
- Our solution enables the robots to pick links stacked randomly in the deep material bin, and place them in a specified location after determining the links' front and back sides.
- With self-developed high precision Mech-Eye Laser, typical ambient light interference can be handled, significantly reducing the demand for shading facilities.
- Variable end effectors, multi picking point strategies and intelligent path planning algorithms are adopted to avoid collisions and improve stability.
- Production line can be seamlessly integrated with the upstream and downstream processes.



Point Cloud

Outcomes

- Dozens of work stations of the production line have completed the automatic transformation, ensuring the daily output of each station up to **1000+**.
- The reachability of robot in limited space has been greatly improved, and the speed and stability can meet the clients' needs.



Recognition Result

Typical Use Cases

A Construction Machinery Factory Vision-Guided Beveling

Challenges

The client is a construction machinery industry giant. Traditional beveling is low-efficient and cost-intensive. Therefore our customer expects Mech-Mind industrial robot solutions to boost efficiency and productivity.



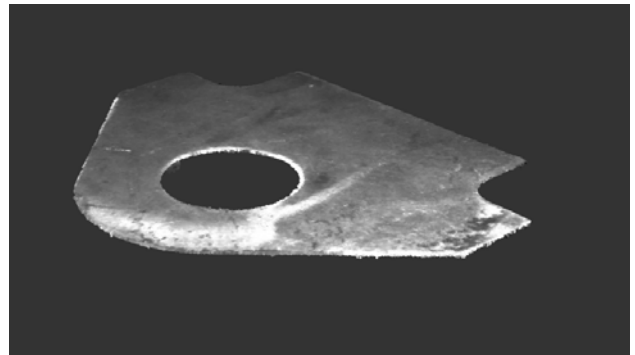
Various Different Steel Plates



Real-World Image of Beveling

Highlights

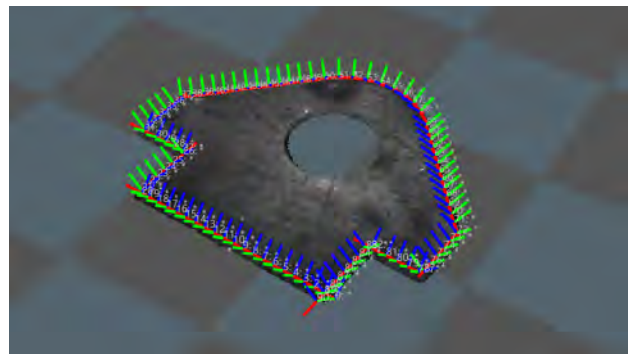
- Our 3D vision system can quickly and accurately locate the steel plate, and automatically plan the optimal cutting trajectory.
- Mech-Eye Laser 3D camera, can easily recognize considerably reflective objects.
- With high precision and an extended field of view, our solution enables robots to execute beveling with excellent stability and consistency.
- Our solution can seamlessly integrate with the upstream and downstream (e.g. steel plates distribution) of the production line.



Point Cloud

Outcomes

- Efficiency has been improved by 50% with a 40% cost reduction.
- Our solution can handle various kinds of workpieces.



Recognition Result

Typical Use Cases



A Large Construction Machinery Enterprise Vision-Guided Sheets Picking

- Metal sheets in different sizes that are stacked layer by layer can be quickly identified.
- Metal sheets of various thicknesses (the thinnest is only 0.4 cm) can be well handled.
- With an extended field of view, the vision-guided robot can pick sheets stacked in a large bin.
- The vision-guided robot can seamlessly work with the upstream and downstream devices.



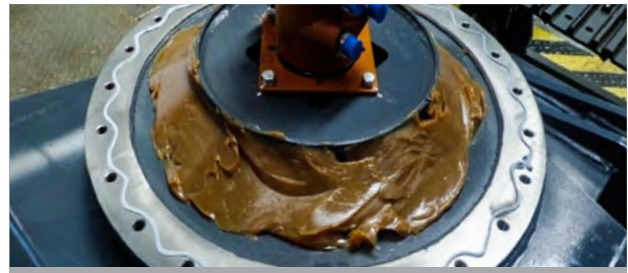
A Large Automobile Plant Vision-Guided Wheel Assembly

- Mech-Eye Laser L Industrial 3D Camera, featuring a large FoV and high precision, can resist typical ambient light interference (> 15,000 lx).
- The industrial-grade 3D camera, featuring waterproof and dustproof design, can operate in a high-temperature environment (50 - 120 degrees Celsius).
- The robot system can handle parts with complex structures, or dark/considerably reflective surfaces.
- The single robot station can help to increase production efficiency by 2 times.



A Large Construction Machinery Enterprise Vision-Guided Steel Plate Sorting and Feeding

- Mech-Eye Laser L Industrial 3D Camera, featuring large FOV and high precision, can resist typical ambient light interference (>15,000 lx).
- The robot system can analyze the nesting layout in advance and generate appropriate grasping points intelligently.
- The robot system can count, sort and palletize sheets according to the requirements of the fabrication process.
- The robot system can handle the small kerf width (0.4 mm) of sheets.
- Gantry robot helps to pick heavy cut sheet metal (e.g., more than 200 kg) easily.
- The whole intelligent robot production line has been a benchmark in the customer's Lighthouse Factory.



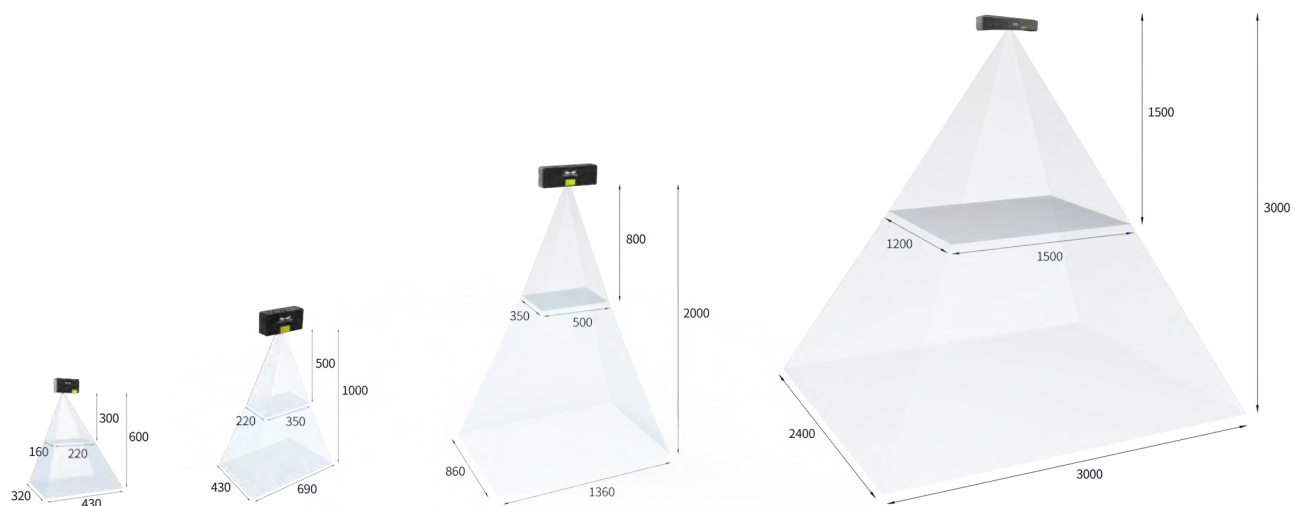
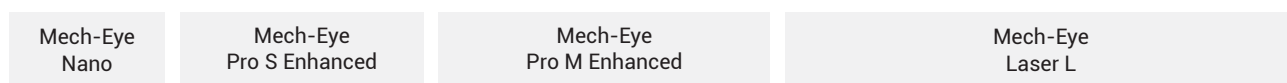
A Large Construction Machinery Enterprise Vision-Guided Oil Coating of Shaft Parts

- Mech-Eye Pro S Enhanced industrial 3D camera, featuring high precision and excellent imaging, can produce high-quality 3D point cloud data for various types of slewing bearings.
- The robot can generate the appropriate grease applying trajectory immediately according to the recognition result from Mech-Mind's vision system.
- Mech-Eye is mounted on the robotic arm, which enables robots to handle quite large slewing bearings.
- Fast adaptation to newly added types of slewing bearings.

Mech-Eye Industrial 3D Camera

A Perfect Combination of Excellent Performance and Cost Effectiveness

Specification	Nano	Pro S Enhanced	Pro M Enhanced	Laser L
Optimal Scanning Range (mm)	300 - 600	500 - 1000	800 - 2000	1500 - 3000
Near FoV (mm)	220 × 160 @ 0.3 m	350 × 220 @ 0.5 m	500 × 350 @ 0.8 m	1500 × 1200 @ 1.5 m
Far FoV (mm)	430 × 320 @ 0.6 m	690 × 430 @ 1.0 m	1360 × 860 @ 2.0 m	3000 × 2400 @ 3.0 m
Resolution	1280 × 1024	1920 × 1200	1920 × 1200	2048 × 1536
Megapixels (MP)	1.3	2.3	2.3	3.0
Z Repeatability(σ)	0.1 mm @ 0.5 m	0.05 mm @ 1 m	0.2 mm @ 2 m	0.5 mm @ 3 m
Accuracy	0.1 mm @ 0.5 m	0.1 mm @ 1 m	0.2 mm @ 2 m	1.0 mm @ 3 m
Typical Capture Time (s)	0.6 - 1.1	0.5 - 0.8	0.5 - 0.8	0.5 - 0.9
Baseline (mm)	68	150	280	400
Dimensions (mm)	145 × 51 × 85	270 × 72 × 130	387 × 72 × 130	459 × 89 × 145
Weight (kg)	0.7	2.2	2.4	3.7
Operating Temperature	0 - 45°C			-10 - 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			



Field of View (mm)

Mech-Eye Industrial 3D Camera

High-quality Images of Various Objects

Mech-Eye can generate high-quality 3D data for common workpieces in the fields of construction machinery, steel, automotive, etc., and can handle complex situations such as considerably reflective objects, objects with dark surfaces and complex structures.



Densely-Stacked Track Shoes



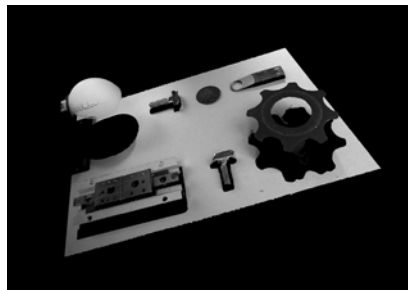
Auto Seat Side Plates



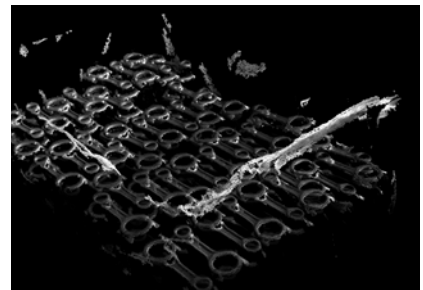
Steel Plates Only 3 mm Thick



Tightly-Packed Steel Plates of Various Specifications



Considerably Reflective or Dark Workpieces

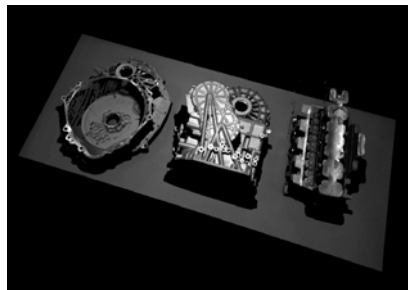


Randomly-Piled Workpieces

Mech-Eye Laser 3D camera can generate complete, detailed, and accurate 3D point cloud data for a wide range of workpieces at typical ambient light (intensity >15000 lx) of the actual plants.



Crankshafts

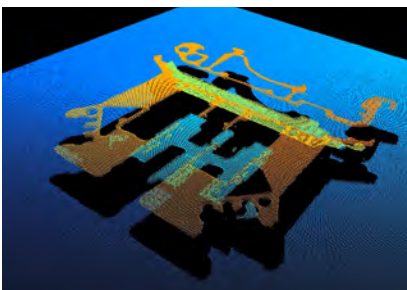


Gearbox Shell

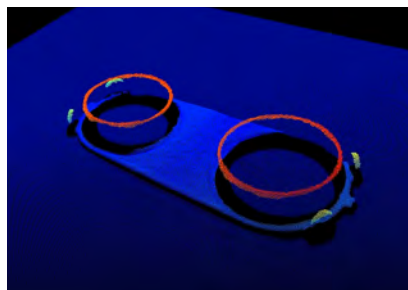


Track Links

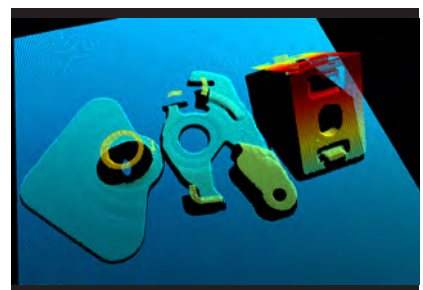
Mech-Eye can output high-quality 3D imaging of a broad range of objects (including metal materials, plastics, wood, etc.)



Precision Component



Parts of Merely 0.68 mm Thickness



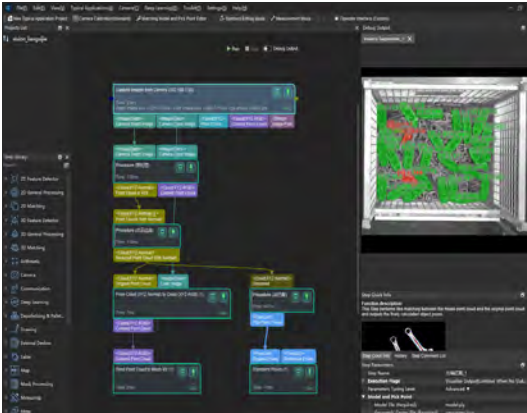
Various Small Workpieces



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 clear-cut functional partitions. Professional programming skills are not required for users to realize visual engineering construction. The software enables integrators to develop models locally.

Built-in Advanced Algorithm Modules

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, depalletizing, registration-free goods grasping, high precision positioning, 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 workpieces for electronics, and automotive industries.

Consistently Reliable & Validated Results

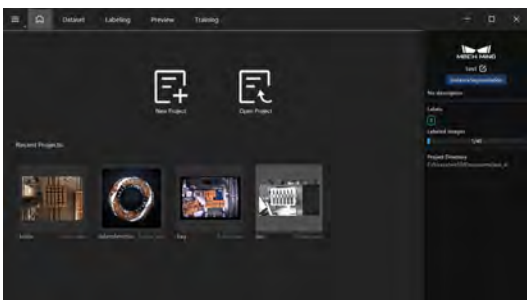
Its highly consistent inspections archives images that can be reviewed offline, enabling end-users to understand and quickly rectify anomalous results.

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. Built-in intelligent algorithms such as path planning, collision detection, grasping strategy, etc. The environment can be adapted to various mainstream robot brands in China and abroad.



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

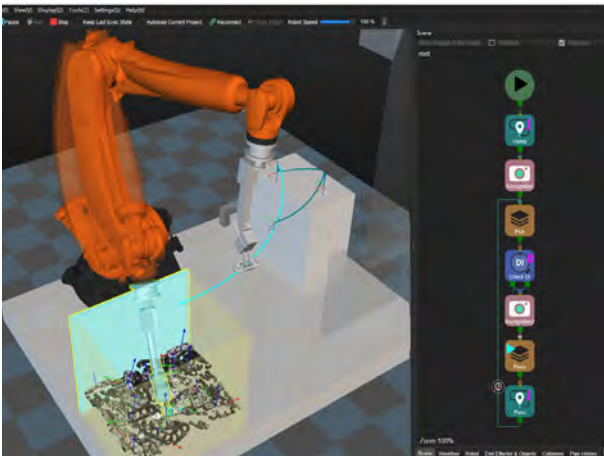
Visualized and code-free programming interface can realize one-click simulation. Code programming experience is not required for users to operate the robot.

Built-in Intelligent Algorithms

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

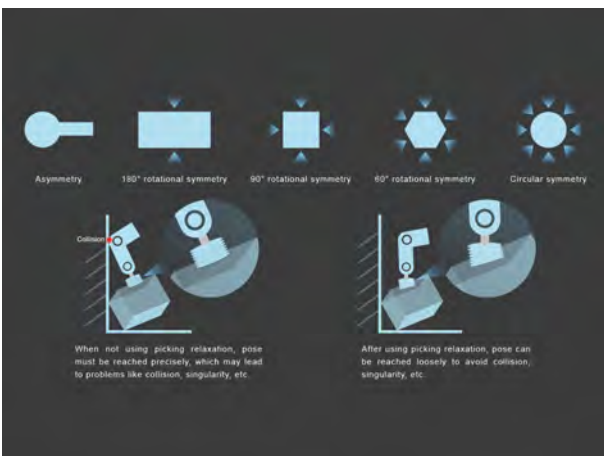
Adapted to Various Mainstream Robot Brands

The programming environment can be adapted to various mainstream robot brands worldwide. The adaption of a new brand robot only needs 3-5 days.



Intelligent Path Planning Algorithm

With built-in advanced motion planning algorithm, Mech-Viz can automatically plan the appropriate robot motion path and entry angle to avoid collision.



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 detection, Mech-Viz can guide the robot to accurately grasp the target under the premise.



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.

Offices: Beijing | Shanghai | Shenzhen | Qingdao | Changsha | Jinan | Zhengzhou | Guangzhou | Hangzhou | Munich | Tokyo

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