IRSC 2022

INTERNATIONAL RAILWAY
SAFETY COUNCIL

SEVILLA, OCTOBER 16-21, 2022

I&T APPLICATIONS TO ENHANCE SAFETY IN STATIONS

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機電工程署 EMSD

MTR

AGENDA

Part 1
Background

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:

MTR Corporation – Major Railway Operator in Hong Kong

- 99 heavy rail stations
- 68 light rail stops
- Total Route Length: over 270 km

International Recognition
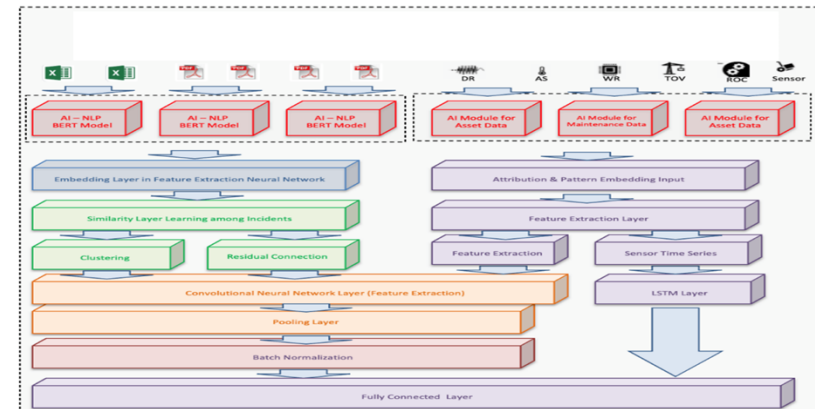
Participate in International Competitions

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 & 2021 RFID Journal Award:

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

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
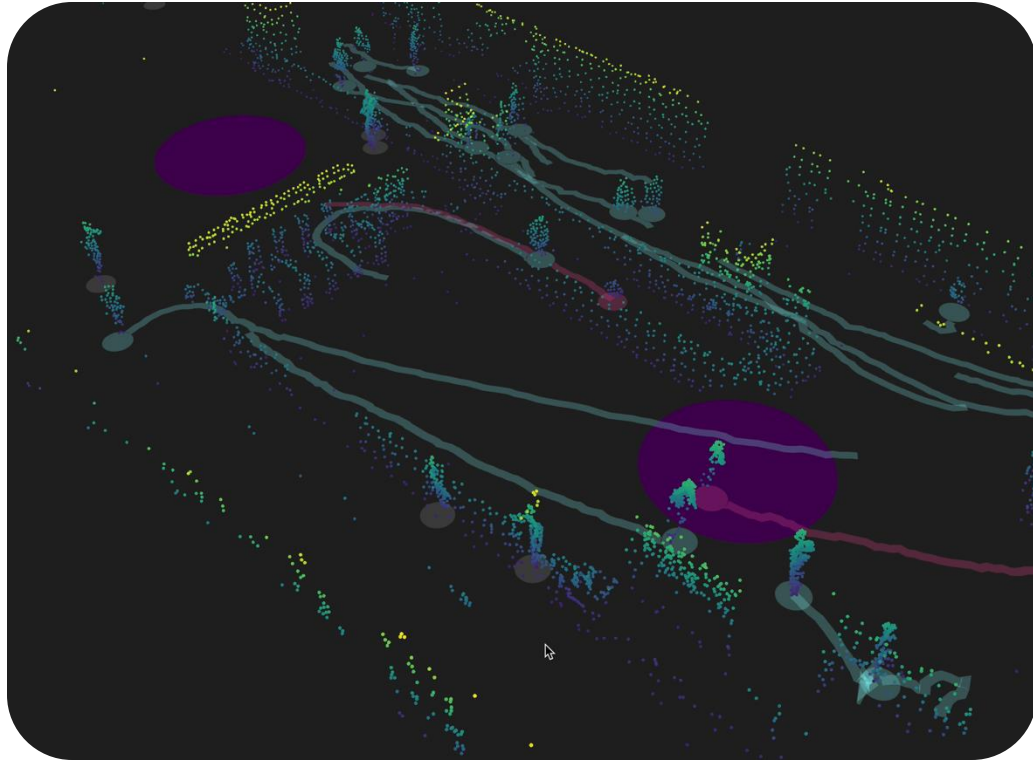
- Initiate relevant PA & visual alert message

- Instant message sent to station operators

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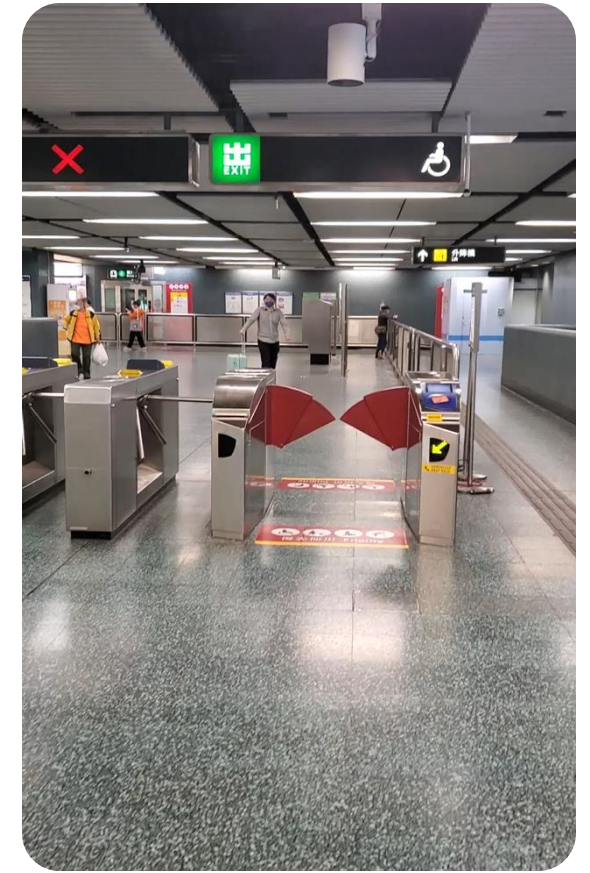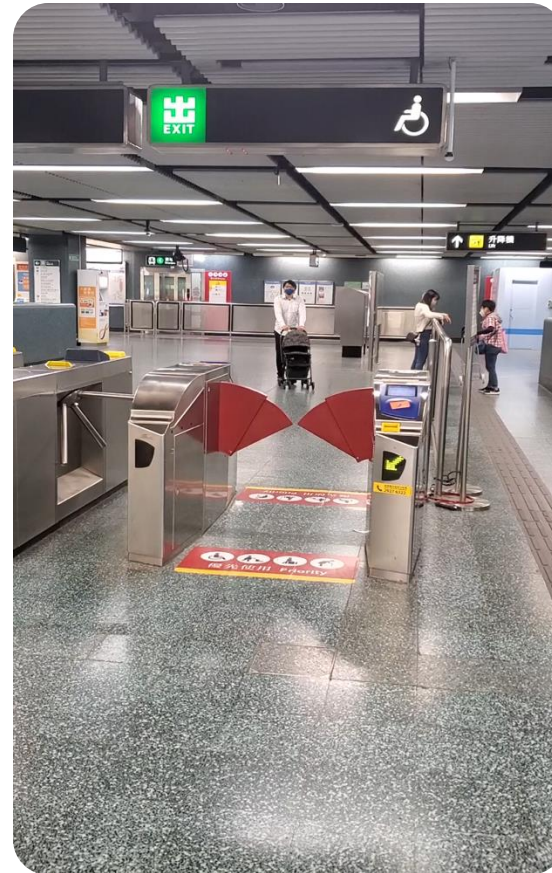SEVILLA, OCTOBER 16-21, 2022

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AI-based Accident Prevention System for Escalators

Path tracking for high-risk passengers

Initiate specific public announcement & visual alert message
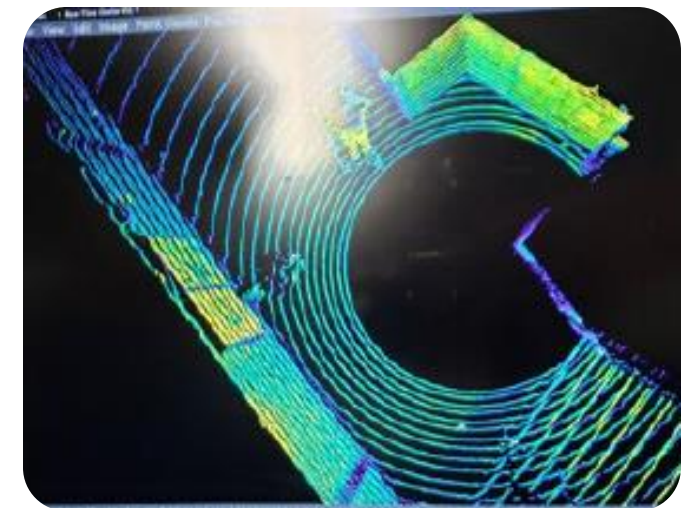
Dangerous Goods Detection System

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 for taking immediate actions
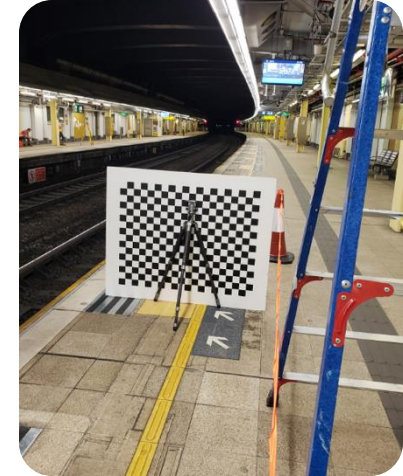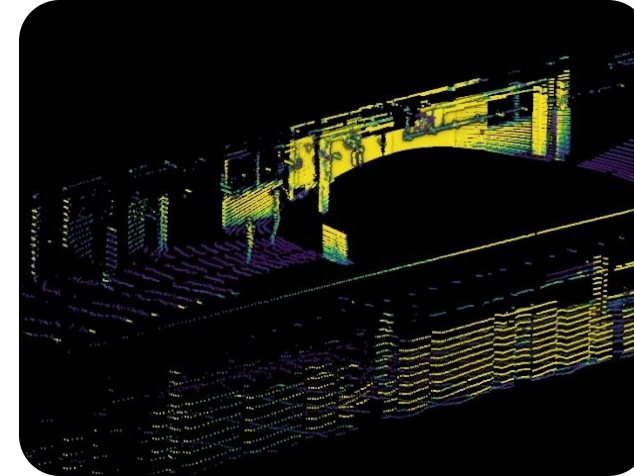

大嬸攜石油氣罐搭荃灣線 港鐵:已交警方跟進

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
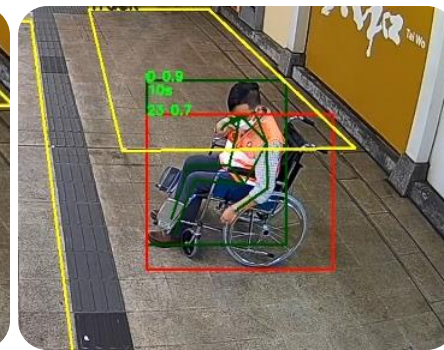
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Video analytics Platform Crowd Control System

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
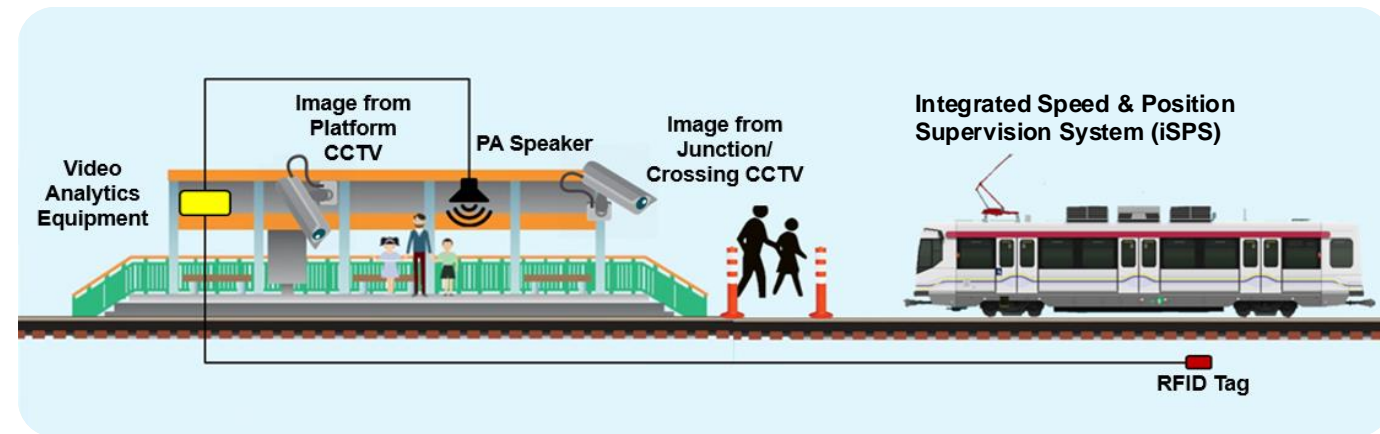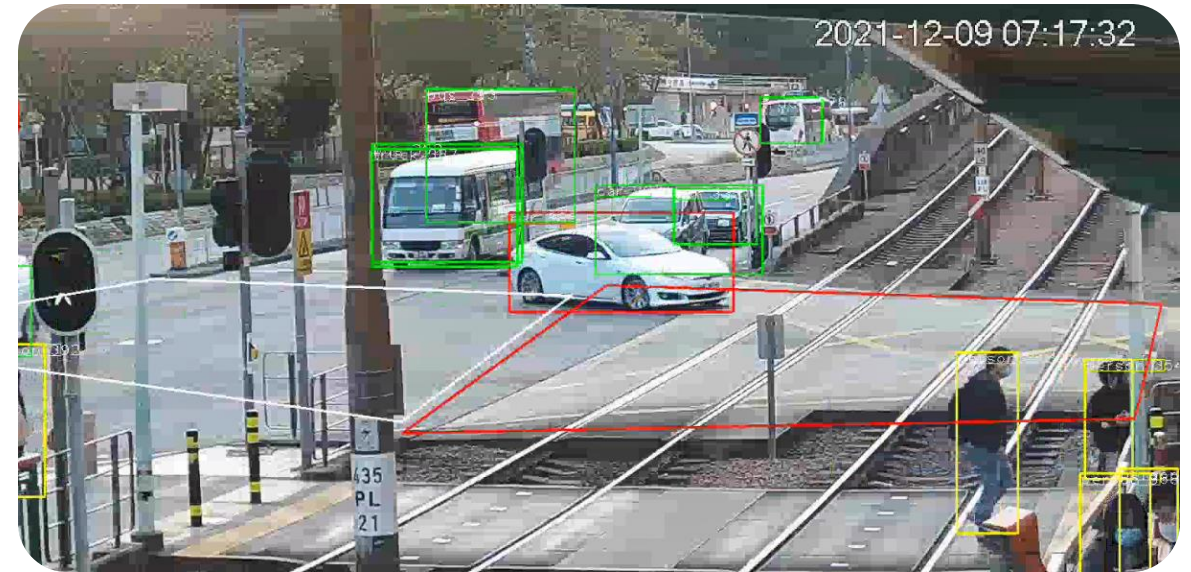
Smart Junction System

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

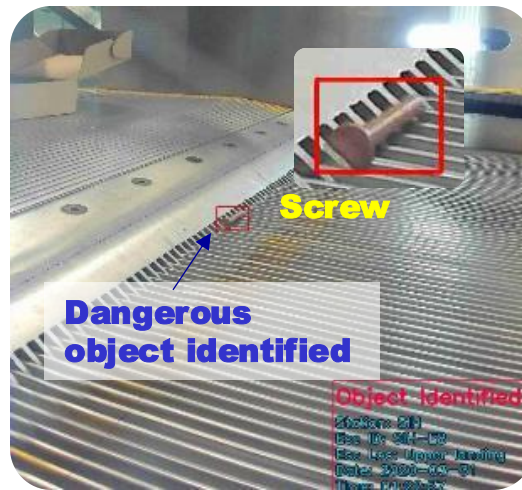Escalator step misalignment due to foreign object

Solution

| Dedicated Camera | → | Video Analytics | → | Automatic Alert |

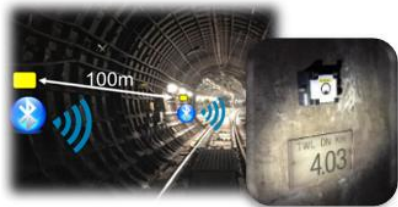
- Instant message sent to station operators for on-site inspection

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

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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