

New Paths for the Intelligent Development of the AI-Driven Consumable Management

Children's Hospital of Fudan University, Shanghai, China
 National Children's Medical Center
 Dahui Wang, MD

Why Does Orthopedic Consumable Verification Need AI?

Trigger Thought



Every screw must be handled with extreme care, as it may be implanted into a child's body.

Ultimate Challenge



Diverse in variety, complex in specifications, and multifaceted in packaging forms



The verification workload is a substantial and high complexity, with prolonged duration and inefficiency



Return rate exceeds 85%

Check & Accept **20-60 min/unit**
 Handover **10-30 min/unit**

Goal Setting & Key Bottlenecks

SMART Goals

Acceptance error rate

17% → ≤2%

Verification time

20-60 min → 10-15 min

Consumable waste rate

87% → ↓60%

Certification cycle

7 days → 1 day

Key Bottlenecks

Manual dependence

Human memory-based matching

UDI entry errors

Frequent specification input mistakes

Document-item mismatch

Physical consumables separated from certificates

Poor code recognition

Worn or contaminated UDI codes

AI-Agent Framework for Intelligent Verification

Visual Recognition

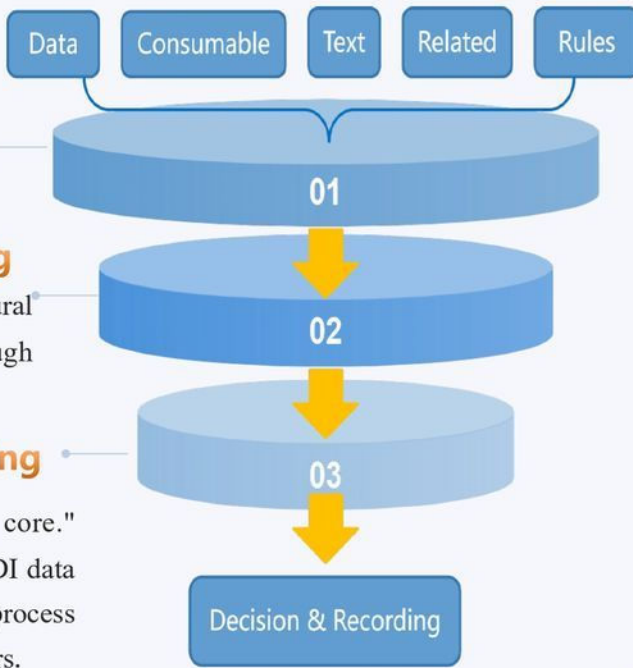
The visual recognition layer integrates AI, OCR, and image capture algorithms, enabling smart hardware to batch-process images of consumables and uniquely identify and trace non-sterile packaged consumables (e.g., bone screws, bone plates).

Language Understanding

The language understanding layer enables the system to handle complex natural language interactions and comprehend users intentions and needs through applications such as generative AI material matching and Chat BI.

Intelligent Decision-Making

The intelligent decision-making layer serves as the systems "executive core." Leveraging an AI domain-specific model with over 10 million data points, UDI data assets, and regulatory frameworks, it performs sophisticated reasoning and process orchestration based on information acquired from the visual and linguistic layers.



Reengineered Workflow & AI Applications



5 Seconds Error Correction (Inspect-AI)



10 Seconds Action (Chat-BI)

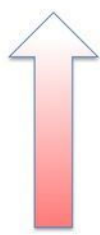
Performance Validation & Future Vision

10 Times A single surgical procedure Verification and Handover Personnel Efficiency

100% Consumable supply Accuracy improvement

100% Full Process for Consumables Retrospective Proportion

100% A single surgical procedure Data Analysis Verification



Autonomous Healthcare Supply Chain

Data

UDI data assets and process records

AI

Visual recognition and language understanding

Agent

Autonomous planning and decision-making