RailSwinX

Enhanced Rail Track Defect Detection Through Cutting-Edge AI Technology
détection améliorée des défauts de la voie ferrée à l'aide d'une technologie d'IA de pointe

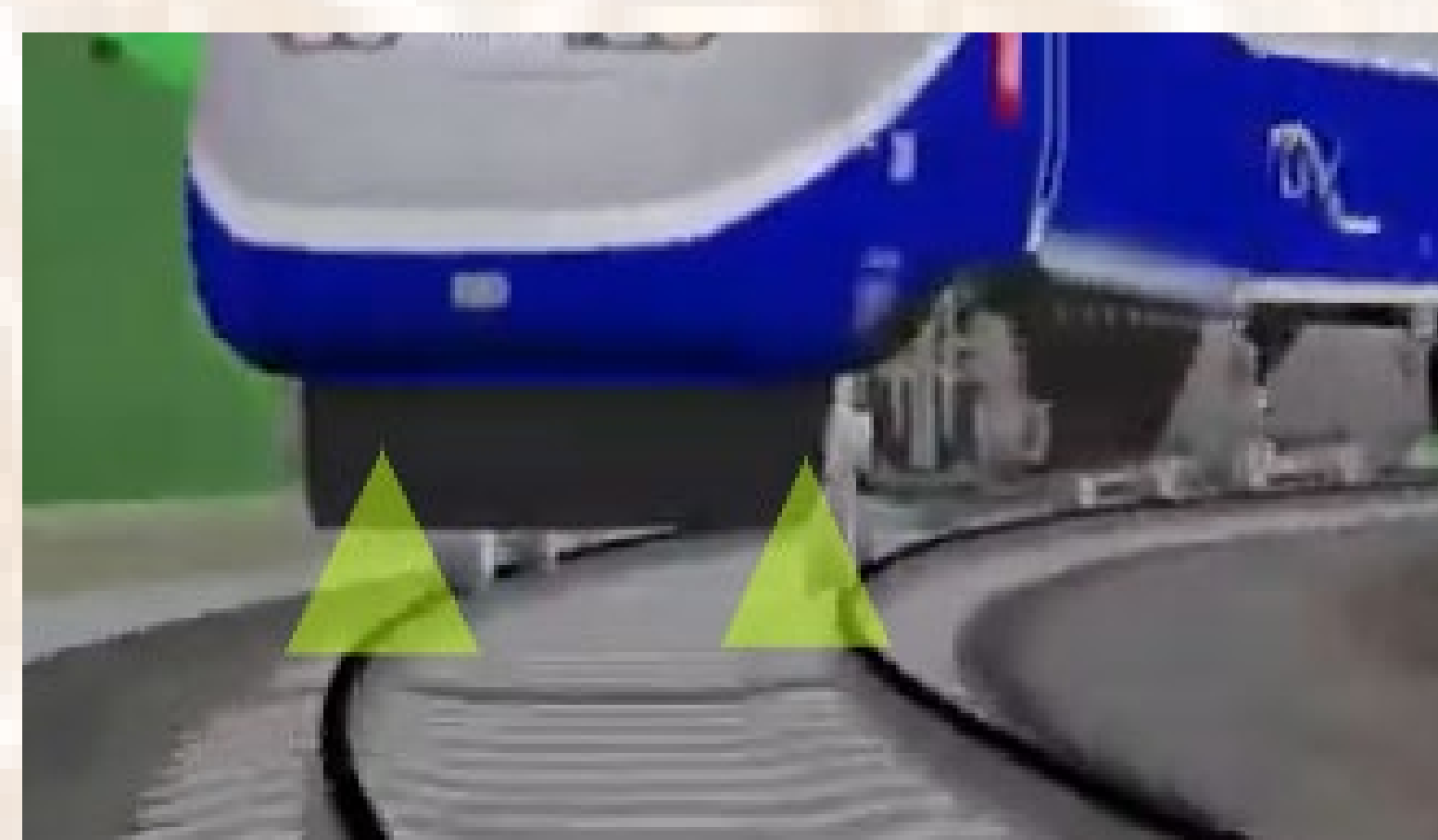**CAiRS** 產品可靠性暨系統安全研發中心 CENTRE FOR ADVANCES IN RELIABILITY AND SAFETY

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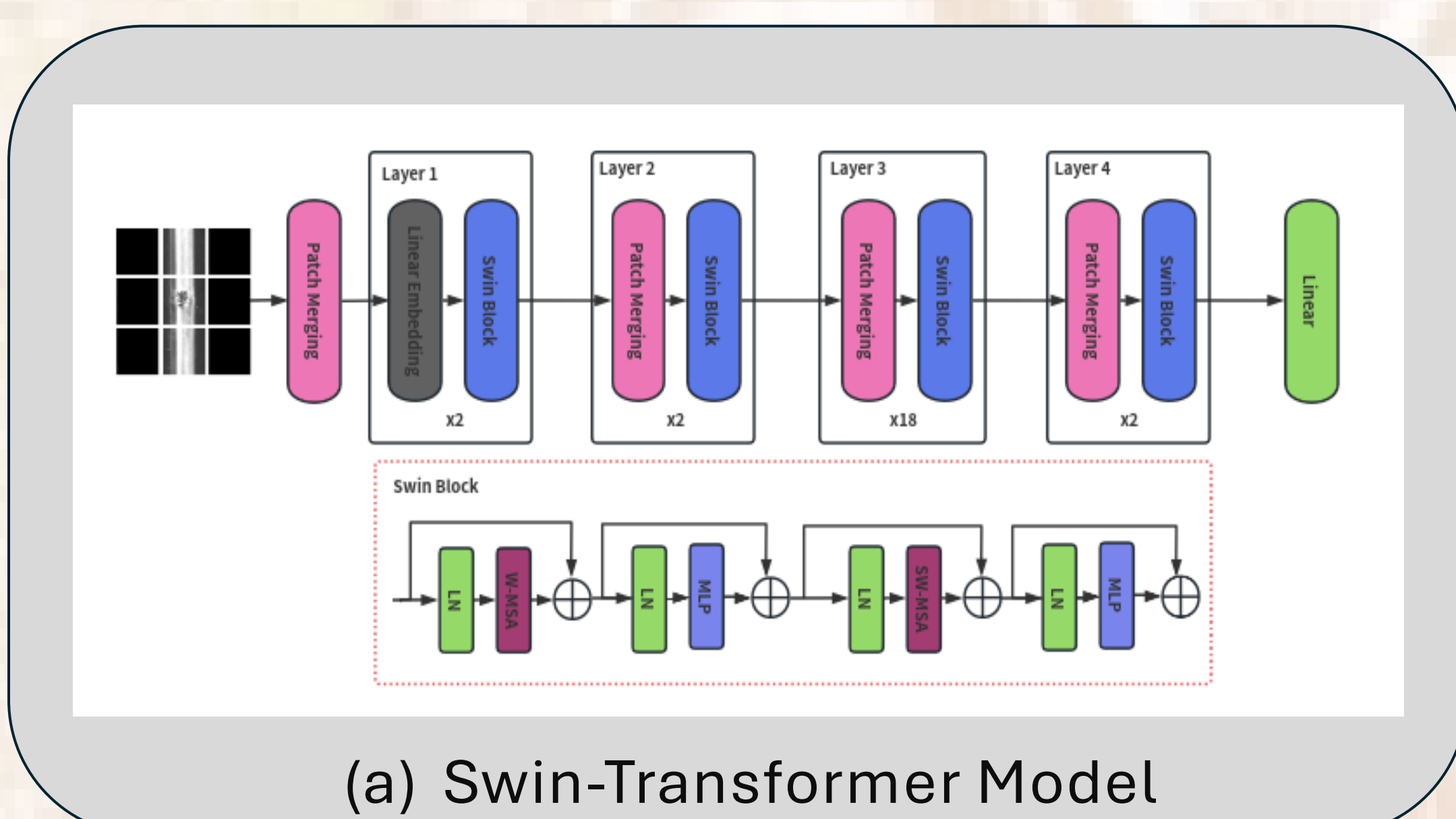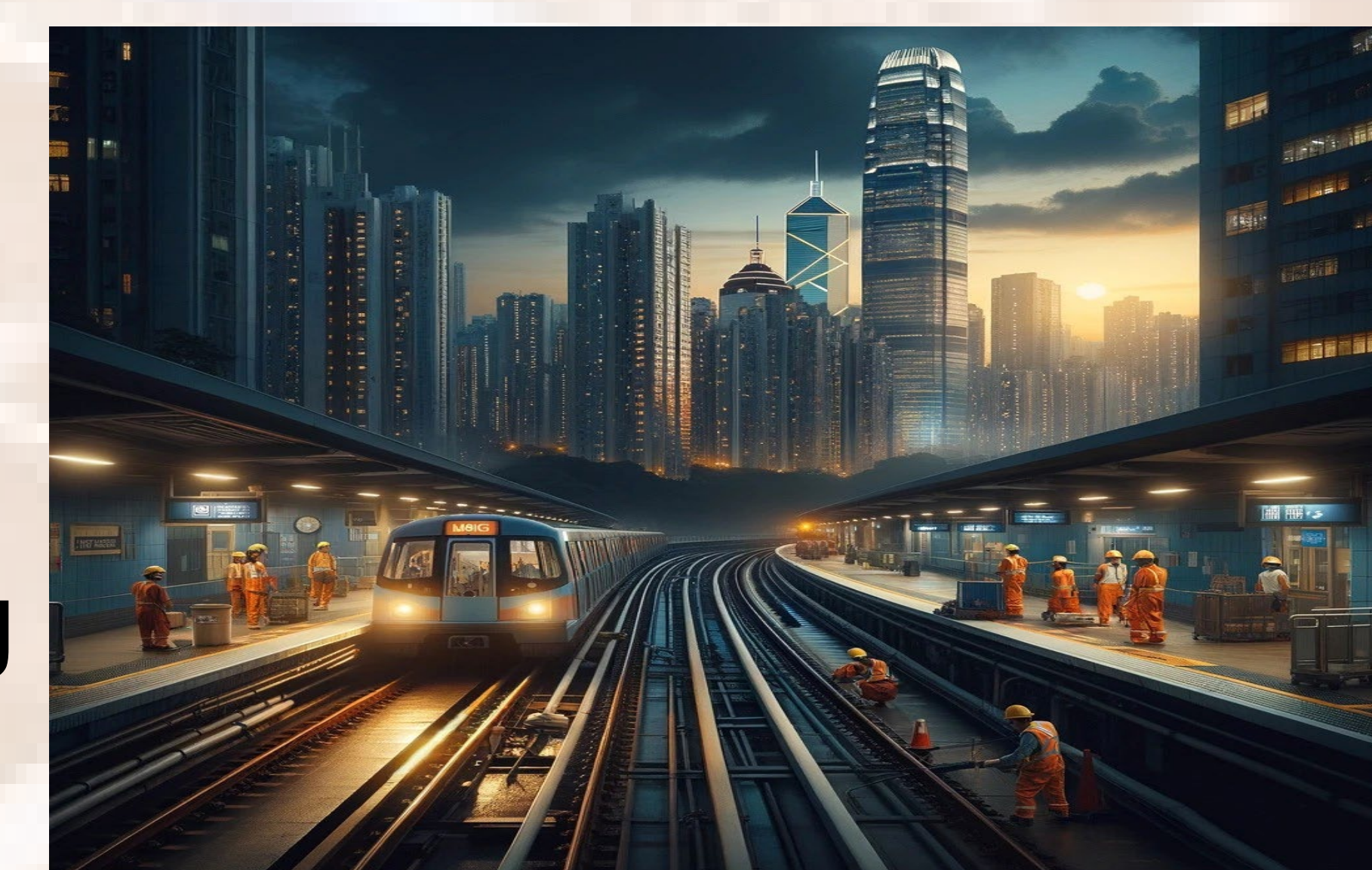
The Invention

Problem:
- High False Alarm Rate in Current Vision Inspection System

Pain Points:
- Long traffic hours (>19 hours), maintenance inspections only carried out during non-traffic hours.
- Overcome the limitation of conducting inspections solely during non-traffic hours.

Solution and Novelty:

AI-based Computer Vision
a. Reduce false alarms as well as accurate rail defect detection
b. Generative Methods (GAN)
c. Visualization of the defect and non-defect track surface
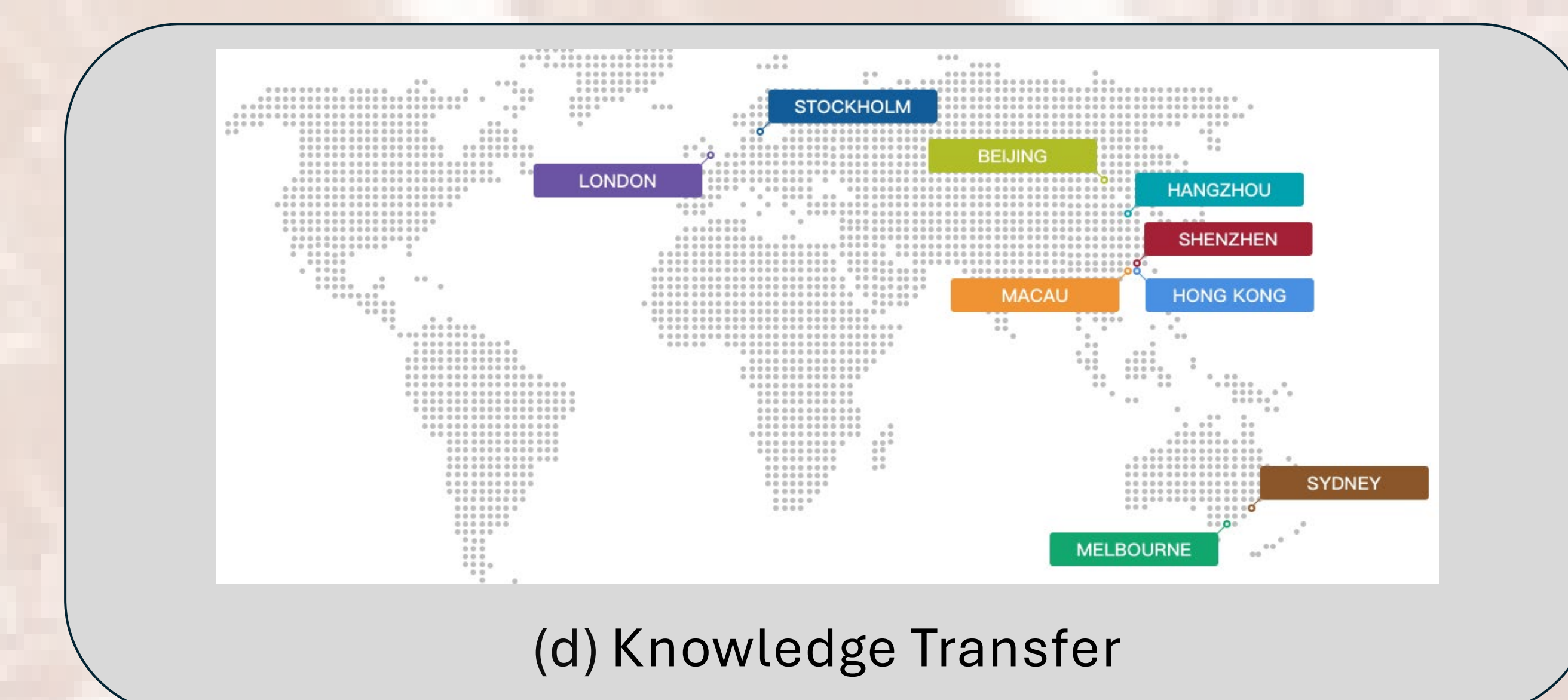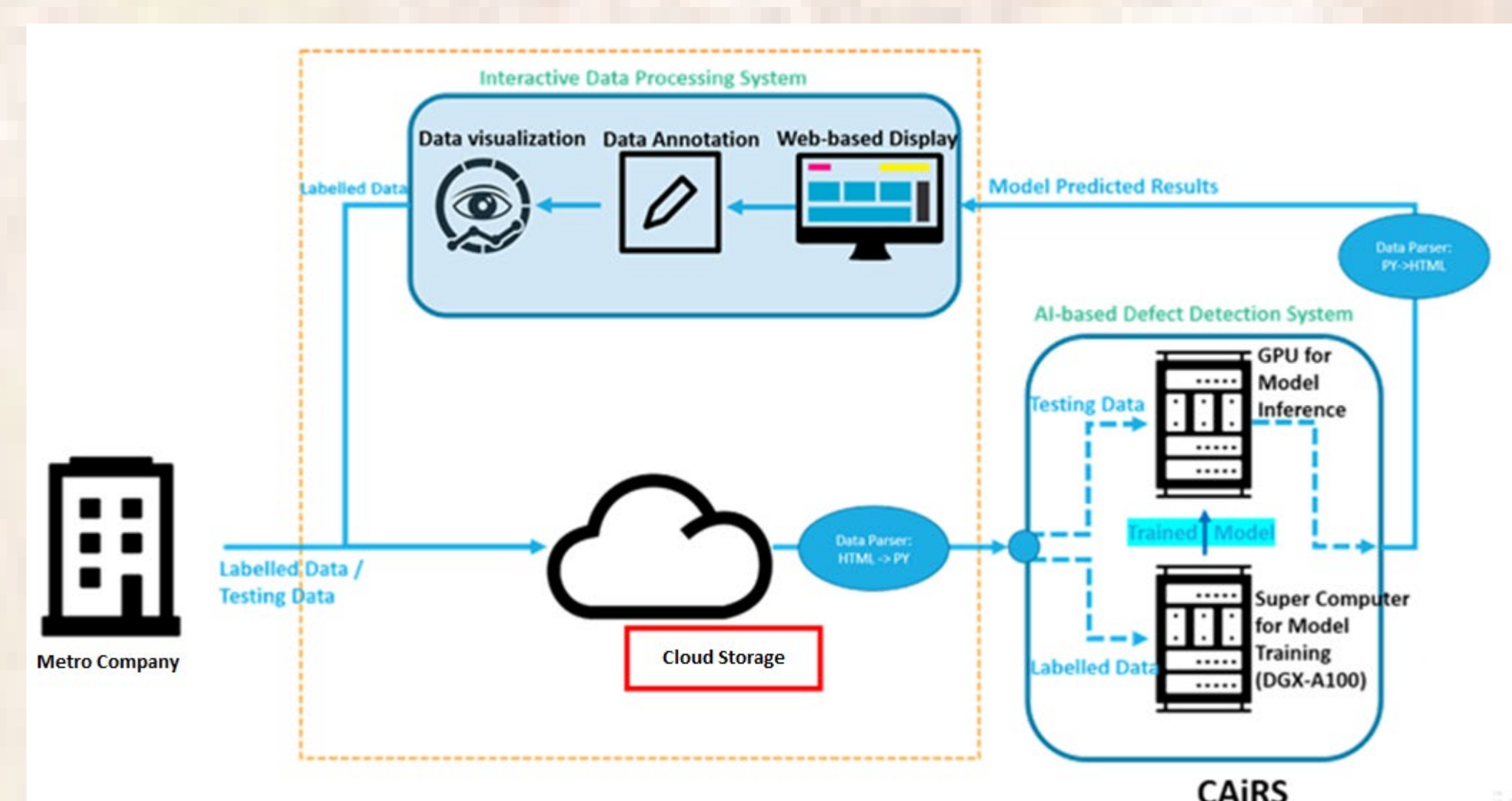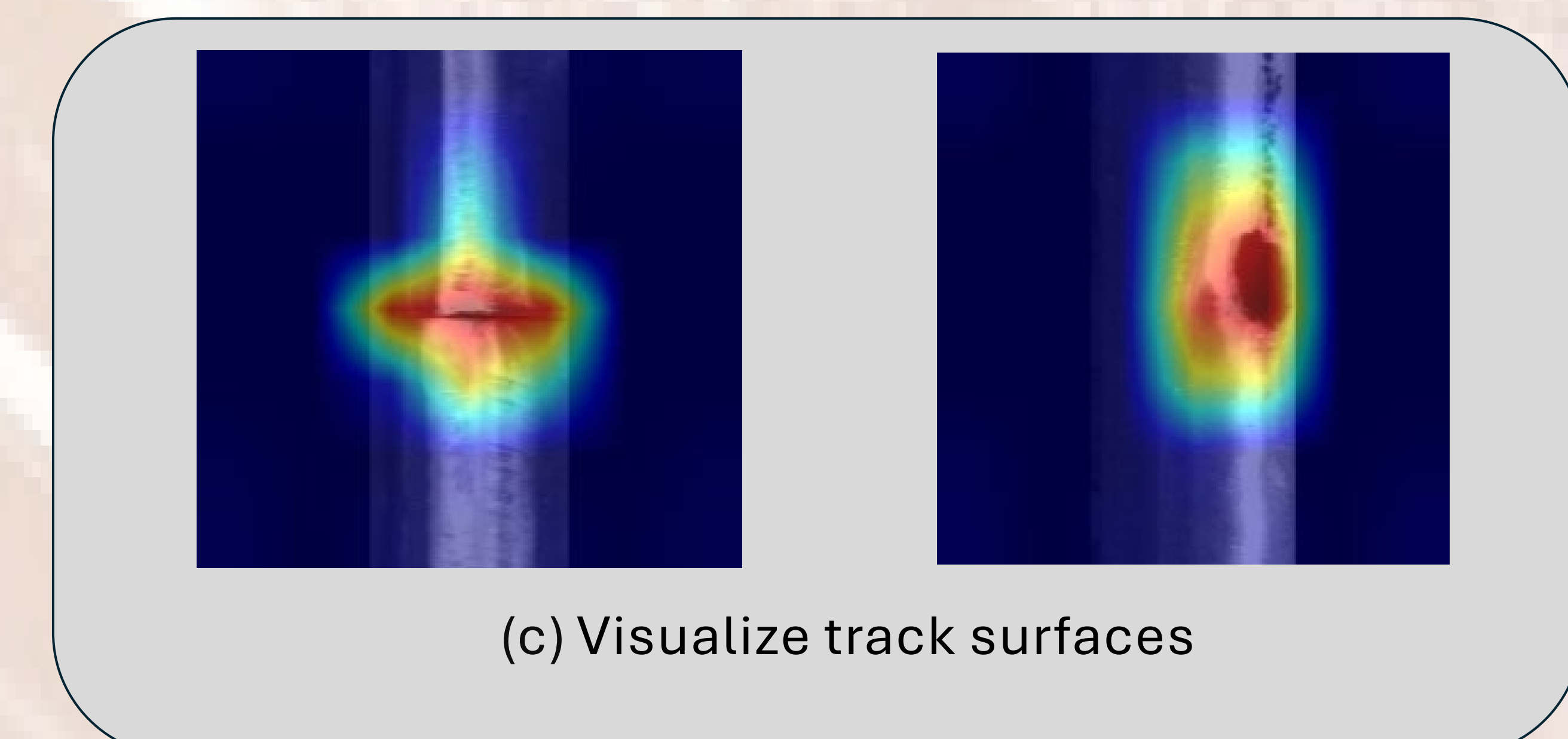d. Knowledge Transfer (Scalable)

(a) Swin-Transformer Model
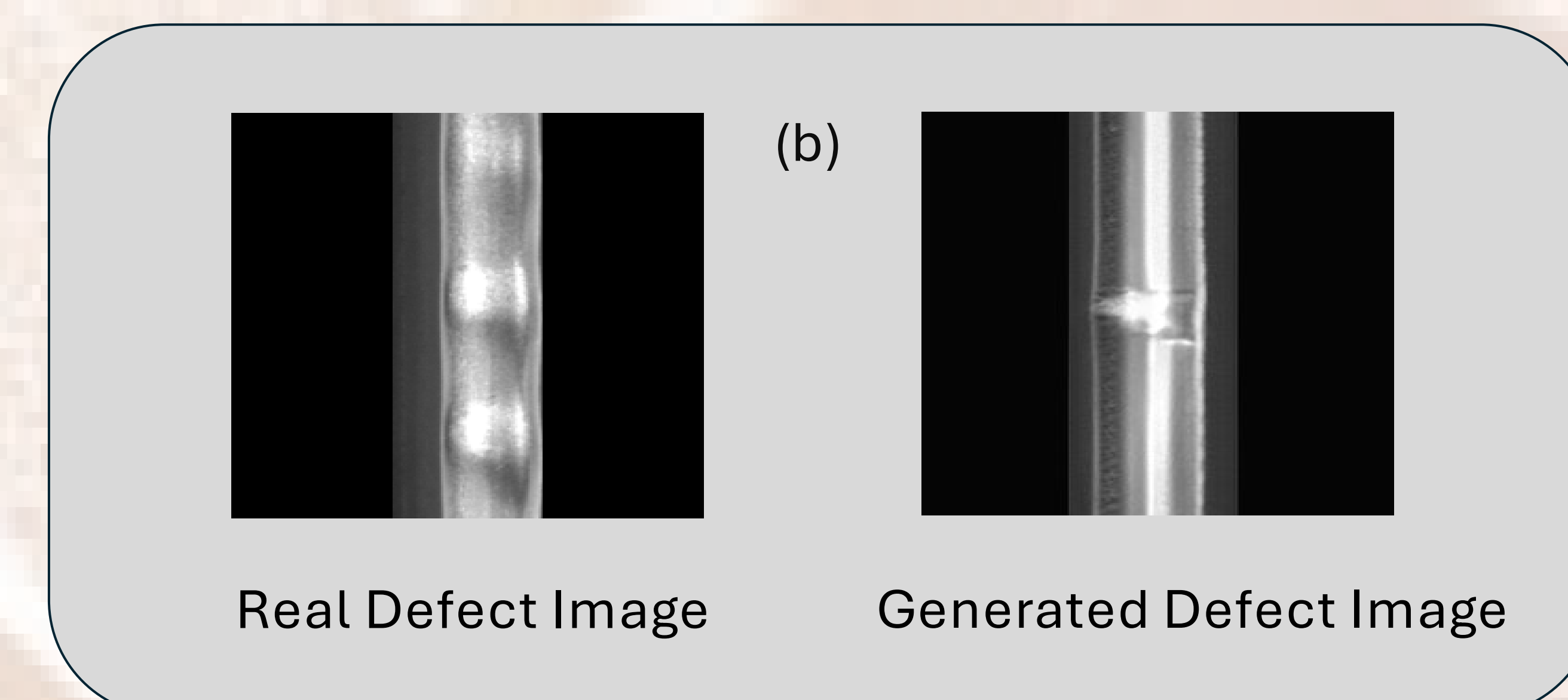
Uniqueness:
- High Accuracy
- Automation
- Applicable to Different Rail Tracks

Performance:
- ↓ >88% Alarm Rate
- ↓ Manual Verification

(b) Real Defect Image | Generated Defect Image

(c) Visualize track surfaces

(d) Knowledge Transfer

Application:
- Rail Tracks Surface Defect Classification

Patent
Title: Improving Rail Tracks Defect Classification based on a Cascade Swin-Transformer Model
Registered region and date: Hong Kong, 31/10/2023
Patent Publication No: 30096108 A

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