



IRSC 2022

INTERNATIONAL RAILWAY
SAFETY COUNCIL

SEVILLA, OCTOBER 16-21, 2022



機電工程署
EMSD



I&T APPLICATIONS TO ENHANCE SAFETY IN STATIONS

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AGENDA

Part 1

Background

Part 2

Successful I&T Applications

Part 3

Conclusion

Part 1

Background



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Railway Safety Regulator - Electrical and Mechanical Services Department (EMSD)

Railways Branch, EMSD is the railway safety regulator in Hong Kong which regulates safety of mass transit railways, tramways and peak trams. Regulatees include:



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International Recognition

Participate in International Competitions

EMSD wins 19 awards at International Exhibition of Inventions of Geneva in 2022.

Railway safety related awards:



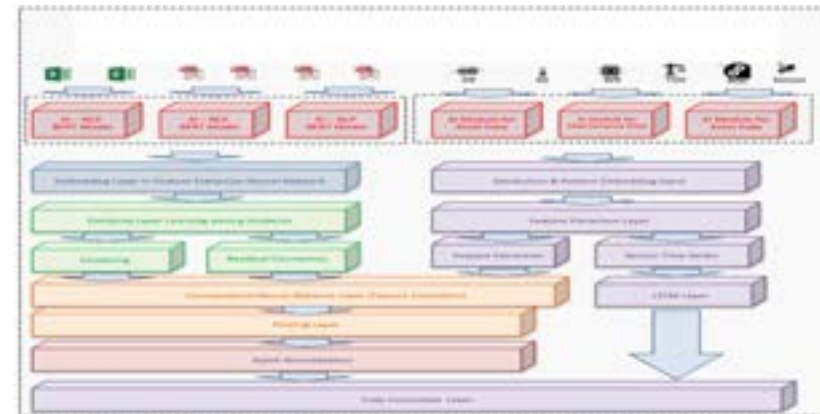
Gold medal:

Smart Driver Assistant for Automated People Mover



Silver medal:

Semantic AI for Predictive Maintenance of Railway Track Systems



International Recognition

Participate in International Competitions

MTR wins various awards in the following projects



2022 International Exhibition of Inventions of Geneva - Silver Medal & 2021 UITP Award – Special Recognition Award:
Integrated Speed and Position Supervision System (iSPS) with Smart Junction & Platform Analytics project



2020 IET Innovation Award:
Smart Junction project



2019 IET Innovation Award & RFID Journal Award:

2021

Integrated Speed and Position Supervision System (iSPS) with Small Bollard project



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Part 2

Successful I&T Applications



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AI-based Accident Prevention System for Escalators

Problem

- Carrying bulky objects or baby trolley
- Influence by alcohol/ drugs
- Passenger with accessible needs

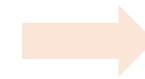


Solution


Identify High-risk Passengers



Predict Passengers' Behavior



Trigger Alert

- Light Detection and Ranging (LiDAR)
- Privacy guarantee 
- Detect speed, volume profiling of passengers under crowd
- Tracking path

- AI algorithm identifies characteristics of 4 types of passengers



- Predicts path

- Initiate relevant PA & visual alert message

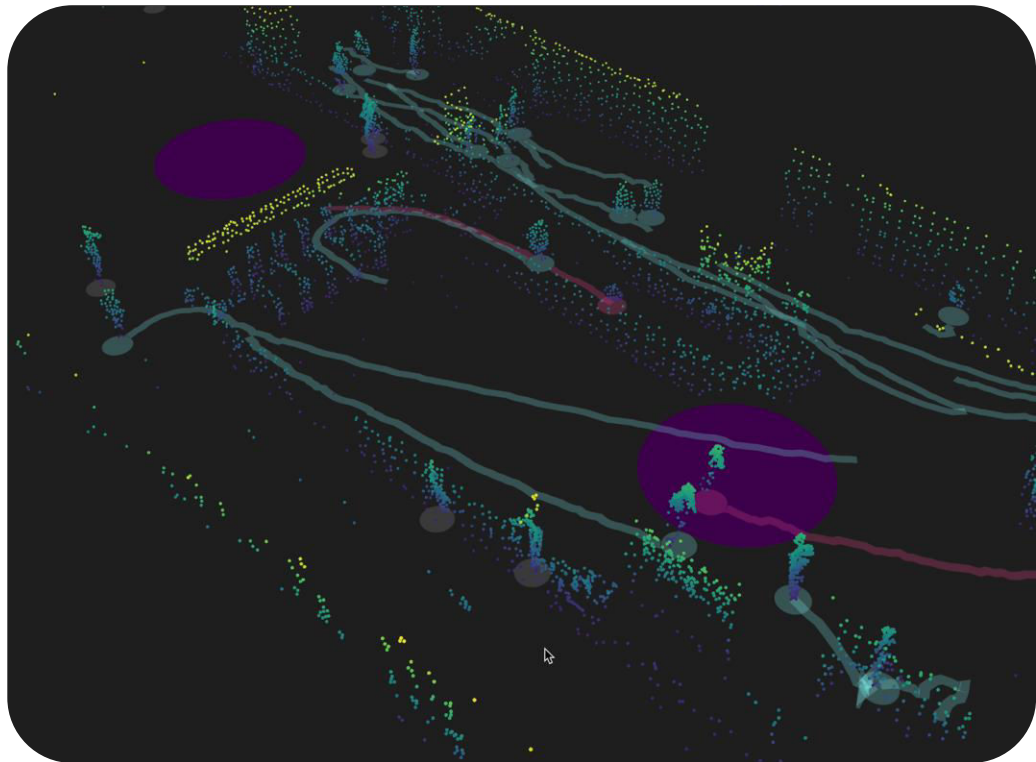


- Instant message sent to station operators

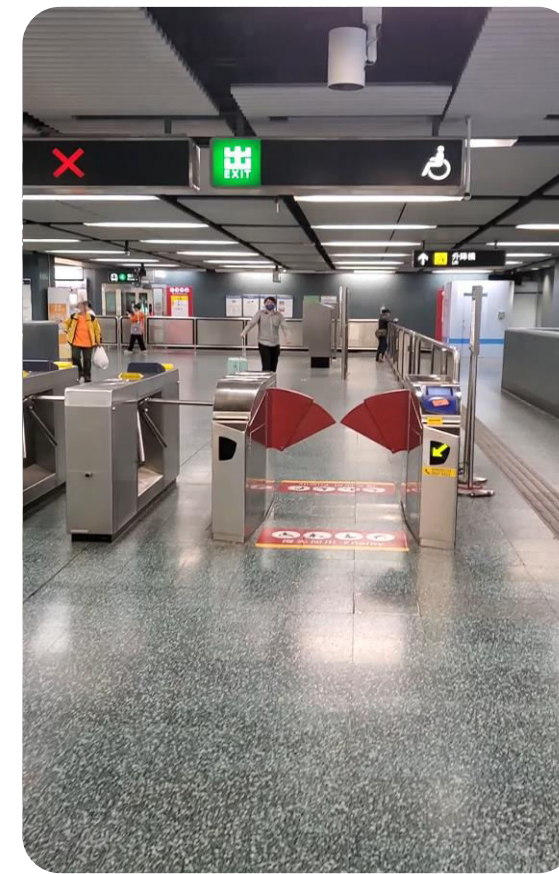
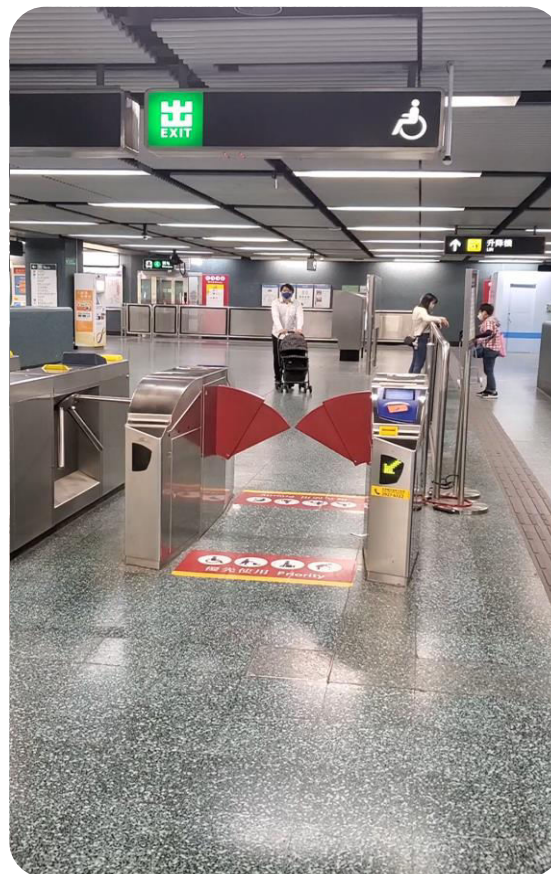


AI-based Accident Prevention System for Escalators

Path tracking for high-risk passengers



Initiate specific public announcement & visual alert message



Dangerous Goods Detection System

Problem

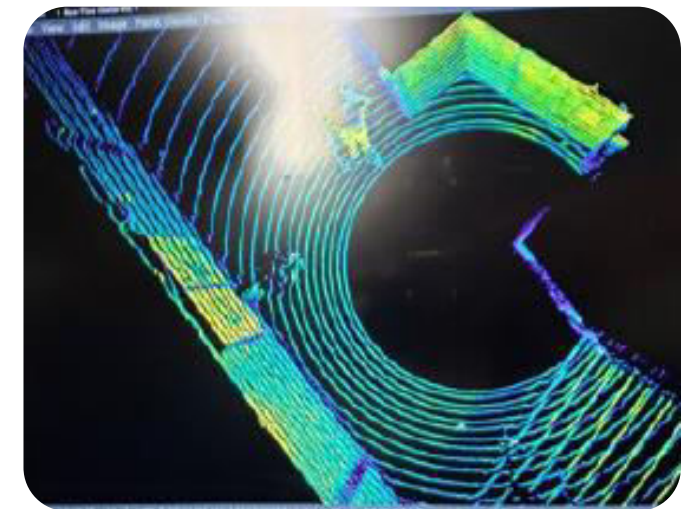
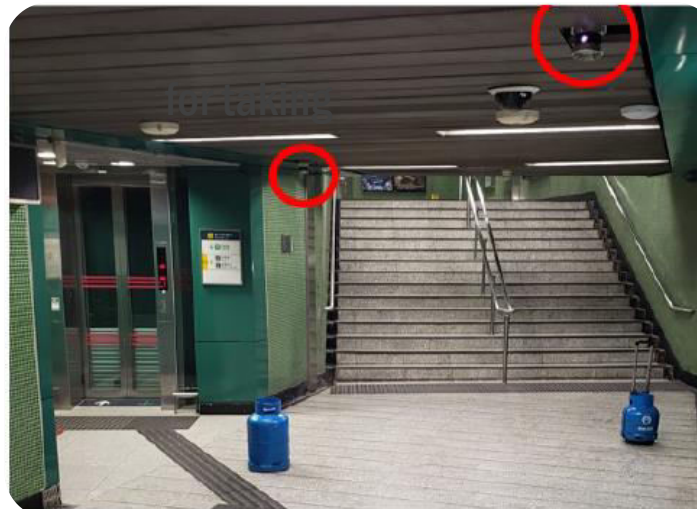
Passengers carrying bulky objects or dangerous goods in crowded railway stations pose safety risks

Solution

- Light Detection and Ranging (LiDAR) and Artificial Intelligence (AI) object detection
- Issue alert message to station staff immediate actions

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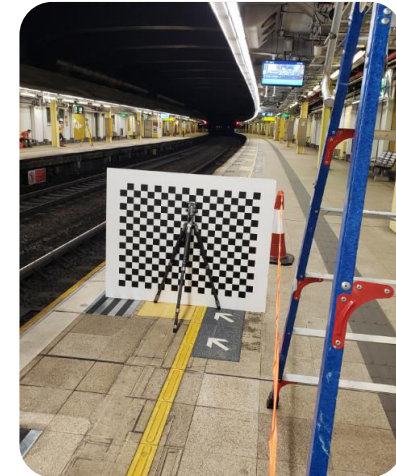
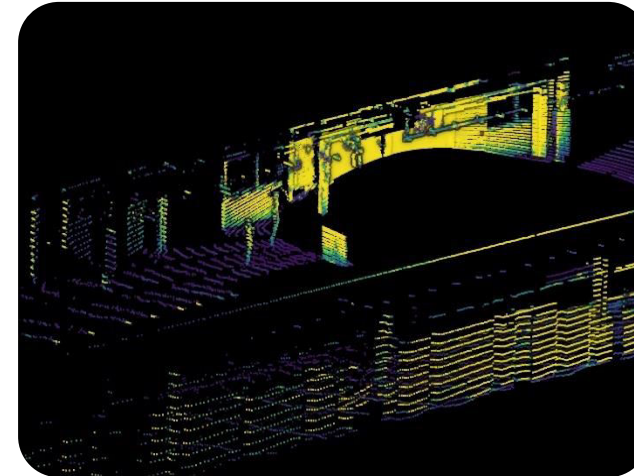
AI-based Platform Crowd Control System

Problem

- Passenger falling into track or bumping against trains on overcrowded platforms
- Infringement of passenger over yellow line on the platform with no platform screen doors

Solution

- LiDAR detection
- Trigger public address announcements to the passenger
- Send alert messages to advise station staff for carrying out different crowd control strategies



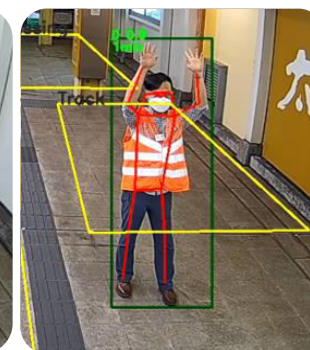
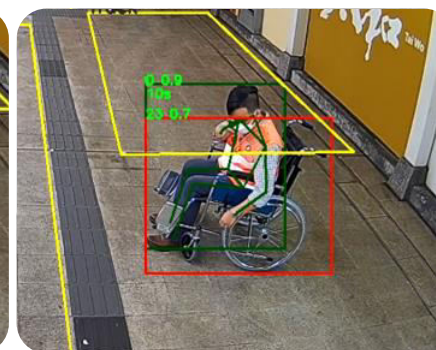
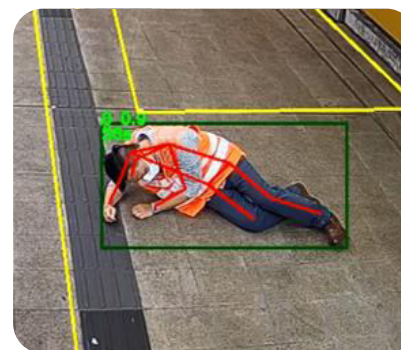
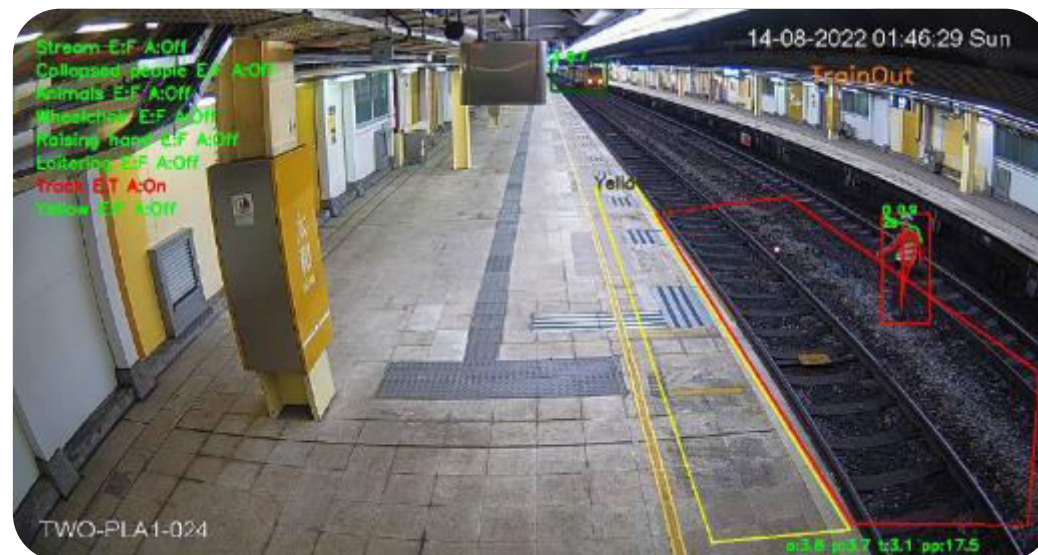
Video analytics Platform Crowd Control System

Problem

- Passenger falling into track or bumping against trains on overcrowded platforms
- Infringement of passenger over yellow line on the platform with no platform screen doors

Solution

- Video Content Analysis with existing CCTV system
- Automatic trigger public address announcements to the passenger
- Send alert messages to advise station staff for carrying out different crowd control strategies



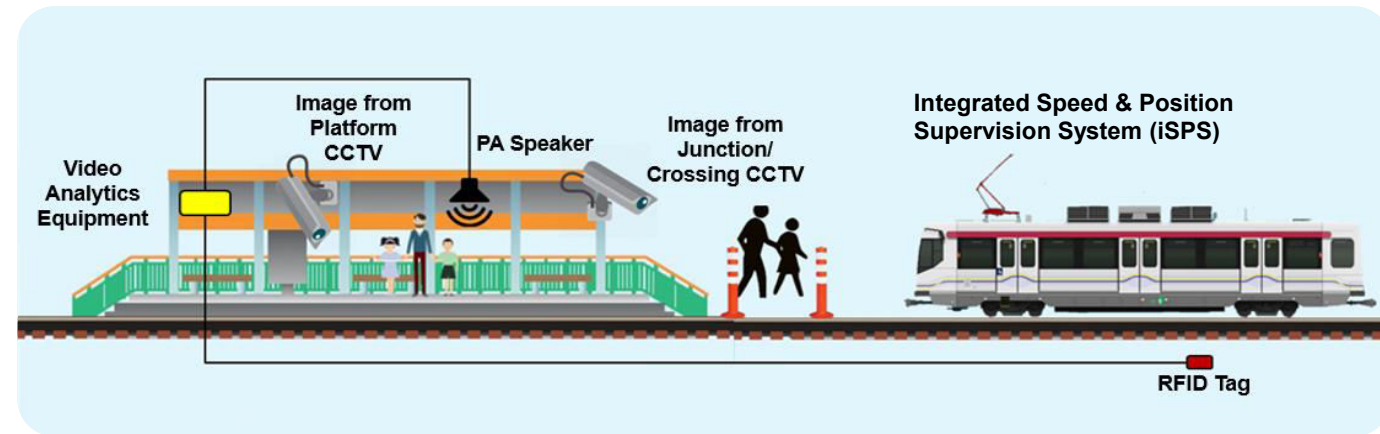
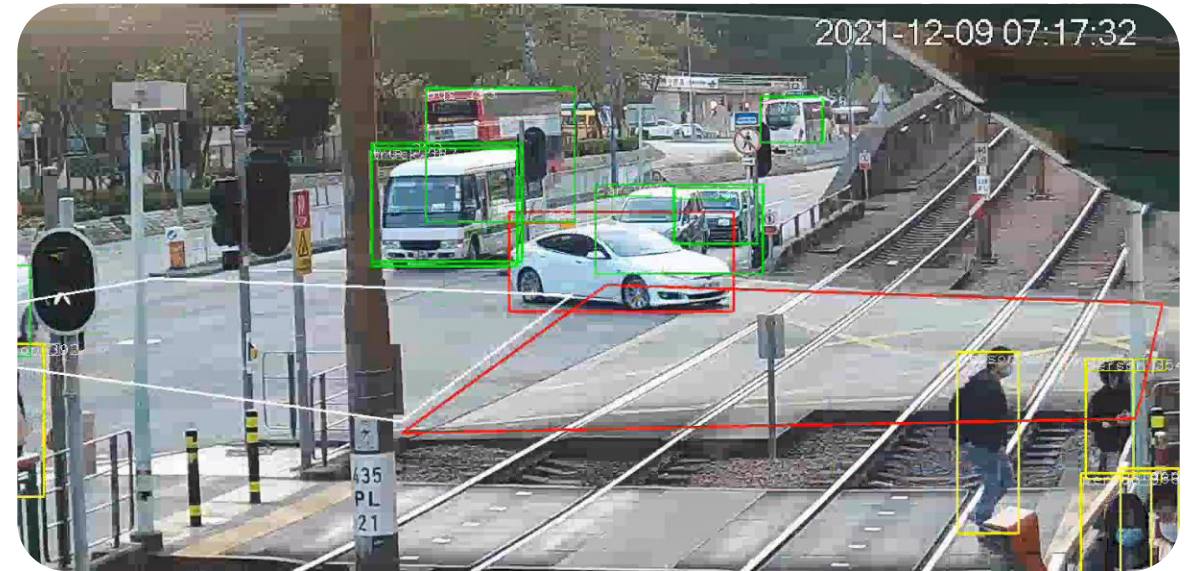
Smart Junction System

Problem

- Open Light Rail system – close interface with road vehicles without physical barriers
- Jump-red vehicles and pedestrian ignoring traffic signal

Solution

- Patented Video Analysis with CCTV system
- Automatic detection algorithm with consideration of the trajectory and moving direction of road vehicles to provide **accurate detection**
- Instant pre-alert to pedestrian and train captain



Smart Bollard

Problem

- Unsignalized pedestrian crossings
- Jaywalkers ignoring approaching trains
- Pedestrians focusing on using mobile phone

Solution

- Utilizing the same RFID system on train
- Patented Solutions in HK and UK
- Visual and audio alerts through a flashing bollard and on-ground LED strip



Escalator Comb Object Identification System (EOIS)

Problem

Escalator step misalignment due to foreign object

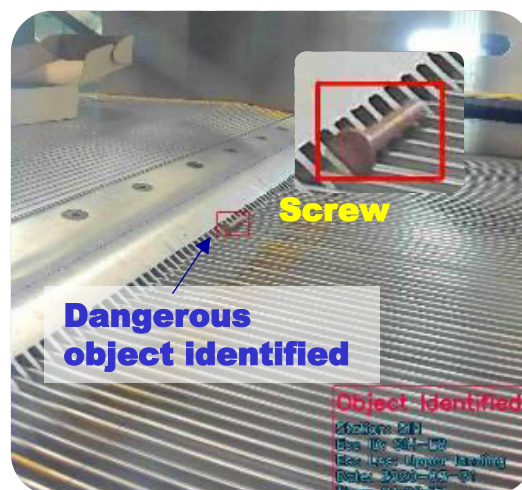
Solution



Dedicated Camera

Video Analytics

Automatic Alert



- Instant message sent to station operators for on-site inspection



Smart Trackside

Problem

Unauthorized track access

Solution



Smart Tunnel

Indoor Positioning
along Tunnel

- Patented tailored algorithm based on Bluetooth signal
- Overview of real-time positions of all workers
- Enhancing trackwork safety



Trackside Access Door Detection System (TADDS)

Trackside Door Status

- Patented solution on IoT backbone along tunnel
- Real-time trackside door status
- Intrusion detection and access control



CHAPTER 3

Conclusion



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Conclusion

- Committed to expedite the I&T transformation to sustain continuous enhancement on railway safety
- EMSD and MTR will continue to work towards a smarter and safer railway, continuously create cohered partnership to enrich the I&T development in railway safety



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