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AI Image Recognition

AKUSENSE AIVS

AKUSENSE AIVS(Artificial Intelligent Vision System) provides from image acquisition to model deployment and upgrade, and then to the production line for complete closed loop, through the docking with imaging equipment to achieve image acquisition, the user annotates the collected data, and then perform model training with one-click operation,Export and deploy the model to the production line to directly inspect the materials in real time Measurement. As the production line changes, AKUSENSE AIVS will conduct independent training and upgrade models, There is no need for professional AI algorithm personnel to participate in the whole process.

0 Programme   1 Deploy   2 Contents 3 Operations

AKUSENSE AIVS(Artificial Intelligence Vision System) consists of training and running, no need programming requirements, only 3 steps to complete model training, and 1 click deployment to the production line.

Program Overview

AKUSENSE AIVS is a set of end-to-end solution for industrial vision AI, mainly with two parts: model training and operation. It can provide full flow, one stop AI empowerment and management capabilities for industrial manufacturing to create intelligent manufacturing standardized AI delivery system.

The AIVS model training platform is aimed at AI algorithm autonomous training for complicated scenes like material tracking, defect positioning, workpiece measurement of the production line, and Multi-class appearance detection. The AIVS model running platform imports the model generated by the training platform and deploys it directly to the production line, then connect with the production line equipment to achieve real-time AI detection.
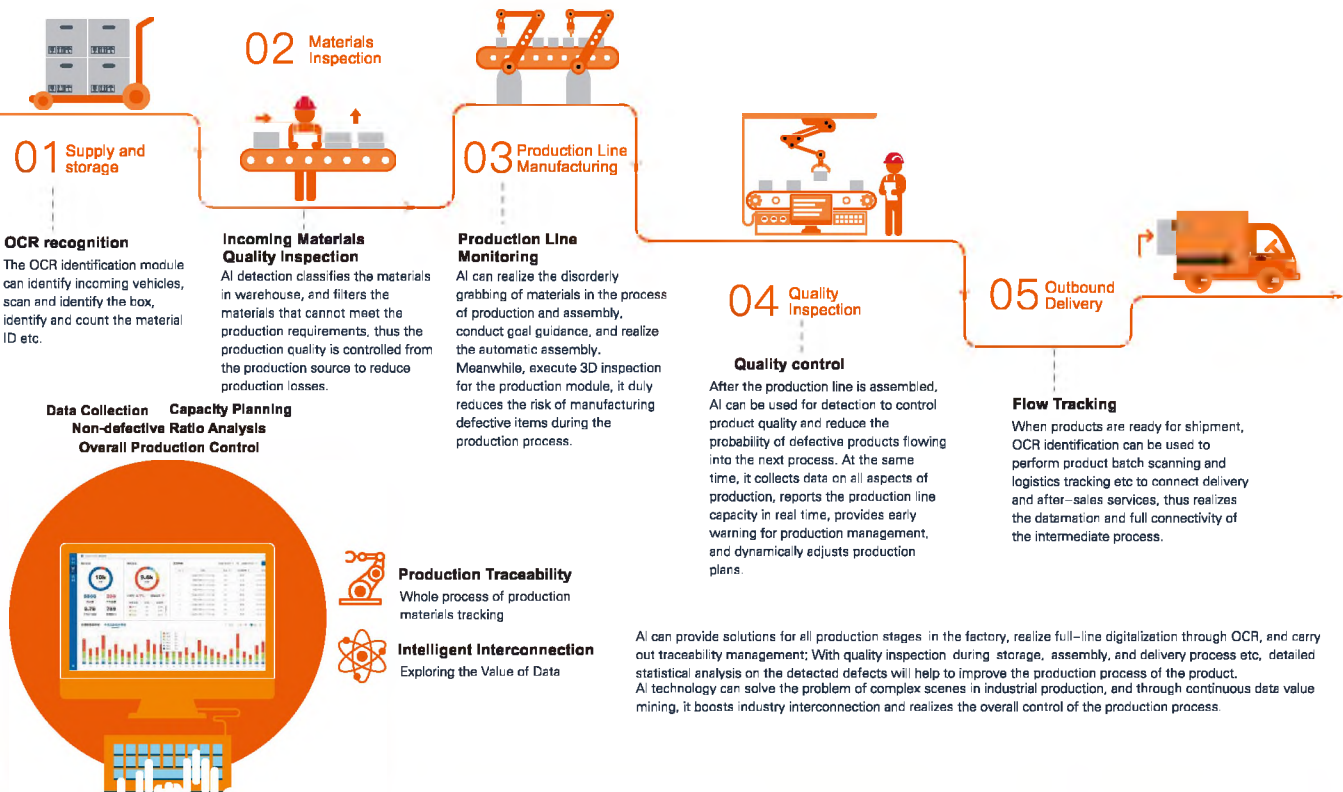
AKUSENSE AIVS decreases the industries'dependence to professional AI ability. With the program launched, the corporations do not need algorithm personnel to program on-site, the training and deployment of the AI model can be completed with simple mouse click, so that AI can be used in industrial production line to improve production efficiency, and fulfil the intelligent upgrade of traditional manufacturing. This solution can be widely used in consumer electronics, automobiles, new energy, and pan-industries. At present, it has provided services for a great number of Fortune 500 manufacturers in different fields, with production line equipments seamlessly connected to realize AI real-time detection.

Image Acquisition

Training Model

Deployment

Imaging Equipment

Monitoring

The model will be updated and iterated as the production lines change.

AKUSENSE AIVS

Application

For typical cases and industry applications, please refer to P51-54

AKUSENSE AIVS provides AI services for the entire manufacturing process, and helps to improve production traceability management and industrial interconnection.

01 Supply and storage

02 Materials Inspection

03 Production Line Manufacturing

04 Quality Inspection

05 Outbound Delivery

OCR recognition
The OCR identification module can identify incoming vehicles, scan and identify the box, identify and count the material ID etc.

Data Collection   **Capacity Planning**
Non-defective Ratio Analysis
Overall Production Control

Incoming Materials Quality Inspection
AI detection classifies the materials in warehouse, and filters the materials that cannot meet the production requirements, thus the production quality is controlled from the production source to reduce production losses.

Production Line Monitoring
AI can realize the disorderly grabbing of materials in the process of production and assembly, conduct goal guidance, and realize the automatic assembly. Meanwhile, execute 3D inspection for the production module, it duly reduces the risk of manufacturing defective items during the production process.

Quality control
After the production line is assembled, AI can be used for detection to control product quality and reduce the probability of defective products flowing into the next process. At the same time, it collects data on all aspects of production, reports the production line capacity in real time, provides early warning for production management, and dynamically adjusts production plans.

Flow Tracking
When products are ready for shipment, OCR identification can be used to perform product batch scanning and logistics tracking etc to connect delivery and after-sales services, thus realizes the datamation and full connectivity of the intermediate process.

Production Traceability
Whole process of production materials tracking

Intelligent Interconnection
Exploring the Value of Data

AI can provide solutions for all production stages in the factory, realize full-line digitalization through OCR, and carry out traceability management; With quality inspection during storage, assembly, and delivery process etc, detailed statistical analysis on the detected defects will help to improve the production process of the product.
AI technology can solve the problem of complex scenes in industrial production, and through continuous data value mining, it boosts industry interconnection and realizes the overall control of the production process.

Core Algorithm Function

OCR

Adopting end-to-end solution based on deep learning, it supports single-character and multi-character labeling and recognition, and recognize different background characters, such as steel stamping, laser engraving, printing, textiles etc, breaking the technical limitations of traditional approaches and solving curved characters Recognition, low-contrast character recognition, large character recognition and other complex issues .

Detection
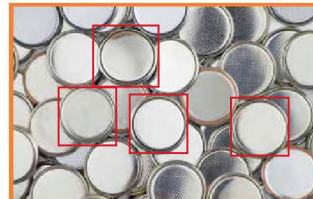
Positioning and categorizing the targets in the detected materials, it is suitable for multi-target detection, small target detection, counting etc, can be used as drug pill counting and 3C device detection etc.

Classification

Classify and analyse the tested materials, such as the OK/NG two-class judgment of materials, the color of the object, the type of food material, and the detailed classification of 3C defects etc.

Segmentation

Pixel level detection and edge recognition of the detected object. Such as identifying the crack area of the silicon wafer, and the bearing bump area etc.

Extreme Fine Recognition Capability
|
4 Pixels

When the detection objects are very dense, with only 4-5 pixels between different targets, ordinary algorithms cannot distinguish it well. AKUSENSE AIVS detects the label structure information of the target through the auto-encoder learning, which can identify the granularity as low as 4 pixels.

Small Sample Error Corrector
|
Boost 10%+

In order to solve the issue of fewer training samples, AKUSENSE AIVS solution will search for typical cases among the samples, cyclically guides and rectifies for the prediction results, so that the recognition rate of the final small samples increases by over 10%.

Core algorithm advantage

Super Image Processing Power
|
100 Million Pixels

Super model parallel capability, image processing on a multi-card machine, can handle 4 times the field of view of the normal network, and can conduct up to 100 million pixels in a single image.

Dynamic Data Enhancement
|
Up to 30x Enhancement

The uneven distribution of training sample data leads to poor prediction effects of the model. AKUSENSE AIVS can automatically match the optimal data enhancement strategy according to different task requirements, generate new simulation data through learning iteration, and increase the data utilization rate by over 30 times.

Remarks: The above algorithm effect data are calculated based on the actual measurement data of AKUSENSE's running projects. Specific to similar projects measured results may produce small deviations.

AKUSENSE AIVS

01

Consumer-level Product Experience

It provides data labeling, management and other functions, humanized interactive design helps to complete labeling work smoothly through guided labeling and quickly close up; the platform supports image and labeling data import and export,which can be used for data sharing and management.

02

Visual Training Process

AKUSENSE AIVS features characters such as automatic parameter tuning and intelligent data distribution. Users do not need to acquire professional AI knowledge, but conduct simple parameter configuration to perform one-click training; during the model training process, the system provides real-time model effect trend curve, Model performance is shown clearly.

03

Clear Test Results

The model can be tested after training. The test result includes model information,test indicators and visual images for users to judge the performance of the model promptly. The test report supports one-click export, which is convenient for users to conduct further deep learning analysis and summary for the report.
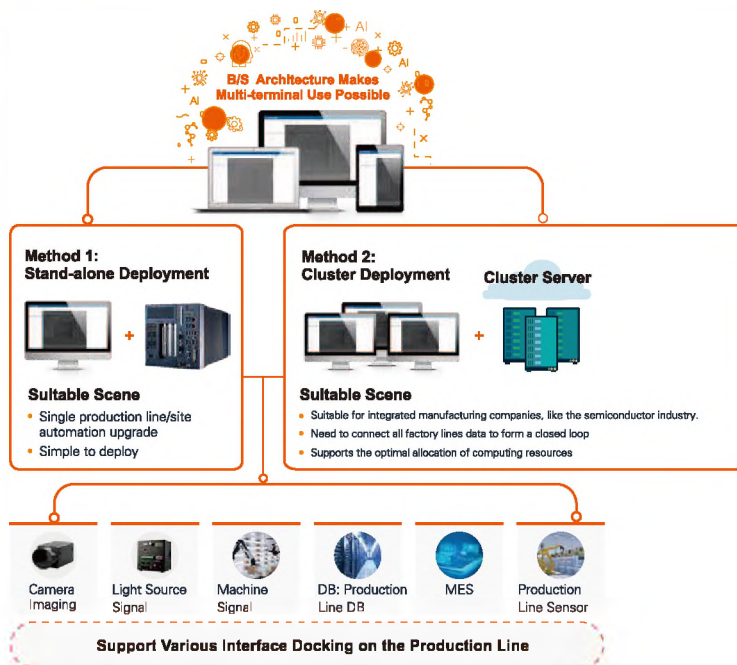
04

Agile Project Delivery

The agile project delivery model can be easily deployed to the operating platform, and the detection results can be displayed in real time. The operating platform supports docking with various camera data interfaces and multi-view configuration. The model can be operated on the production line with simple operation.

Application

B/S Architecture Makes Multi-terminal Use Possible

Method 1: Stand-alone Deployment

Suitable Scene
- Single production line/site automation upgrade
- Simple to deploy

Method 2: Cluster Deployment

Cluster Server

Suitable Scene
- Suitable for integrated manufacturing companies, like the semiconductor industry.
- Need to connect all factory lines data to form a closed loop
- Supports the optimal allocation of computing resources

| Camera Imaging | Light Source Signal | Machine Signal | DB: Production Line DB | MES | Production Line Sensor |

Support Various Interface Docking on the Production Line

AKUSENSE AIVS provides two deployment methods, and users can choose flexibly according to their needs.

For a single site/production line, only single link problem needs to be solved through AI, and then stand-alone deployment method can be used.

For production lines with high digital interconnection requirements, in addition to solve the single-point problem of the production line, it is also necessary to open up the data of the whole plant to form industrial interconnection and drive digital management,cluster deployment can be adopted.

AKUSENSE AIVS can adapt to multiple types of interfaces and communication protocols in industrial production scenarios, and supports the docking of multiple models of cameras, light sources, industrial computers, common sensors, MES and databases, etc., to open up the data link of the production line.

Stand-alone Deployment Characteristics

One click deployment, promptly used on the production line, light-weight operation, and supports cross-operating systems.

Cluster Deployment Features

AKUSENSE AIVS supports multiple server clusters (data centers), training and running machine mixing to achieve maximum sharing of computing power to achieve optimal allocation of resources and to ensure the full mobilization of idle resources. In addition, it can also provide capacity monitoring and statistical analysis of the entire production line to guide for yield analysis and process improvement.

Platform Architecture Characteristics

The platform adopts B/S architecture, no matter which deployment solution is selected, users can apply to multiple terminals under the same network segment to use various services provided by AKUSENSE AIVS.

NEW!

Basic Features	Operating Principle	Intelligent Vision Sensor		
	Shell Style	Square		
	Detection Range	30~300mm	40~300mm(@ 6mm),100~400mm(@16mm)	
	Field of View	–		
	Focal Length	6mm		16mm
	Focus Adjustment Method	Manual Focus	Liquid Focus	
	Resolution	1280*800		
	Light Source	Non-polarized Red Light/Non-polarized White Light/Polarized Red Light/Polarized White Light		
	Color/Black and White	Black and White		
	Shutter	Global		
	Indicator Light	2 green light spots indicate the center area of scanning position; 3 status LEDs and buzzer		
Electrical data	Image Sensor Size	3μm x 3μm		
	Target Surface Size	1/4"		
	Maximum Reading Speed	60		
	Exposure Time	20μs~10000μs		
	Gain	0 dB ~ 255dB		
	Operating Voltage	24V DC		
	Power Consumption	5W		
	Output Type	Two optically isolated inputs, supporting NPN, PNP types; three non-isolated outputs		
	Communication Protocol	TCP Server、TCP Client、ModBus TCP、ModBus RTU、Profinet、Ethernet/IP、MELSEC/SLMP、Serial		
	Communication Interface	RS232、Ethernet		
Environmental conditions	Operating Temperature	0~45℃		
	Storage Temperature	−20~70℃		
	Humidity	5%~95%RH(Non-condensing)		
	Protection Level	IP67		
	Connection Method	Cable Connection		
Mechanical data	Dimensions	47x25x43mm		
	Weight	about 100g		
	Accessories	M12-17PIN cable, 24V power adapter (optional), L-shaped mounting bracket + screws		
Model	Non-polarized Red Light	VDS10-BH0106-RP	VDS10-BQ0106-RP	VDS10-BQ0116-RP
	Non-polarized White Light	VDS10-BH0106-WP	VDS10-BQ0106-WP	VDS10-BQ0116-WP
	Polarized Red Light	VDS10-BH0106-RD	VDS10-BQ0106-RD	VDS10-BQ0116-RD
	Polarized White Light	VDS10-BH0106-WD	VDS10-BQ0106-WD	VDS10-BQ0116-WD

Dimensions

Unit：mm

2-M2
25
8.5 12

43
2-M2
12 8.5

47

2-M2
33
3.5
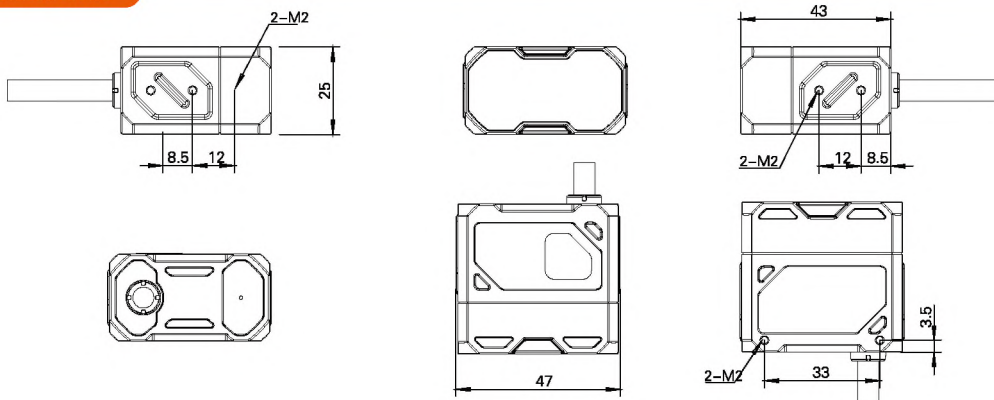
Vision Sensor

VDS20 Series

NEW!

Basic Features	Operating Principle	Intelligent Vision Sensor					
	Shell Style	Square Shape					
	Detection Range	100~1000mm					
	Field of View	–					
	Focal Length	8mm	12mm	16mm	8mm	12mm	16mm
	Focus Adjustment Method	Mechanical Focus					
	Resolution	1280*800			1920*1200		
	Light Source	Non-polarized Red Light/Non-polarized White Light/Polarized Red Light/Polarized White Light					
	Color/Black and White	Black and White					
	Shutter	Global					
	Indicator Light	1 green light spot indicates the center area of scanning position; 5 status LEDs and buzzer					
Electrical data	Image Sensor Size	3μm x 3μm					
	Target Surface Size	1/4"			1/2.6"		
	Maximum Reading Speed	60					
	Exposure Time	20μs~10000μs					
	Gain	-					
	Operating Voltage	24V DC					
	Power Consumption	15W					
	Output Type	Two optically isolated inputs, supporting NPN, PNP types; three non-isolated outputs					
	Communication Protocol	TCP Server，TCP Client，ModBus TCP，ModBus RTU，Profinet，Ethernet/IP，MELSEC/SLMP，Serial					
	Communication Interface	RS232、Ethernet					
Environmental conditions	Operating Temperature	0~45℃					
	Storage Temperature	−20~70℃					
	Humidity	5%~95%RH(Non-condensing)					
	Protection Level	IP67					
	Connection Method	Cable Connection					
Mechanical data	Dimensions	58x53.5x83mm					
	Weight	about 220g					
	Accessories	M12-12PIN-3M (3m high-flex), M12-8PIN-3M (3m high-flex), L-shaped mounting bracket, 24V power adapter (optional), screw kit					
Model	Non-polarized Red Light	VDS20-BX0108-RP	VDS20-BX0112-RP	VDS20-BX0116-RP	VDS20-BX0208-RP	VDS20-BX0212-RP	VDS20-BX0216-RP
	Non-polarized White Light	VDS20-BX0108-WP	VDS20-BX0112-WP	VDS20-BX0116-WP	VDS20-BX0208-WP	VDS20-BX0212-WP	VDS20-BX0216-WP
	Polarized Red Light	VDS20-BX0108-RD	VDS20-BX0112-RD	VDS20-BX0116-RD	VDS20-BX0208-RD	VDS20-BX0212-RD	VDS20-BX0216-RD
	Polarized White Light	VDS20-BX0108-WD	VDS20-BX0112-WD	VDS20-BX0116-WD	VDS20-BX0208-WD	VDS20-BX0212-WD	VDS20-BX0216-WD

Unit: mm

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