

DAVAI

An Visual AI Platform for the Intelligent Manufacturing

AI PCBA Inspection Solution

AI Bounding box drawing in 5 Minutes

Comprehensive Visual AI Defect Coverage

Automatic Threshold & Parameter Generation

Born in Canada, Built for the World



R&D CENTER

Vancouver

2018

Founded in Vancouver

2019

Partnered with Brose

2021

Part of the Siemens Ecosystem



OPERATION OFFICE

Beijing

Wuhu

Chongqing

DAOA I

WELINKIRT

PART
01

Consumer Demand

- Client Painpoints
- Equipment Valuation
- Advantages of Equipment

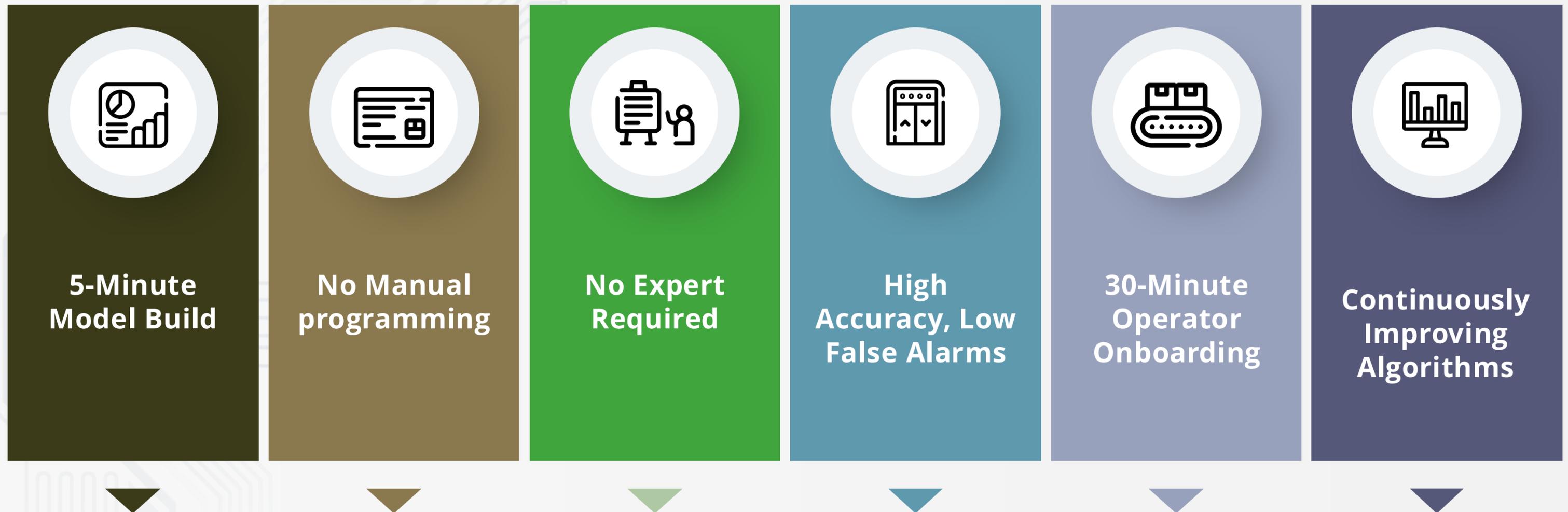
Client Painpoints

- 01 Manual Define Area & setup
- 02 Programming requires CAD / libraries
- 03 Experience-dependent programming
- 04 High false-alarm rates
- 05 No connection between inspection data
- 06 Long operator training Process



Application Value

Immediate results — boosting PCBA inspection efficiency & yield



Benefits

Category	Rule-Based AOI	DaoAI AOI	Benefits
Programming Time	3–5 hours	5 minutes	Faster line changeover × higher productivity
Staff Requirement	Engineer	Operator	Save approx. USD 14,000 / person per year
Modeling Requirement	Requires CAD or component library	Built by golden board photos	Cut annual labor cost by USD 28,000–42,000
Inspection Accuracy	High false alarm rate	AI optimization	80% fewer false alarms with higher yield

Competitive Advantage

- Advantages of Visual Foundation Models
- Algorithm Principles
- Benefits of Visual AI
- Inspection Examples
- Rule based Algorithms vs. DaoAI Visual AI
- Summary of Advantages



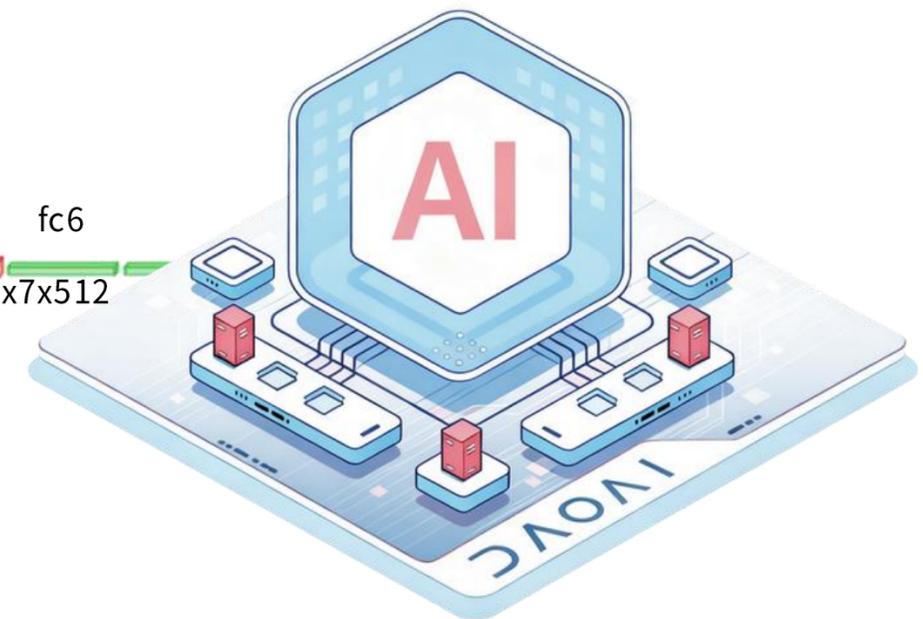
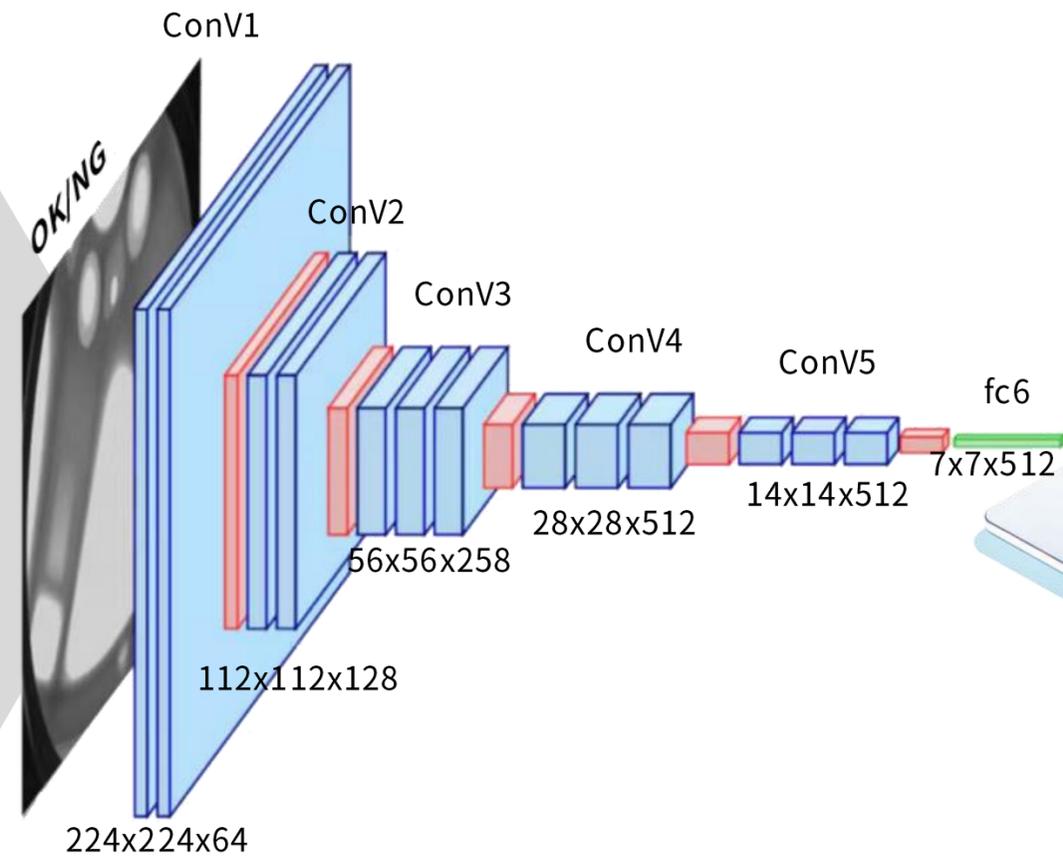
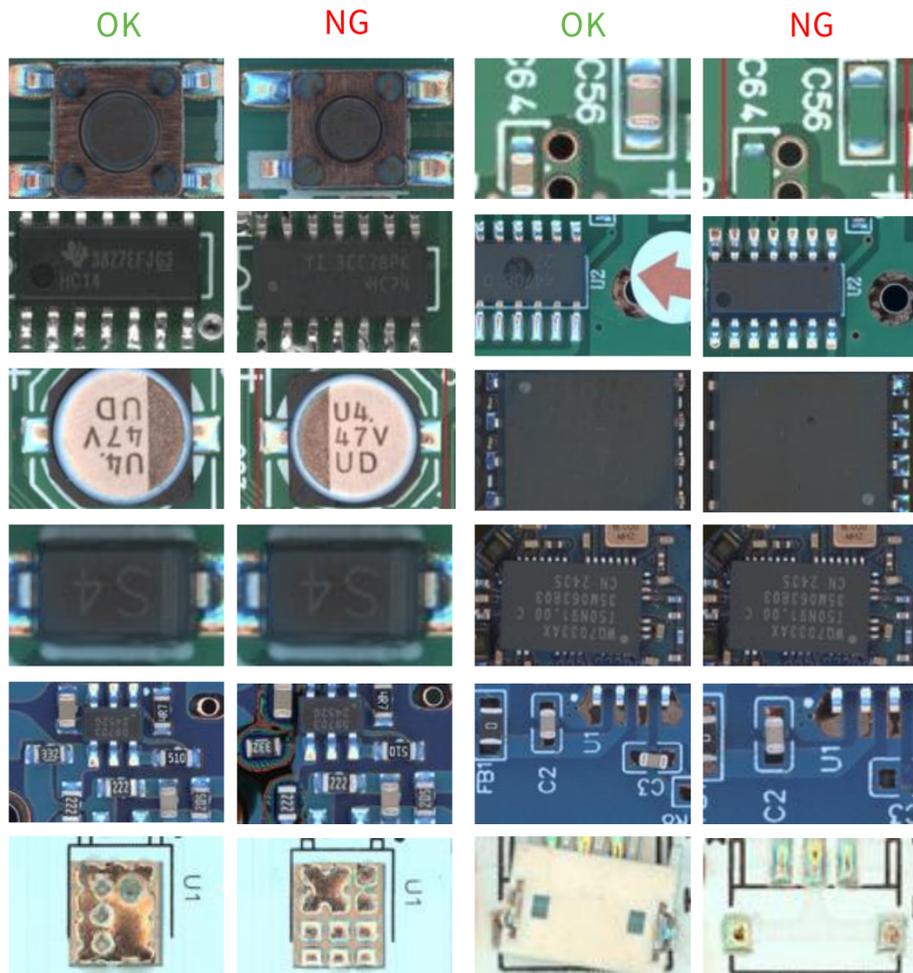
Advantages of Visual Foundation Models: Superior Generalization Through Large-Scale Data Learning

Improves performance and recognizes real production-line anomalies.

Over 100 million
Good/Defect samples

AI learns directly from
real samples

PCBA Visual AI



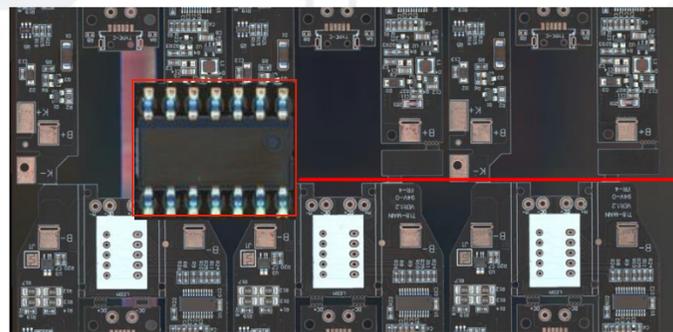
Rule-Based Methods Often Miss Defects

Visual AI overcomes color similarity between PCB and components, significantly improving detection accuracy.

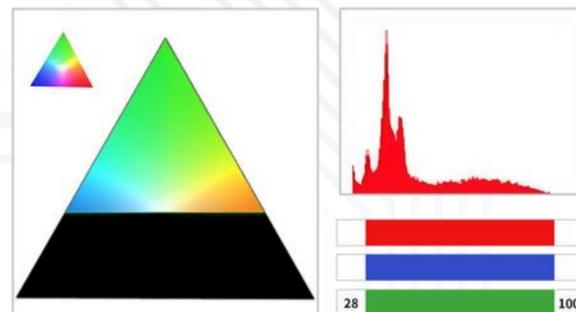
Color-Comparison Algorithm

Identifies missing components by analyzing extracted RGB values

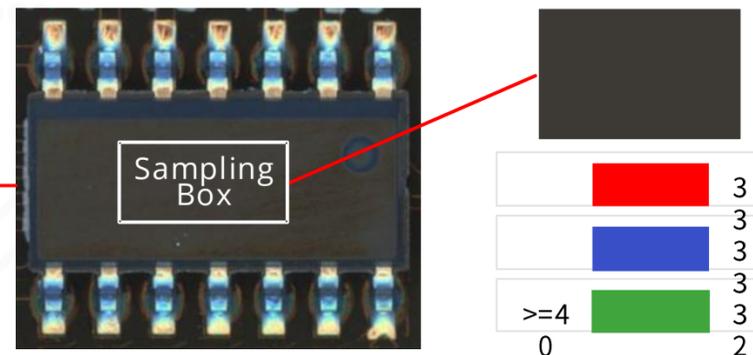
Black-base PCB



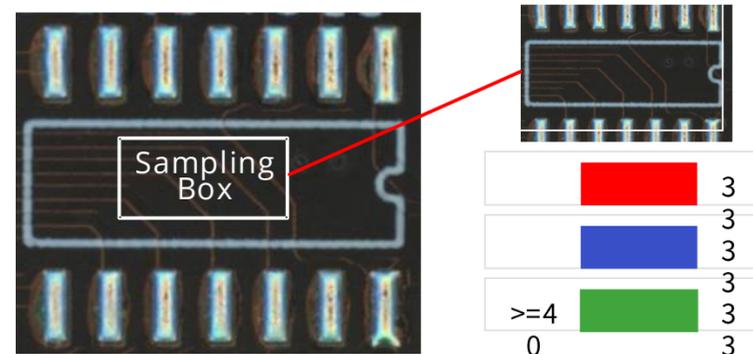
PCB Base Color-Extraction Distribution



No Missing Components



Missing Components



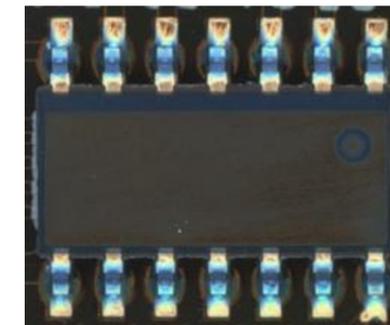
Result: Missed Detection

Cause: PCB base color is too similar to the component color

Visual AI Feature-Based Judgment

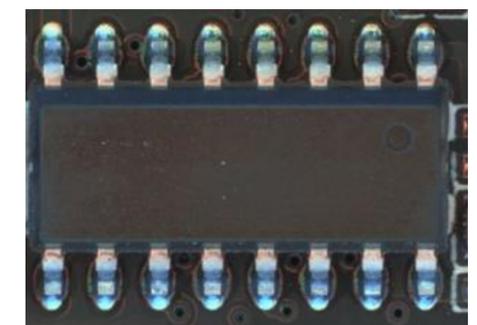
AI compares features and automatically generates anomaly scores

No Missing Components



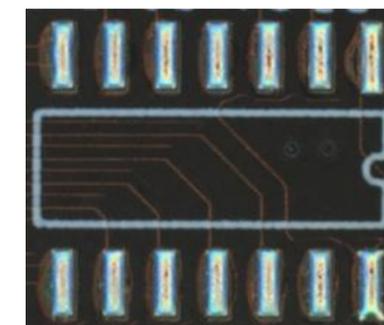
OK Threshold < 0.2

No Scratches



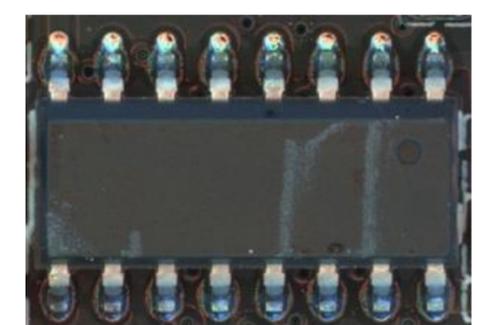
OK Threshold < 0.2

Missing Components



NG Anomaly Score: 0.4

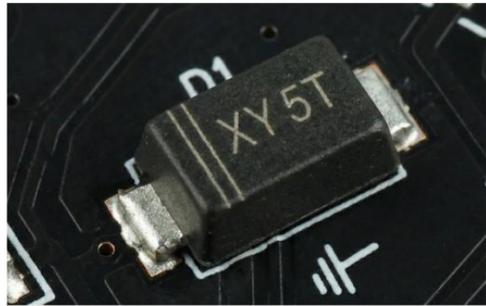
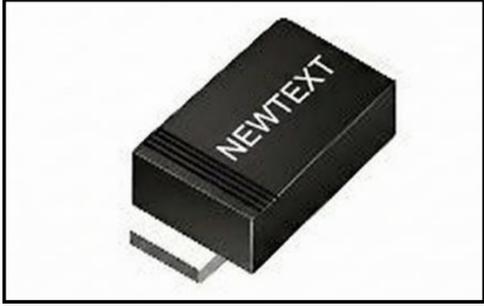
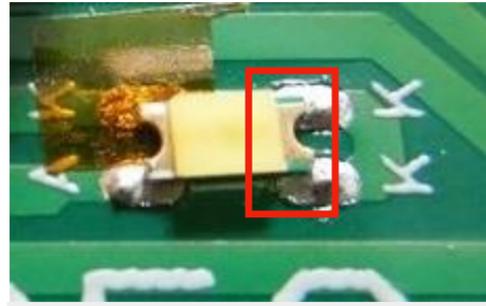
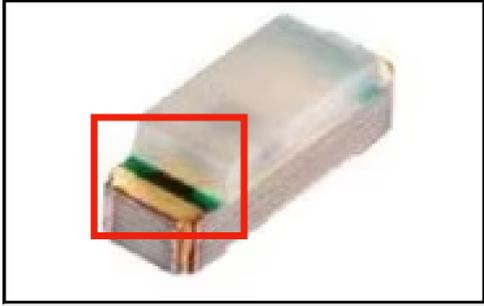
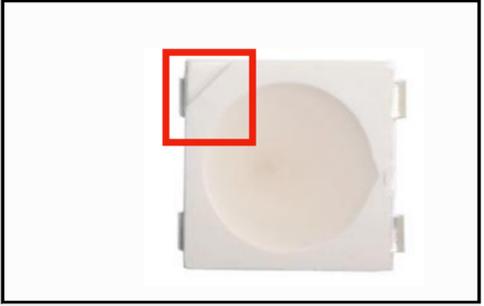
Scratches



NG Anomaly Score: 0.35

Software Highlights

Solving the Most Difficult Challenge in AOI: **Polarity Inspection**

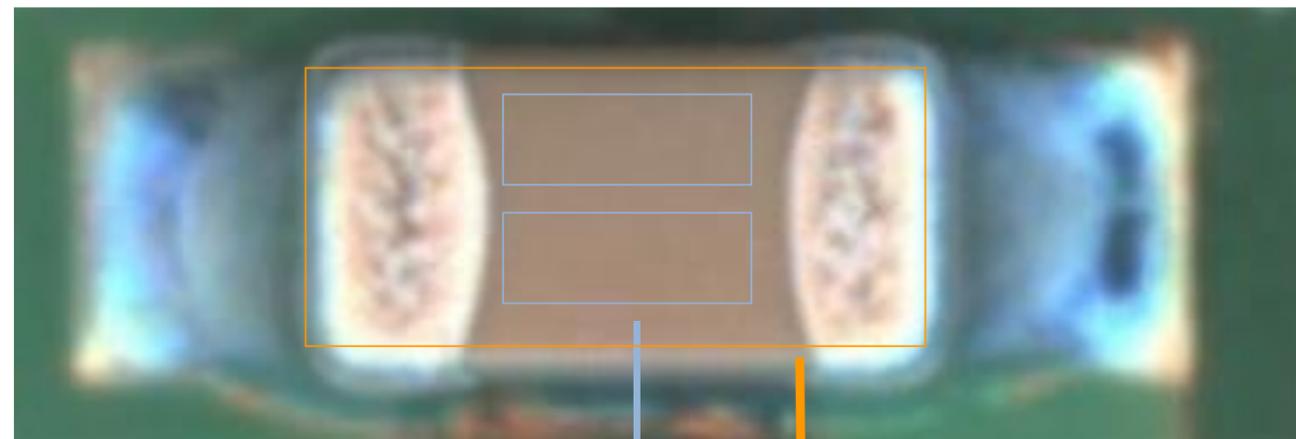
<p>SOD Polarity Detection</p>				<p>98%up AI Detection Rate</p>	<p>60-70% Rule-Based AOI</p>
<p>LED Polarity Detection</p>				<p>98%up AI Detection Rate</p>	<p>60-70% Rule-Based AOI</p>

Visual AI Advantages

1 Fewer Inspection bounding boxes Needed

No repeated drawing required — one box detects wrong parts, missing parts, inverted parts, damage, tombstoning, and other defects.

Rule-based AOI Box Drawing

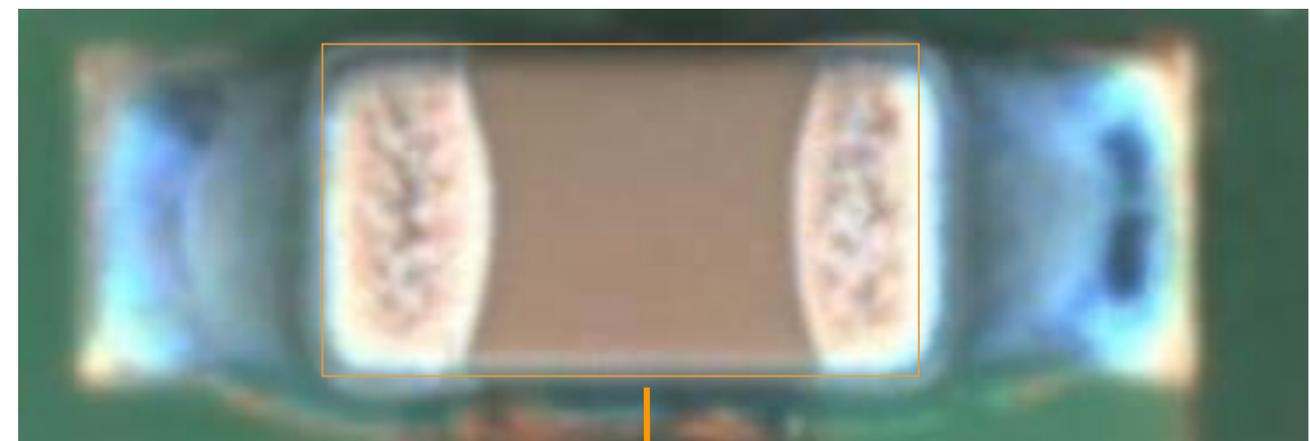


Missing-Component box

Component Body box

VS

AI AOI Box Drawing



One box detects wrong / missing / inverted parts.

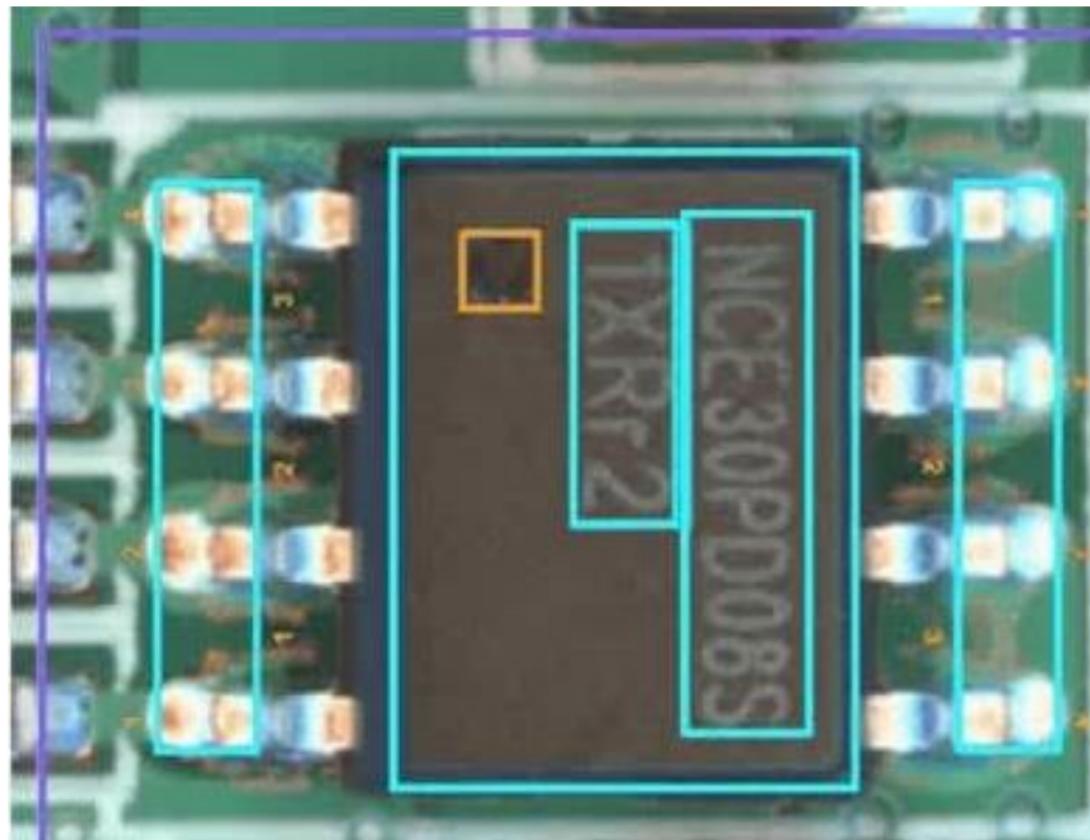
Visual AI Advantages

2

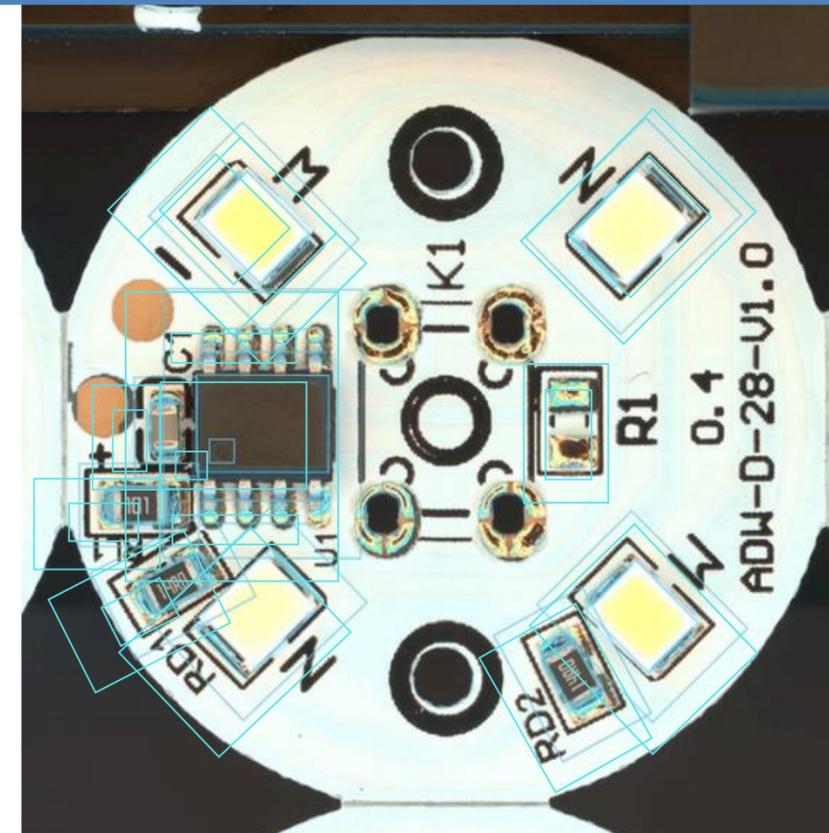
AI Auto programs On Rotated Components

AI automatically identifies IC components, pin positions, and polarity, then completes all necessary bounding frames.

AI Locates Component
and Pin Positions

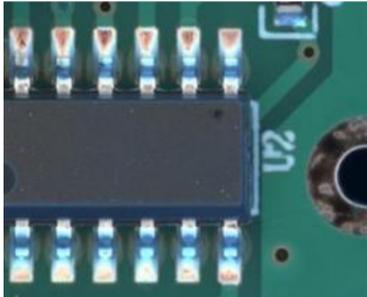
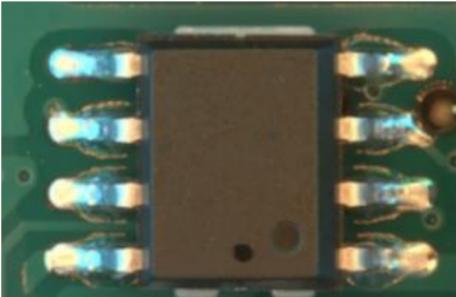
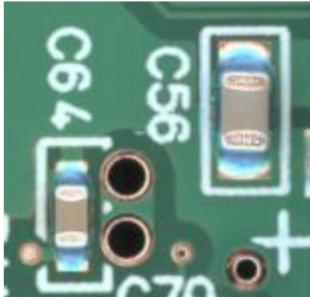
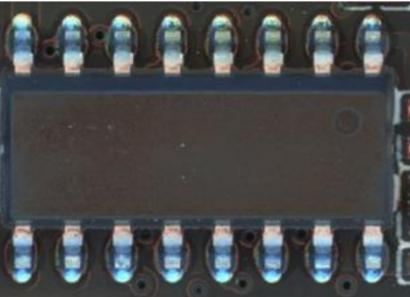
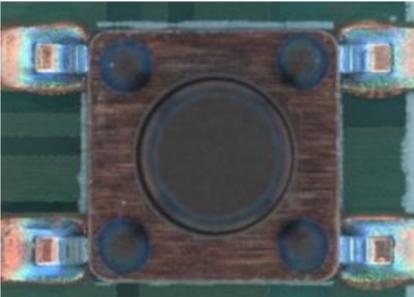
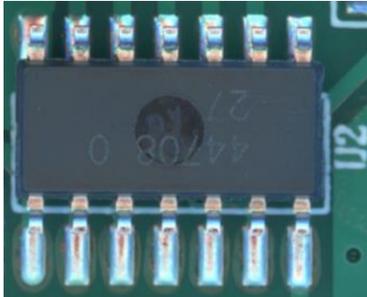
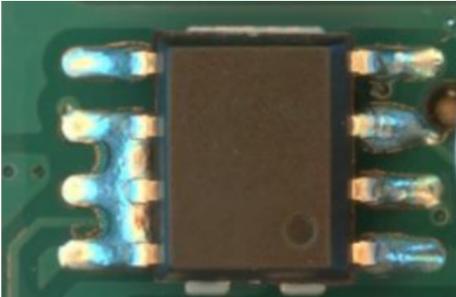
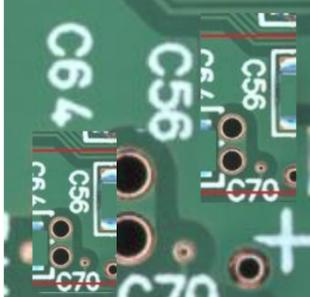
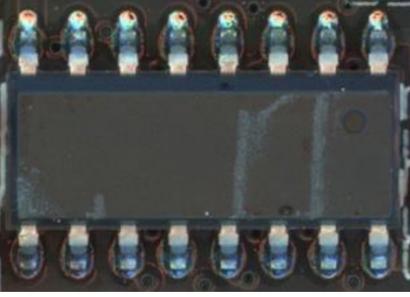
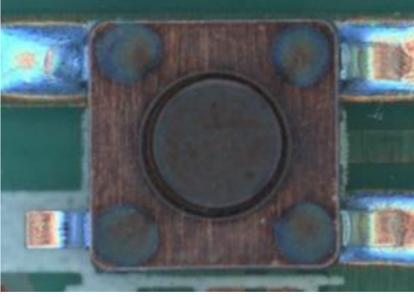
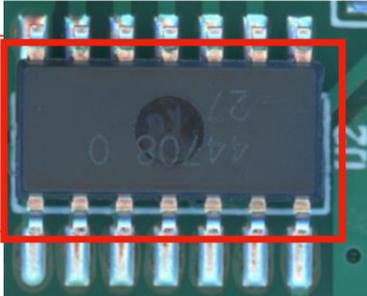
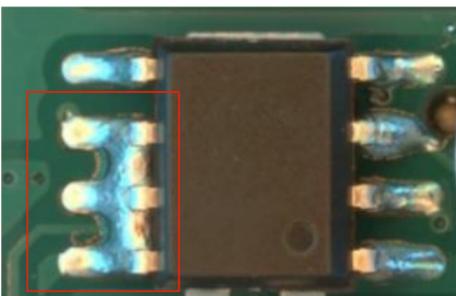
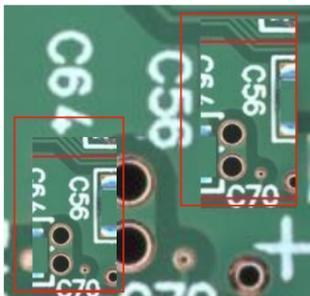
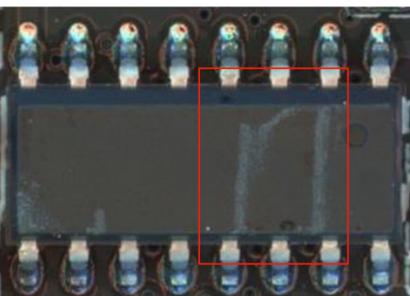
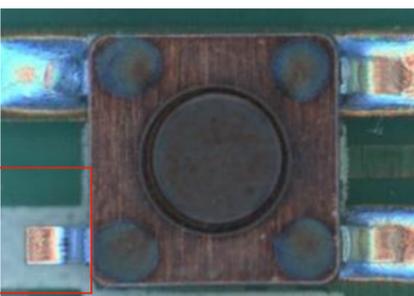


Framing Rotated Components



Inspection Examples

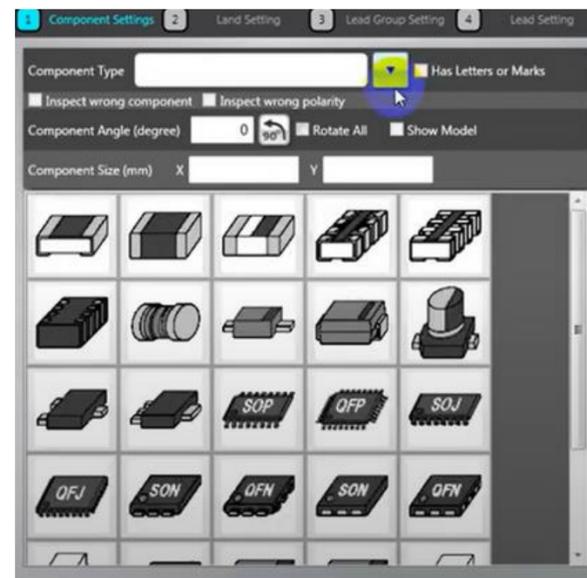
Visual AI Automatically Extracts Features for Higher Accuracy and Reliability

<p>Reference Component</p>					
<p>Target Component</p>					
<p>Visual AI Inspection</p>	<p>Wrong Component</p> 	<p>Solder Bridging</p> 	<p>Missing Component</p> 	<p>Scratch</p> 	<p>Insufficient Solder</p> 

Rule-Based Algorithms VS DaoAI Visual AI

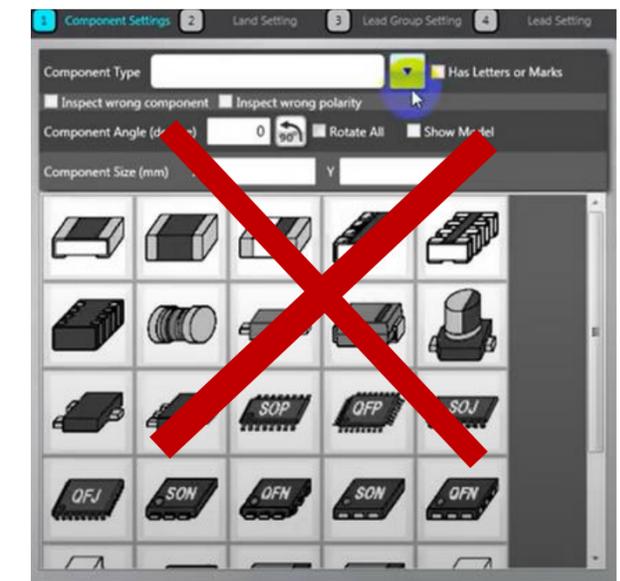
Rule-Based Algorithms

- Manual Feature Extraction
- Programming Time: Tens of Minutes to Several Hours
- Requires Component Library
- Defect Judgment (Traditional Algorithms & Rules) — High False-Alarm Rate
- Algorithms Cannot Iteratively Improve; Performance Depends on Engineer Skill
- Engineer-Dependent



DaoAI Visual AI

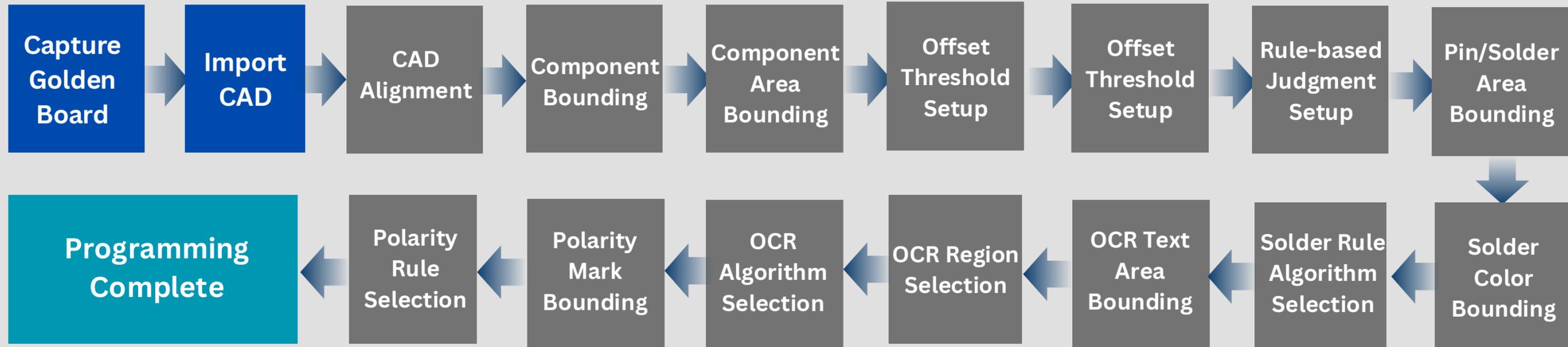
- Automatic Feature Extraction
- Programming Time: A Few Minutes
- No Component Library or CAD Required
- Defect Judgment (Visual AI) — More Stable with 1/10 the False Alarms
- Algorithms Continuously Improve Through Automatic Iteration
- Operator-Friendly (No Expert Required)



3-5 Hours vs 5 Minutes: The New Way to Program

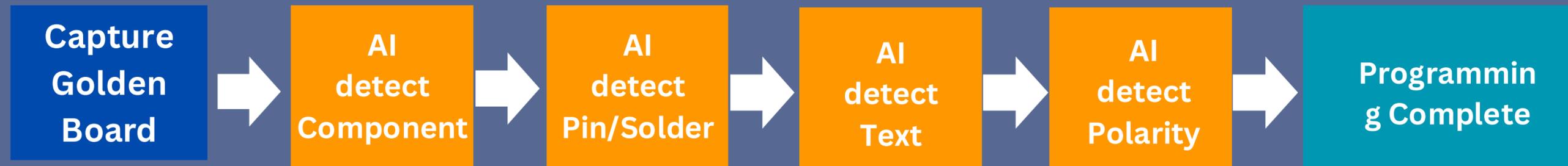


PCBA AOI Rule-Based Programming



Programming with AI

AI Auto-Bounding & Determines Defect Threshold



Summary of Advantages

The Optimal Visual Solution for PCBA Inspection

5-Minute Setup



AI auto-builds models from one golden sample — no CAD, no libraries

High Detection Rate, Low False Alarms



Visual AI identifies defects traditional color rules miss.

Continuous Learning Loop



Operator feedback instantly updates and improves the model.

30-Minute Operator Onboarding



No expert engineer required; operators learn fast.

DAOAI

PART
03



Offline
2D PCBA AOI

Inline
2D PCBA AOI

Product Introduction

- Software Features
- Inspection Speed
- Equipment Overview
- PCBA AOI Range
- DaoAI P1/P2 Spec
- DaoAI P3/P3D Spec

Key Features

1

Detects All Component-Level Defects

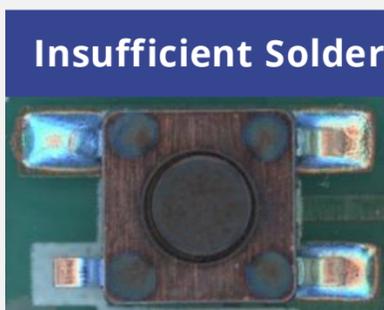
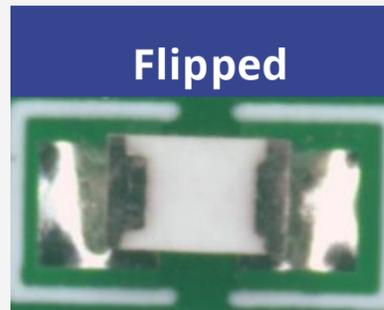
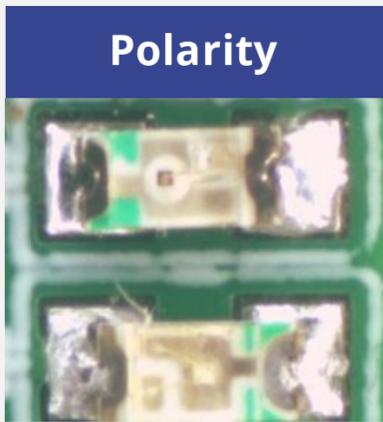
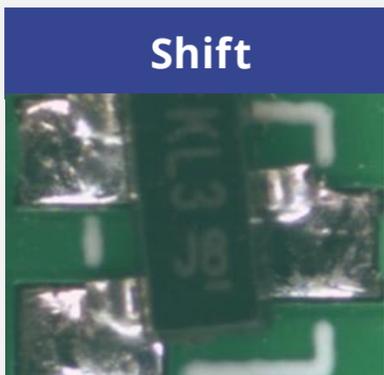
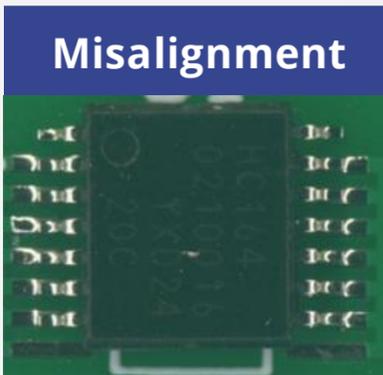
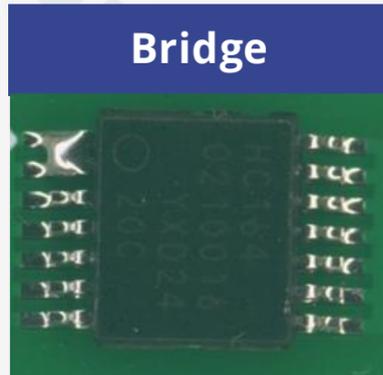
No component library or CAD required — supports detection of capacitors, resistors, connectors, IC pins, and more.

Rule-based AOI:

Complex rule setup with limited coverage of component types and defect variations.

DaoAI AI AOI:

Visual AI accurately recognizes diverse components and detects all major defect types.

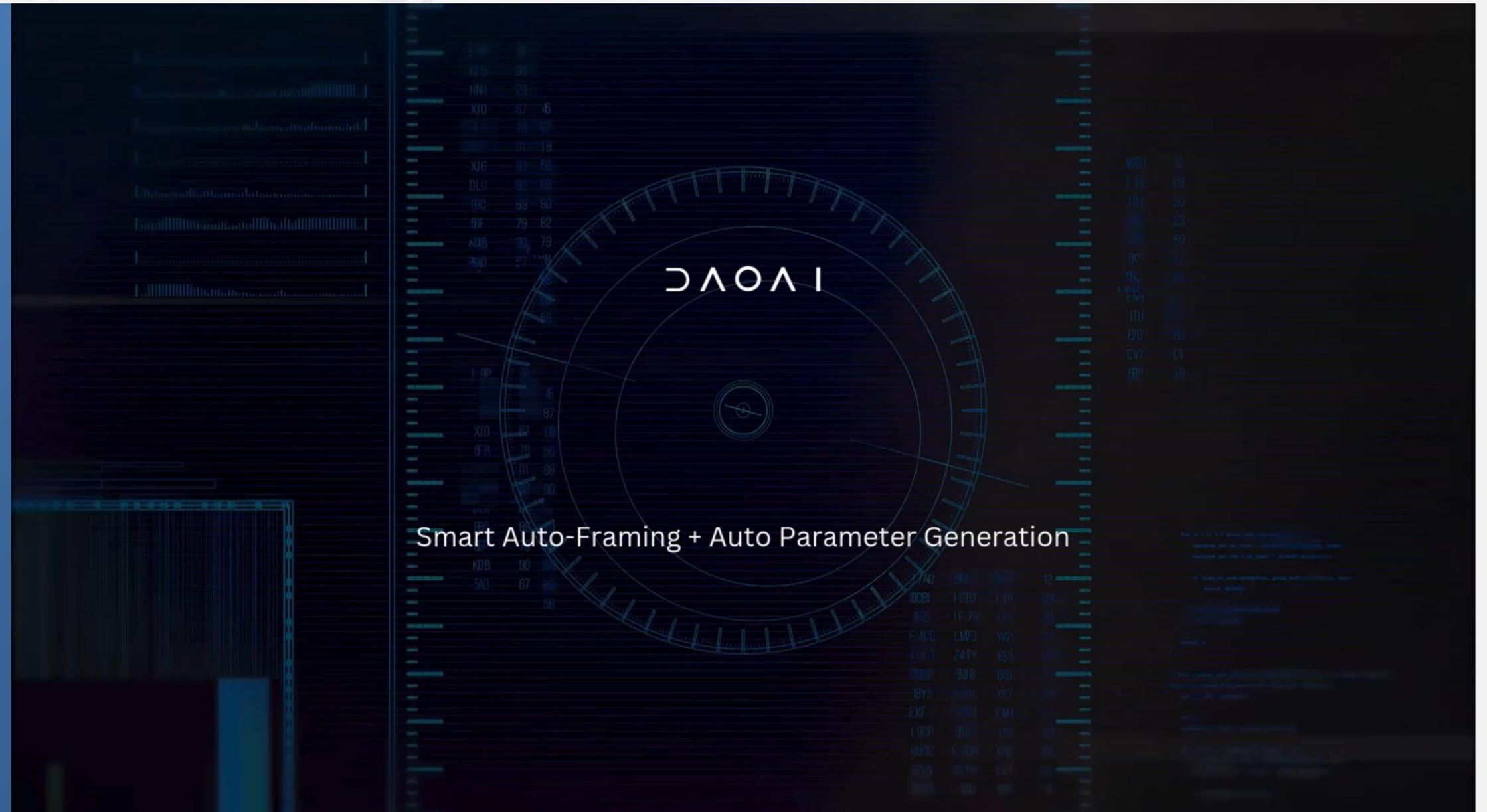


Key Features

2

AI Programming, in 5 Minutes

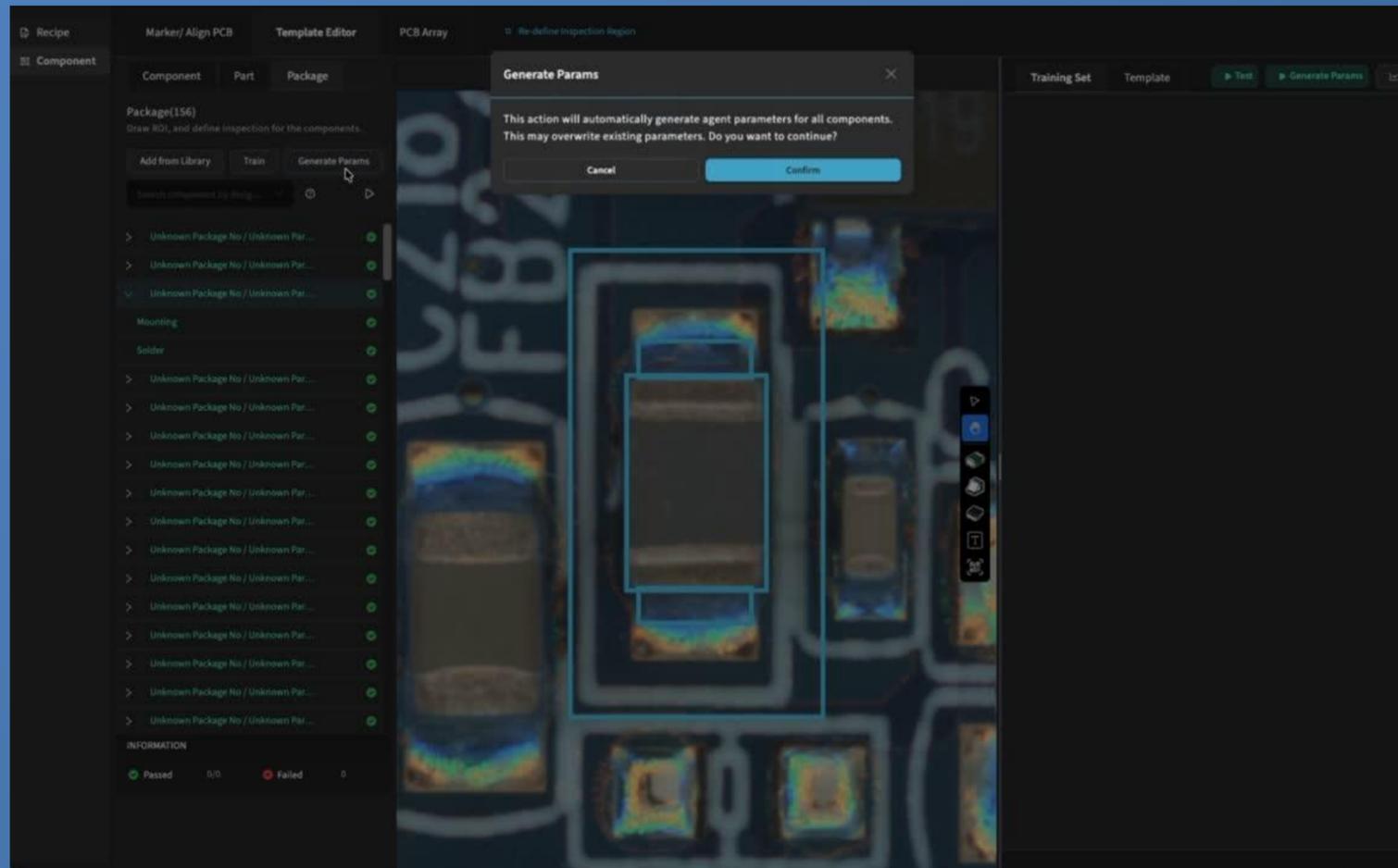
No CAD or component libraries
AI auto-locates components,
auto-frames, and auto-sets
defect thresholds.



Key Features

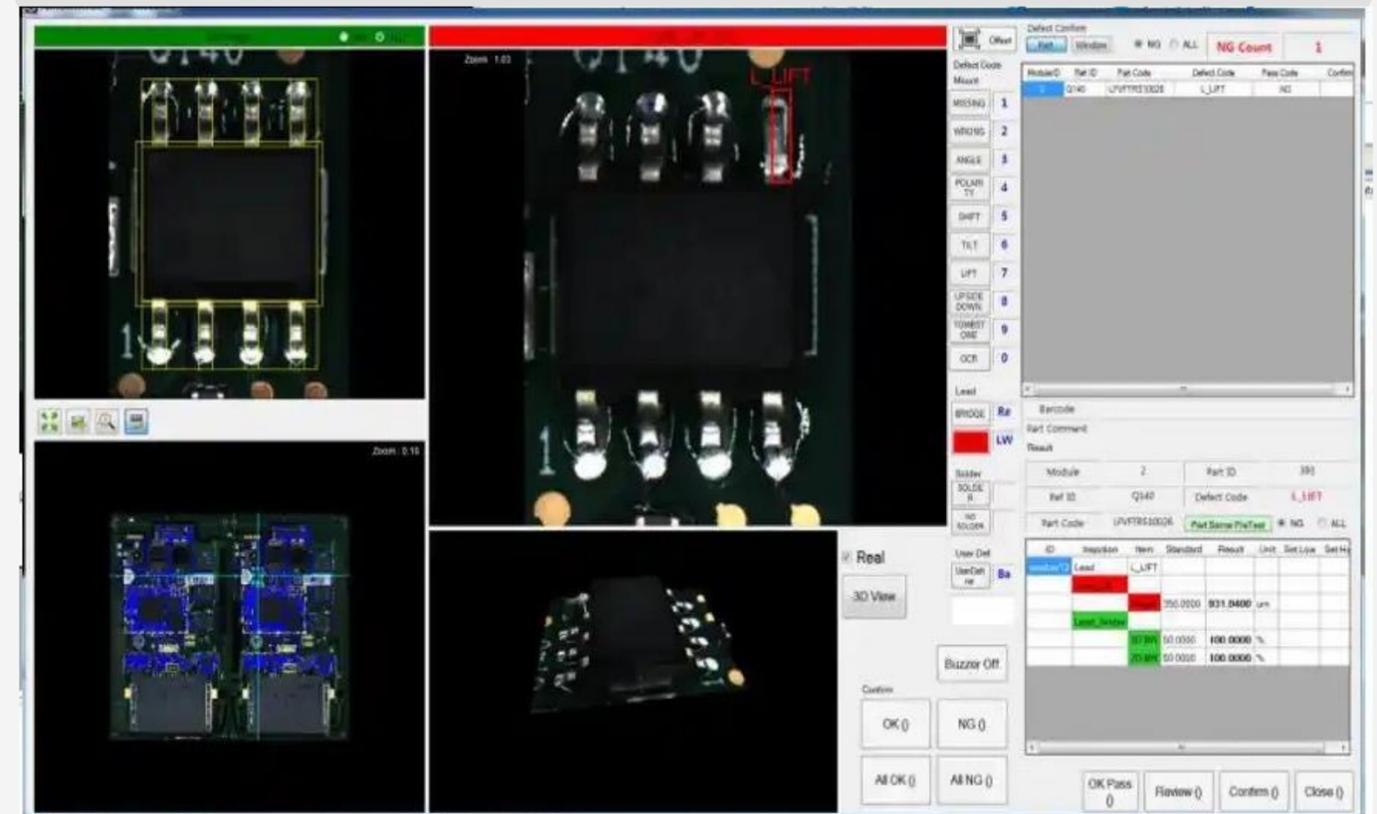
3 AI Auto-Generates Defect Thresholds

AI learns the appropriate inspection thresholds and adapts to different production processes — generating all defect thresholds with a single click.



Rule-Based AOI

Thresholds must be manually tuned for each component, based on process conditions, materials, and lighting parameters.



Key Features

4 Reduce False-Alarm from Feedback

When an operator marks a result as a misjudgment, the AI learns this pattern to avoid repeating the mistake and steadily reduce false decisions.

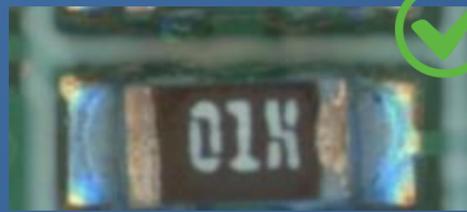
5 Supports Material Substitutions

Add new data anytime — the system evolves with your process, materials, and product updates.

Original Component



Alternate Component



DAVAI

**FEEDBACK-DRIVEN
CONTINUOUSLY OPTIMIZED AI**

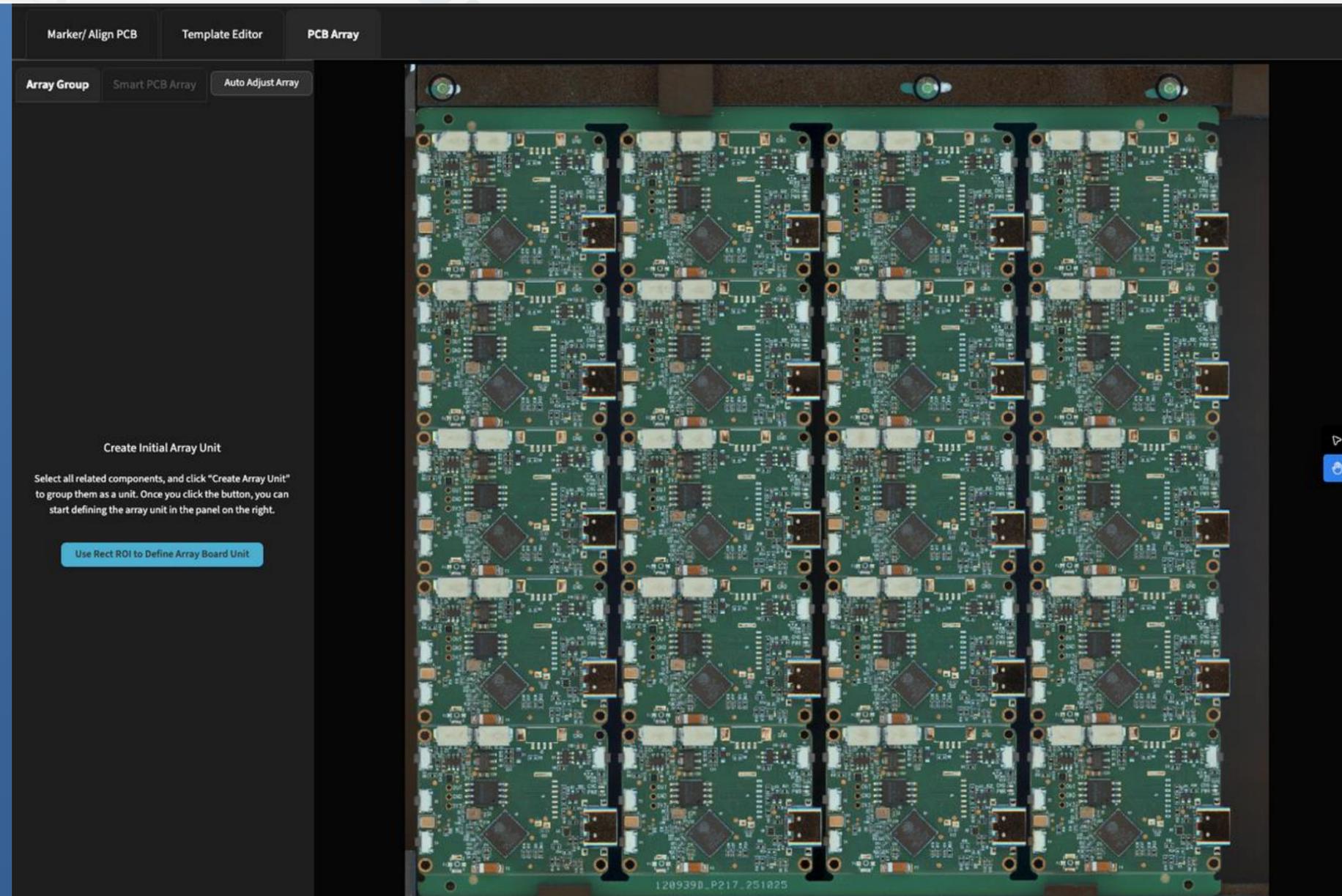
Iterative Learning Loop

Key Features

6

PCB Intelligent Panelization

Eliminates repetitive framing and accelerates programming.



Key Features

7

PCB Dedicated OCR

- AI training based on real PCBA photos
- Overcome challenges like blur, damage, dirt, and low contrast
- Accurately recognize text on components

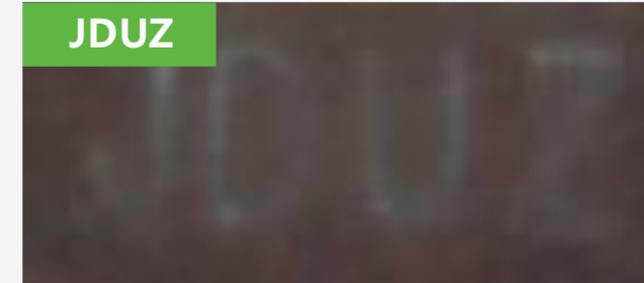
Low Contrast/Blurry

2506



Low Contrast/Dirty

JDUZ

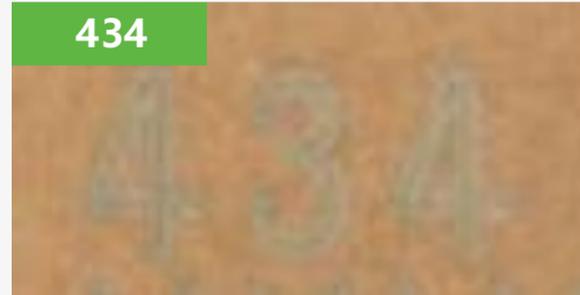


Blurry/Damaged

68X



434



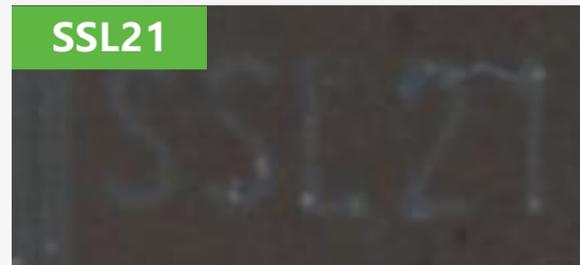
X404A3



3602



SSL21



IORO



ROZO



Inspection Speed

Perfect Balance of Speed & Accuracy

1ms/component

Millisecond-level Inspection

Instantly detects missing parts, wrong components, and polarity on high-density boards without computing bottlenecks.

CPU/GPU Parallel

Processing Architecture

GPU focuses on processing complex defects and OCR, while the CPU synchronously handles logic operations. True parallel processing ensures tasks do not wait for each other, maximizing hardware efficiency

45 cm²/s

High Throughput

Perfectly matches the rhythm of high-speed SMT lines, eliminating post-reflow inspection bottlenecks.

Equipment Overview

DaoAI P-Series is a visual AI AOI system designed for PCBA inspection.

Powered by Visual Foundation Model, it automatically identifies components, extracts features, and generates defect-judgment thresholds — enabling full inspection of components, polarity, pins, and solder joints without CAD or component libraries.

- Powered by Visual Foundation Models
- Auto-programming without CAD or component libraries
- AI-generated defect thresholds
- MES integration
- Supports offline & inline operation
- Supports alternate-material inspection
- Clean and intuitive UI
- Easy to operate
- No expert engineer required
- Lower false-alarm rate
- Strong adaptability to variations
- High Capture Rate



Offline2D PCBA AOI

Inline 2D PCBA AOI

PCBA AOI Equipment

Offline 2D PCBA AOI



DaoAI P1



DaoAI P2

Inline 2D PCBA AOI



DaoAI P3

DaoAI P3D

DaoAI P1/P2 Spec



Optical Spec

- **P1 Resolution : 5MP/15 μ m**
- **P2 Resolution : 12MP/10 μ m**
- Lighting: Multispectral ultra-high-speed RGB six-channel lighting
- Lens: Dual telecentric optical lenses

Conveyor & PCB Size

- PCB Size : 0.5 \times 50mm - 470 \times 330mm
- PCB Thickness : 0.5mm - 5mm
- Maximum PCB Warpage :
Top25mm ; Bottom110mm
- Positioning Accuracy : \pm 3mm
- Maximum Component Height : 2.5mm

Additional Functions

- PCB Fiducial Mark, Panel Mark, Break-off Tab Mark Recognition
- CAD Data Import: Automated inspection framing and inspection parameter setup
- Automatic Component Library Indexing
- Statistical Process Control (SPC) and Data Reporting
- Voice-Controlled Software Operation

Inspection Capability

- Component Inspection : Missing components, Reversed components, Position offset, Polarity errors, Wrong components, Component damage, Bent leads, Foreign materials on PCB, Contaminated or solder-stained gold fingers, Glue overflow
- Solder Joint Inspection: Excess solder / insufficient solder, Tombstoning, Solder bridging, Cold solder / poor wetting, Lifted leads, Solder balls, Post-wave soldering defects (including through-hole components)
- Process Coverage: Supports inspection of solder paste, red-glue (SMT adhesive), and post-wave soldering PCB assembly quality.

Main Differences

DaoAI P3/P3D Spec



Main Differences

P3 Conveyor Type: Single Track

P3D Conveyor Type: Dual Track

Conveyor & PCB Size

- PCB Size: 50 × 50 mm to 500 × 325 mm
- PCB Thickness: 0.3 mm to 6 mm
- Clearance: Top ≤ 30 mm; Bottom ≤ 20 mm
- Minimum Testable Component: 0201 components; ICs with 0.3 mm pitch and above
- Board Weight: ≤ 3 kg
- Conveyor Height: 900 ± 25 mm

Optical Spec

- Camera Resolution: 20 MP / 10 μm
- Optical Lens: 20 MP telecentric optical lens
- Lighting: High-intensity RGB coaxial + multi-angle ring LED
- Depth of Field: 8-10 mm

Additional Functions

- Automatic SPC analysis and report generation
- Offline programming support (optional)
- External barcode scanner support (optional)
- MES integration / Repair-station host connection (optional)

Inspection Capability

- Component Inspection : Missing components, Reversed components, Position offset, Polarity errors, Wrong components, Component damage, Bent leads, Foreign materials on PCB, Contaminated or solder-stained gold fingers, Glue overflow
- Solder Joint Inspection: Excess solder / insufficient solder, Tombstoning, Solder bridging, Cold solder / poor wetting, Lifted leads, Solder balls, Post-wave soldering defects (including through-hole components)
- Process Coverage: Supports inspection of solder paste, red-glue (SMT adhesive), and post-wave soldering PCB assembly quality.

DAOAI

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AI PCBA Inspection Solution

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