

Build Your Own AI-Powered Defect Detection with the DefectAI Platform

Presented by Jerry Xiao

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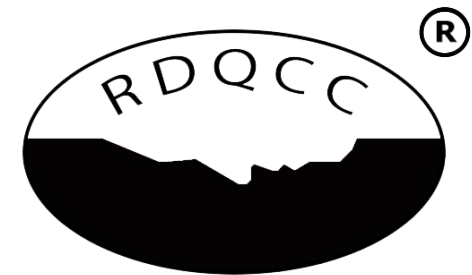
www.rdqcc.com

July 30th, 2025



ASQ®

The Global Voice of Quality™



Building Devices Together

Date: Wednesday, June 30th, 2025.

Time: 6:00 to 7:00 pm PST.

Speaker: Jerry Xiao

**A link will be provided
prior to the meeting.**

Topic: AI Platforms

**Welcome & Introductions will
begin at 6:00 pm.**

Join on your computer,
mobile app or room device.

**This is a virtual/online
meeting.**

**RU's will be given for this
meeting event.**

Agenda

- ❑ Product Defect Description, Impact, & Challenges
- ❑ RdQCC Introduction
- ❑ DefectAI solution, capabilities, features, integration
- ❑ Demo of DefectAI
- ❑ Build your own AI-Powered Defect Detection Solution
- ❑ QAs

Product Defect Description

- Definition

Any deviation from design specifications, quality standards, or customer expectations that makes the product non-functional, unsafe, or undesirable.

- Causes

Poor design, supplier errors, manufacturing errors, storage conditions, shipping damage.

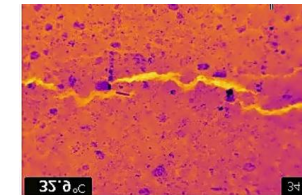
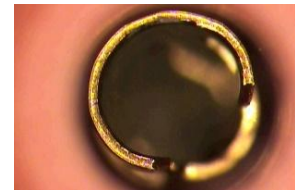
- Category Types

Surface defects, dimensional defects, functional defects, material defects, assembly defects, labeling defects.

- Detection Methods

Manual visual Inspection

Automated inspection system



Impact of Product Defects



- Operational Disruption Costs

Manufacturing downtime (up to 20% of product time), annual manufacturing downtime costs (up to \$255M per plant), rush orders (costs spike by 30%-50%), quality costs (10-40% of operational revenue), recall expenses (single-recall costs between \$5-10 millions), recall shutdown costs (29% plant shutdowns, 33% layoffs). *(source: Gitnux market data)*

- High Volume Product Recalls and impacted Units in USA (2023)

For consumer products, 322 recall events, impacting approximately 135.2 million units; for medical devices, 975 recall events affecting 283.44 million units *(source: PR Newswire)*

- Serious Product-related Incidents in USA (2023)

Approximately 12.7 million individuals were treated in emergency departments for injuries and over 700 deaths due to consumer product incidents *(Source: Stein Whatley)*

- Regulatory violation

FDA 820.90: each manufacturer shall establish and maintain procedures to identify, document, evaluate, segregated and dispose of nonconforming product.

Challenges in Defect Management

- **Inconsistent Defect Detection**

Manual inspection errors and inadequate training often result in missed or misclassified defects. This reduces product quality and increases the risk of quality escapes.

- **Incomplete Root Cause Analysis**

Limited technical expertise or rushed investigations can lead to inaccurate root cause identification. As a result, corrective actions may be ineffective, allowing defects to recur.

- **Ineffective Defect Risk Analysis**

Risk management documentation – such as FMEAs and their risk IDs – can be overwhelming. Tracing a single defect back to its associated ID quickly and accurately is a significant challenge.

- **High Product Inspection Costs and Investment**

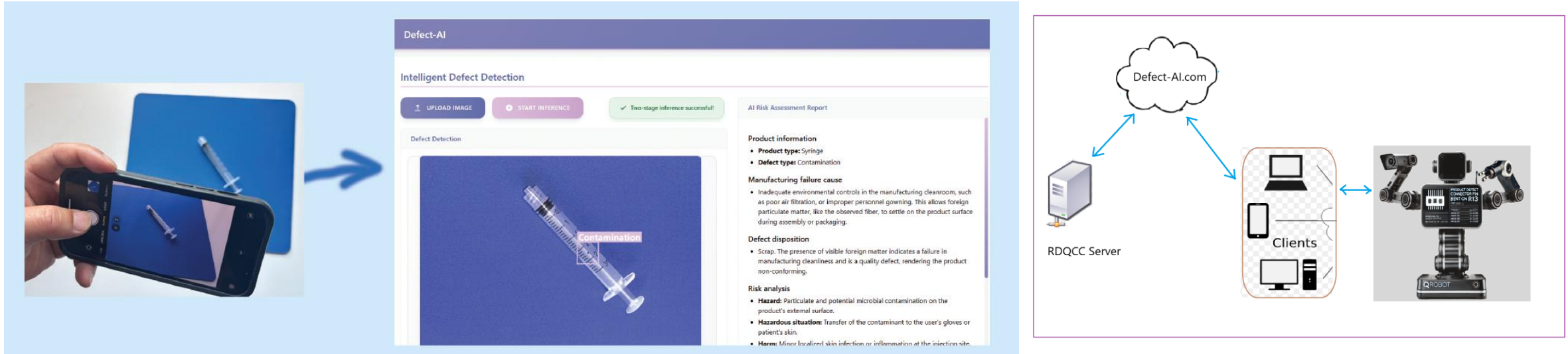
The cost of quality consists of prevention, appraisal, and failure costs, accounts for up to 25% of sales for some firms and can reach 40% to 50% in certain cases.

Automated inspection systems often rely on predefined specifications, defect libraries, and limited checkpoints. These systems require substantial upfront investments. This makes them often unaffordable for small manufacturing companies or companies with low-volume production needs.

Who We Are

- **Decades of Expertise in Product Risk Analysis**
Conducting product risk analysis over 100 product categories in the field of medical device industry.
- **First AI-powered Product Risk Analysis (2021)**
Leveraging input statements to proactively identify potential product risks and initiate risk management, via www.risk-chat.com, already trusted by over 3,000 users worldwide.
- **First AI-Powered Defect Management (DefectAI, 2024)**
Using input images to perform defect detection, marking, root cause analysis, risk assessment, disposition, and reporting – via www.defect-AI.com.
- **DefectAI Integrate with Robots (2025)**
DefectAI has been successfully integrated with our partner robots to enable real-time defect detection on the production line. Its SDK package supports seamless embedding with other leading collaborative robots to service diverse industrial applications.

DefectAI Solution

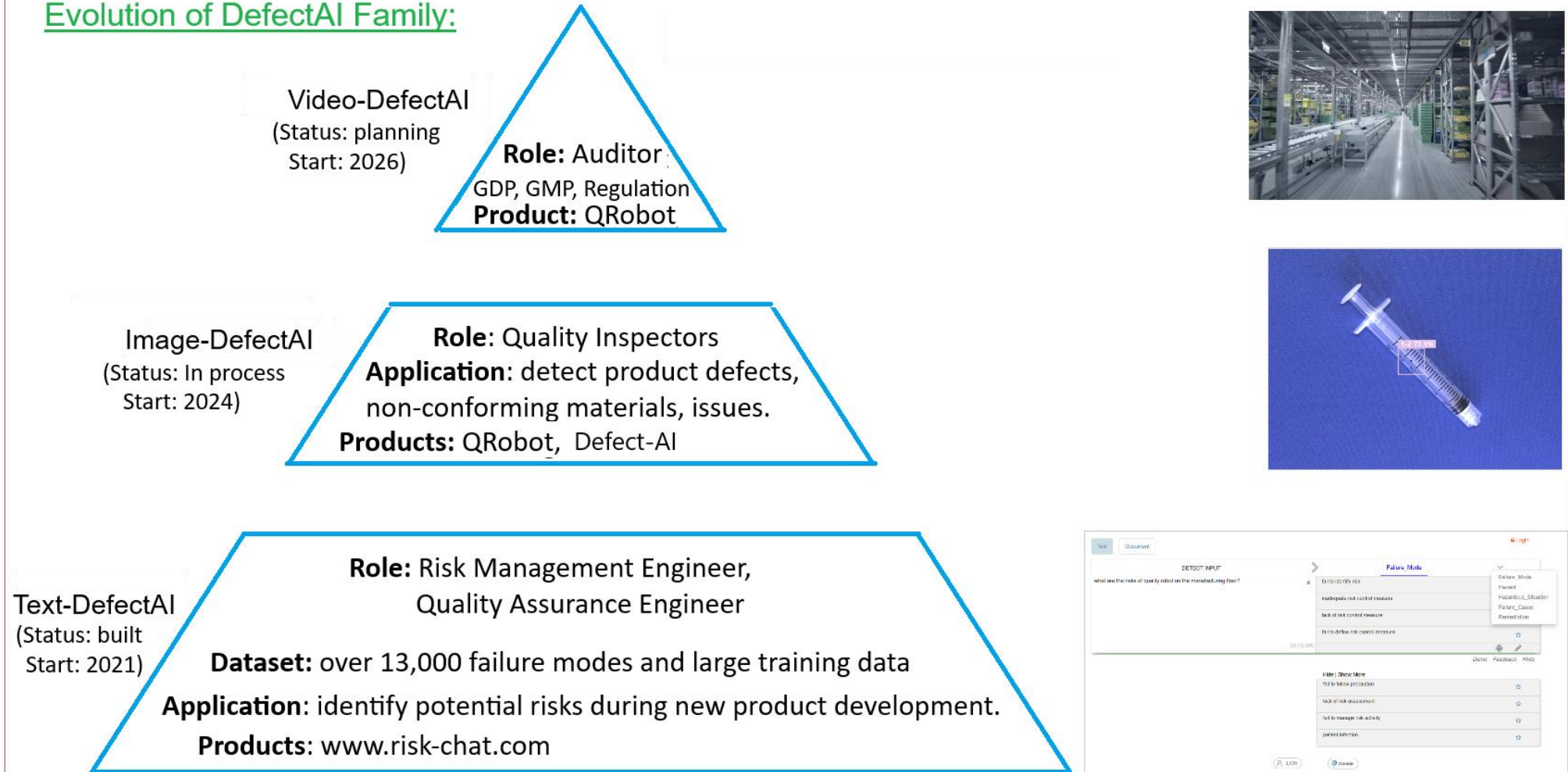


DefectAI, AI-powered defect management, is trained on a proprietary image-text dataset and fine-tuned with a powerful bimodal LLM.

- Web-based access (Left): Users can upload product images to the website and instantly access DefectAI's comprehensive capabilities—including defect detection, marking, root cause analysis, risk assessment, disposition, reporting.
- Robotic Integration (Right): Robots that capture and transmit product images enable DefectAI to instantly identify defects and initiate automated removal of defective parts directly from the production line.

DefectAI Roadmap: from Text to Image to Video

Evolution of DefectAI Family:



DefectAI Capabilities

DefectAI offers powerful capabilities to support quality by:

- **Detecting** surface defects (e.g. cracks), out-of-spec conditions, foreign materials, misassemblies, labeling errors, and more.
- **Assisting inspectors** in identifying defects across incoming materials, in-process parts, finished products, and packaging.
- **Facilitating quality engineers** analyze root causes, assess risks, manage nonconforming materials, and initiate risk mitigations.
- **Providing a cost-effective, scalable, and highly accurate solution** compared to traditional automated inspection and current large language models (LLMs).
- **Integrating with collaborative robots** (cobots) to automatically detect and remove defective parts from production floors.

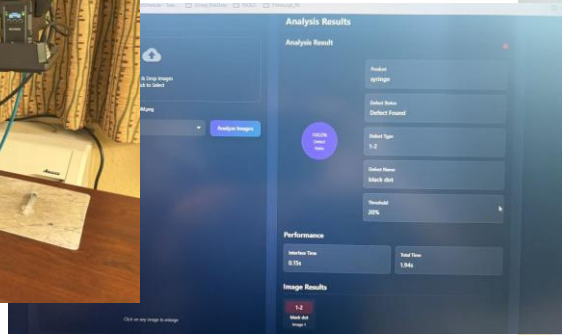
DefectAI Competition Overview

Criteria	DefectAI	Traditional Automated Inspection Systems (AIS)	Market LLMs (e.g., ChatGPT, Gemini)
Cost	\$100/month subscription with zero upfront Investment - Low cost.	\$100,000 upfront investment – High cost	\$0.06 per 1,000 tokens (\$0.03/image) - Medium cost
Adaptability	Broad adaptability to various defect types across manufacturing floors.	Only adaptable to predefined defects that appear with the sensor coverage area.	Not adaptable to user-specific products since the trained models are designed for general use.
Reliability and Accuracy	Deliver consistent and precision defect detection across manufacturing floors	High detection accuracy on limited products on production lines	Low detection accuracy and inability to mark defect zones
Scalability Deployment	No additional hardware and software for new users. Easily upgrade its AI models at minimal cost.	Requires significant reinvestment on hardware & software	No prioritize to upgrade its models for defect detection purpose
Ease of Use	Localize defects and deliver extensive risk assessment to support risk-based disposition decision.	Localize defects but make disposition decision based on predefined criteria.	Inability to localize defects and make defect disposition decision (no risk analysis, no acceptance criteria)

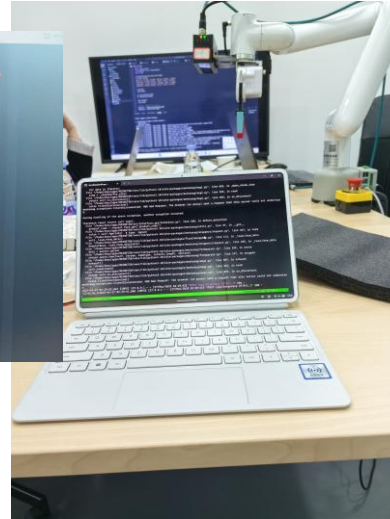
Robot driven by the Heart of DefectAI (2025)



Capture product defect images;
Prepare defect risk assessment dataset.



Train AI models via DefectAI Platform



Embed the DefectAI SDK into the Robot



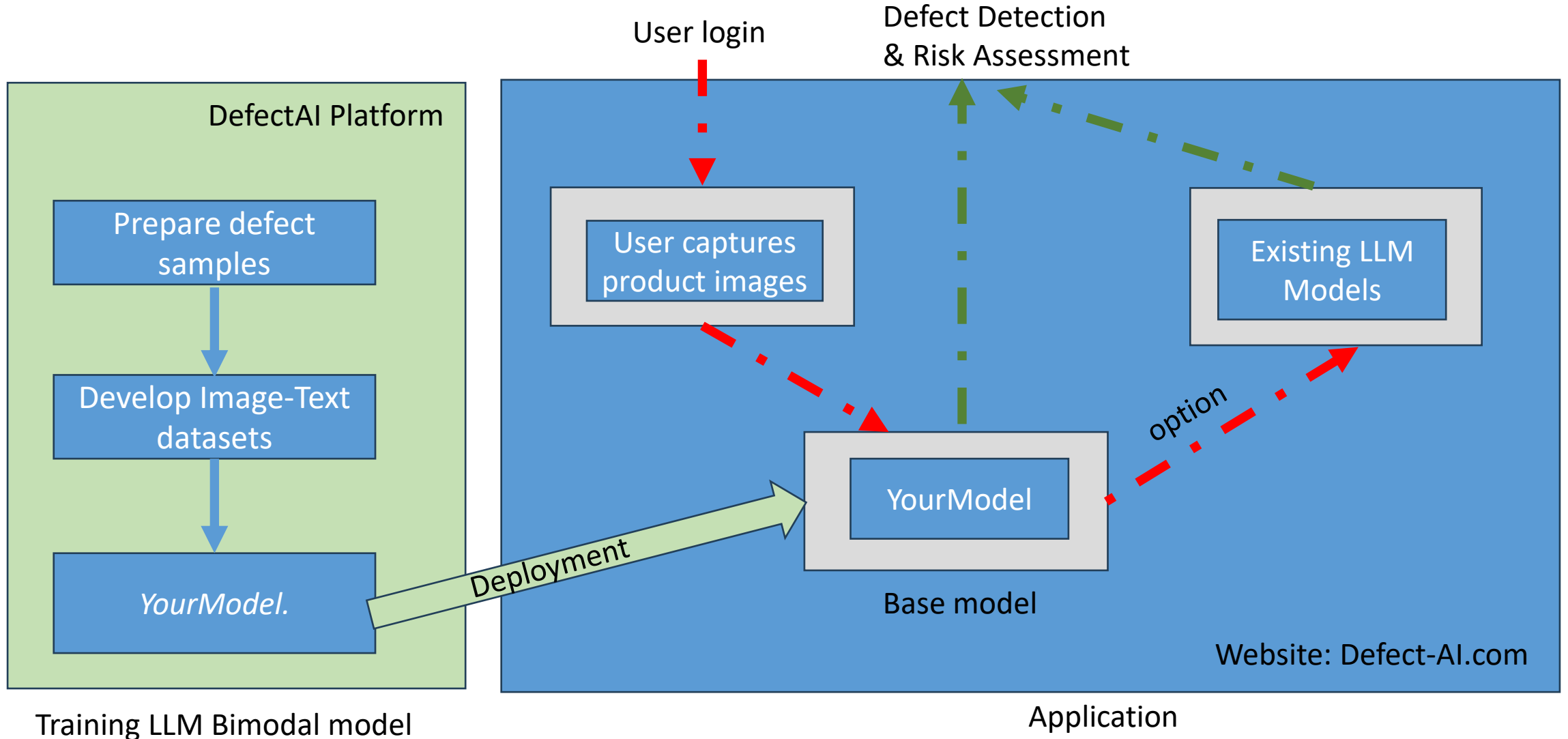
Test detection accuracy and performance in the lab



Deploy the Qrobot to detect and remove defectives on production line

youtube video through
<https://youtu.be/GgZgMHtZdXk>
<https://youtu.be/vmgavYXOssg>

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Contact Info and Q&A

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