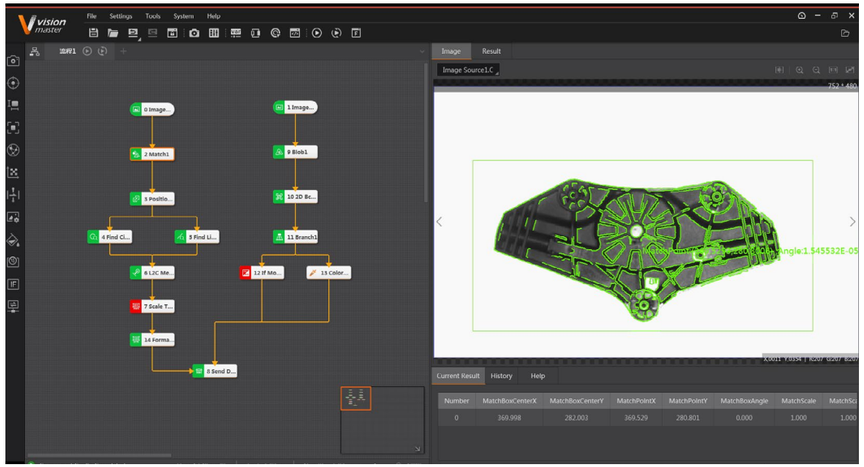
VM Algorithm development platform

Algorithm development platform is a machine vision software independently developed by Hikrobot, which is dedicated to providing customers with algorithm tools to quickly solve vision applications, and can meet machine vision applications such as visual positioning, size measurement, defect detection and information recognition.



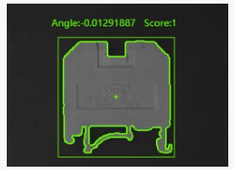
Key Features

- It consists of nearly a thousand completely self-developed image processing operators and a variety of interactive development tools, including 160 + module tools, supporting a variety of operating systems and image acquisition hardware devices, which can meet the needs of positioning, measurement, identification and detection in the field of machine vision applications.
- Fully graphical interactive interface, function icons are intuitive and easy to understand. Dragging operation can quickly set up visual scheme. Module operation status is independently identified and displayed in real time.
- Users can create visual solutions according to their needs, customize the running interface, and integrate background images or company logos on the running interface to meet the personalized needs of customers.
- Compatible with GigE Vision and USB3 Vision protocol standards, allowing access to multiple camera brands. Support local image and camera real-time image processing.
- The secondary development is simple and easy to use. The simplified interface can save 90% of the code. The new tool can be imported into Visual Studio with one key. It supports the interface development of QT, MFC, WPF and WinForm.
- Support the development of user-defined modules. Users can directly drag and use the user-defined algorithm after it is packaged as a VM module.
- Support TCP/IP, ModBus, serial port, UDP, Ethernet/IP and other common industrial communication protocols, compatible with the communication of mainstream PLC models.

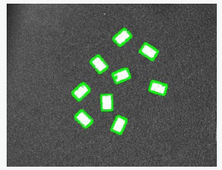
Locating and measuring tools

Accurately and efficiently locate any geometric element in the image with 1/16 pixel accuracy.

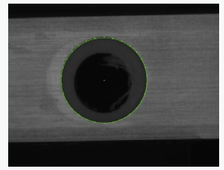
- Efficient template matching tool to overcome differences in sample translation, rotation, scaling, and illumination.
- Quickly and accurately find the position of circles, lines, blobs, edges, vertices, and other geometric objects.
- Accurately measure shapes, dimensions, areas, distances, angles, intersections, and other geometric properties.
- It can be used in robot guidance and other vision tools to provide position information and presence information.



Trait matching

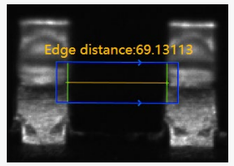


Blob analysis

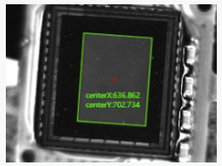


Circle search

Edge intersection

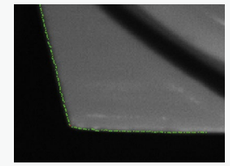


Edge distance measurement



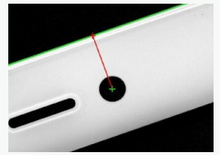
Rectangle search

Parallel lines search

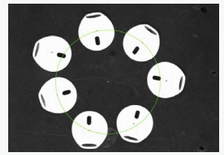


Peak search

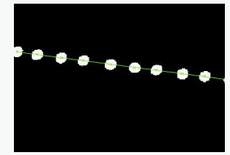
C2C measurement



P2C measurement



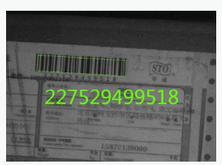
Circle fit



Straight line fit

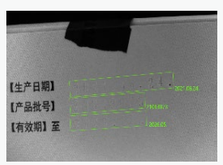
Identification tools

- Fast and accurate reading of digital information code.
- OCR algorithm based on deep learning can adapt to the recognition of complex background, low contrast, deformation and other characters.
- One-dimensional code and two-dimensional code of various types can be identified with different positions, angles and illumination. The influence of image distortion can be effectively overcome.
- Provides continuous, accurate, high-speed reading of ID information for part tracking.
- Support multiple VeriCode accurate identification in case of strong interference.
- It supports CPU and GPU versions of deep learning code reading algorithm, and also carries out accurate positioning and recognition in complex background.

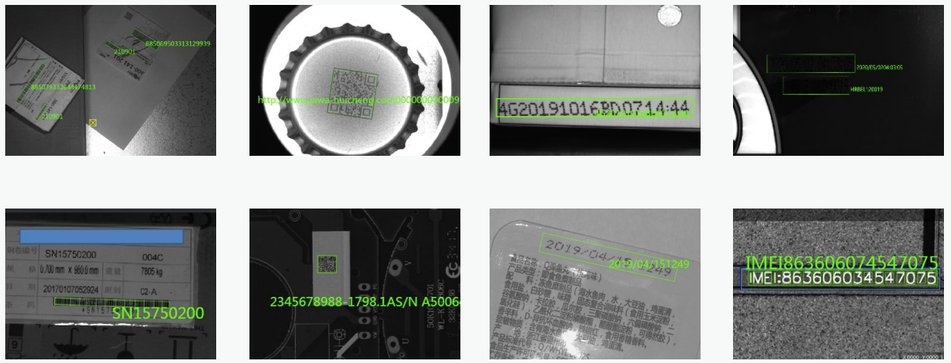


One-dimensional code

Two-dimensional code



OCR

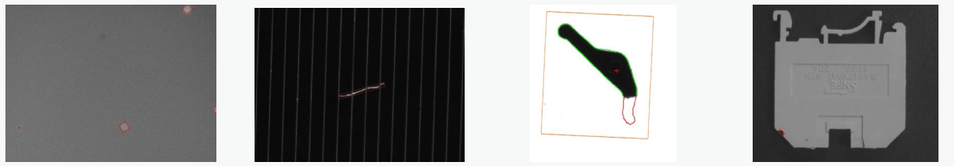


1D Code 2D Code OCR

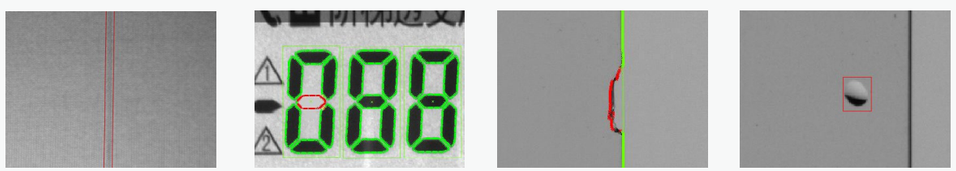
Defect detection tool

Accurately identify defects on the surface, shape and contour of the workpiece.

- Based on deep learning technology, it can detect fine surface scratches and spots, and overcome the interference of surface texture, color and noise.
- Accurate detection of workpiece shape and contour defects, can overcome the interference of burrs, color, noise.
- Reliable tool for comparing standard parts to locate small differences in workpiece.



Surface bright spot Surface scratch Abnormal shape Incomplete contour

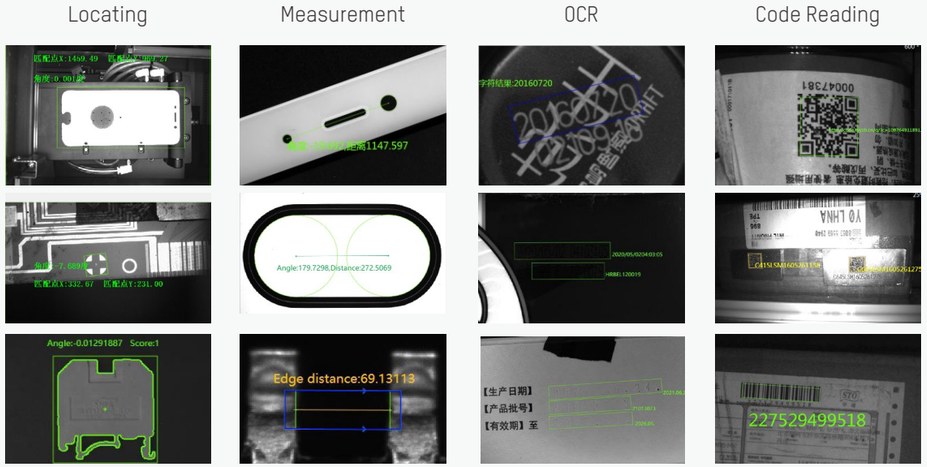


Scratch detection Character defec Broken edge detection Dirt detection

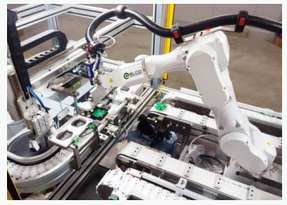
List of algorithm platform tools

Toolbox	Enumeration Of Tools
Acquisition (5)	Image Source, Multi-Image Acquisition, Image Output, Image Buffer, Light Source
Locating (27)	Contour Match, High-Precision Match, Fast Match, Gray Model Match, Mark Locating, Position Fixture, Blbo Analysis, Blob Label Analysis, Circle Search, Ellipe Find, Matrix Circle Find, Line Search, Line Search Group, Multi-Line Search, Edge Intersection, Quadrilateral Search, Parallel Line Search, Calculate Parallel Line, Rectangle Search, Find Median Line, Find Vertical Line, Caliper, Edge Search, Peak Search, Position Fixture, Target Tracking
Image Generation (3)	Circle Fit, Line Fit, Geometry Generation
Measurement (10)	Line-to-Circle Measurement, Circle-to-Circle Measurement, Point-to-Circle Measurement, Point-to-Line Measurement, Line-to-Line Measurement, Point-To-Point Measurement, Intensity Measurement, Edge Distance Measurement, Pixel Count, Histogram
Recognition (12)	BcR, 2D BcR, OCR, DL Character Recognition G/C, DL Code Reading G/C, DL Character Locating G/C, DL Single Character Detection G/C, ML Classifier
Calibration (9)	Calibration Board Calibration, Camera Mapping, N-point Calibration, Translation Calibration, Distortion Calibration, Mapping Calibration, N-image Calibration, Load Calibration, Rotate Calibration
Deep Learning (19)	DL Image Segmentation G/C, DL Classification G/C, DL Object Detection G/C, DL Image Retrieval G/C, DL Anomaly Detection G/C, DL Instance Segmentation G/C, DL Unsupervised Segmentation G, Quick Image Segment, DL Register Classify G/C, Register Segmentation G/C, Register Search G/C, Unsupervised Classification G/C
Calculation (11)	Single Point Alignment, Single Point Grab, Single Point Map Alignment, Single Point Rectify, Calibration Transformation, Point Set Alignment, Rotation Calculate, Line Alignment, Scale Transformation, Variable Calculation, Coordinate Transform
Image Processing (21)	Image Processing Combination, Image Morphology, Image Binarization, Image Filtering, Image Enhancement, Distortion Correction, Image Computing, Image Clarity Estimation, Image Fixture, Shading Correction, Image Resize, Affine Transformation, Ring Expansion, Copy Fill, Frame Mean, Normalization, Image Correction, Geometric Transformation, Image Stitching, Multi-image Fusion, Normalization
Split Combination (6)	Divide Image, 2D Array Correct, Label Filter, Box Merge, Box Overlap, Box Filter
Color Processing (5)	Color Extraction, Color Measurement, Color Transformation, Color Recognition, Color Generation
Defect Detection (13)	OCV, Surface Defect Filter, Arc Edge Defect Detection, Line Edge Defect Detection, Arc-pair Defects Detection, Line-pair Defects Detection, Edge Combination Defect Detection And Edge-pair Combination Defect Detection Respectively, Edge Model Defect Detection, Edge-pair Model Defect Detection, Anomaly Detection, Edge Position Trend Analysis, Edge Pair Position Trend Analysis
Logic Tools (19)	Condition Branch, Condition Detection, Branch, Branch String, Save Text, Logic, Format, String Comparison, Shell, Group, Point Set, Time-consuming Statistics, Data Set, Trigger Module, Graphics Collection, Sorting, Filtering, Classification, Database Storage
Communication (5)	Receive Data, Send Data, Camera IO (Support TCP/IP, Modbus, UDP, Serial Port, Ethernet/IP And Other Common Industrial Protocols; Support Communication With Mainstream Brand PLC), Protocol Analysis, Protocol Assembly

Classic Application



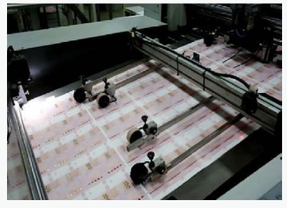
Applicable Industries



3C Manufacturing

Food/Medicine Production

Express Logistics

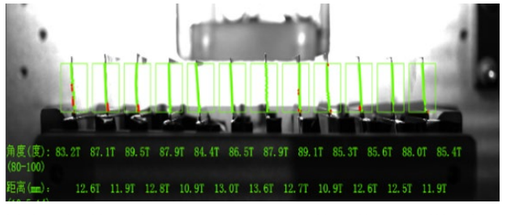


Printing and Textile

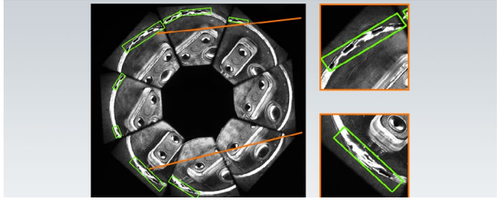
Car Manufacturing

New Energy

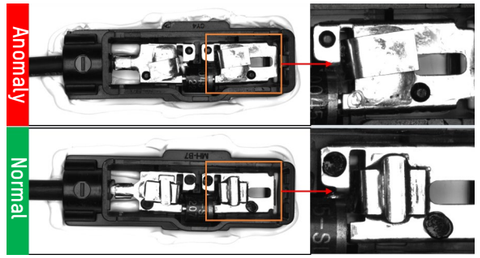
Application Case



Li-ion battery lug measurement: Use the positioning and measurement module to measure the data related to Li-ion battery lugs, and design the software interface through secondary development.

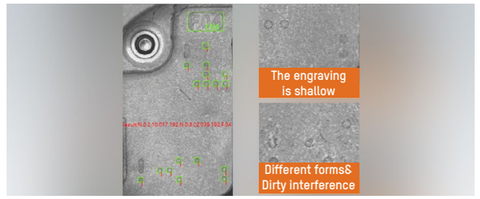


Lithium battery sealing welding defect detection: using deep learning algorithms for lithium battery sealing welding defect detection, can effectively detect welding defects such as welding offset, welding penetration, welding disconnection.

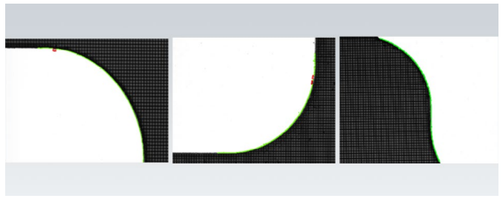


PV module junction box welding scar detection: using deep learning with traditional detection algorithms to detect PV module junction box welding scars.

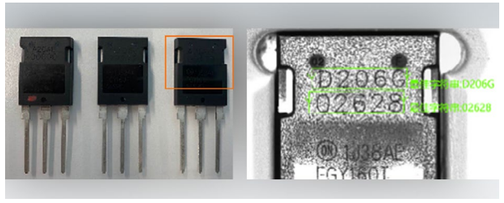
PV panel defect detection: using deep learning with traditional algorithms for defect detection during EL inspection of PV panels.



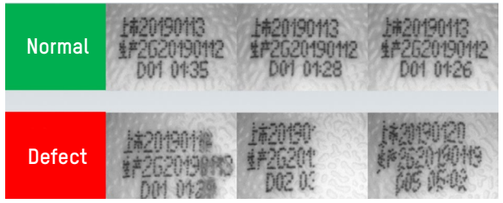
Consumer electronics industry 8421 code reading: using deep learning algorithms to extract the smallest unit of 8421 code from the complex environment, with the script module to decode it.



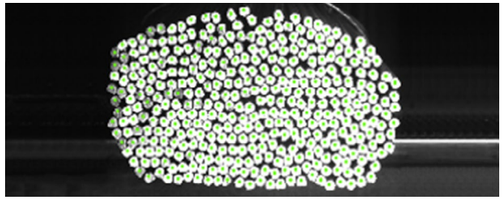
Cell phone screen edge defect detection: the use of traditional defect detection module to achieve the detection of defects on the edge of the cell phone screen.



OCR recognition of electronic components: using deep learning algorithms to cope with OCR recognition of low contrast and complex backgrounds on electronic components



Food packaging character defect detection: using deep learning algorithms to achieve defect detection of spray code characters on food packaging.



Rebar counting: Use deep learning algorithm to implement counting function when rebar is bundled.