

The Real Power of 5G-IoT in PropTech Development



APAS
汽車科技研發中心

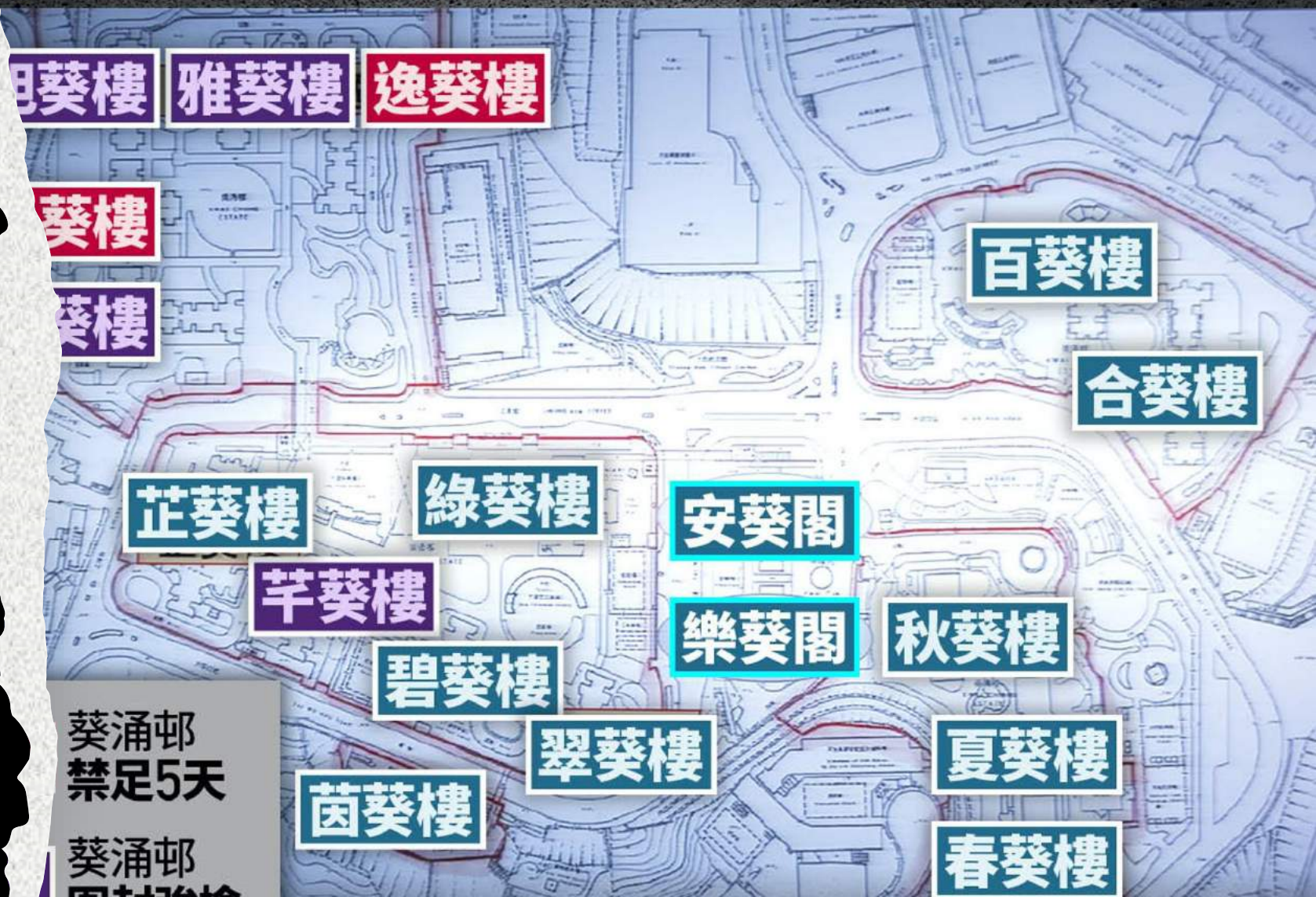
hkpc
生產力局



Dr. Lawrence Poon
General Manager
Smart City Division
Hong Kong Productivity Council

葵涌邨16幢約35000人 一文睇清：禁足及強檢安排

Who can
help to
deliver
meals,
medicine,
daily
necessities ?



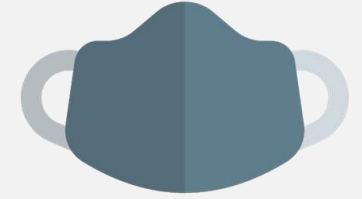
The All-conditions Delivery Robot



Improvement in meal delivery efficiency



Reposition of manpower to high value tasks

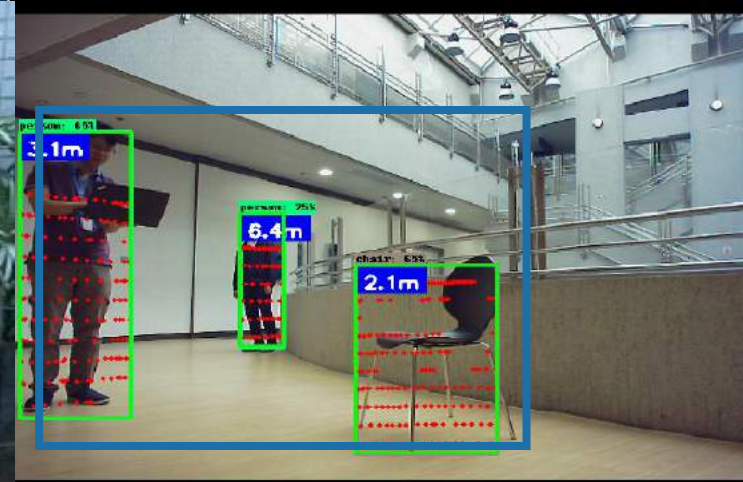


Reduce contact of staff and PIC under COVID-19 pandemic

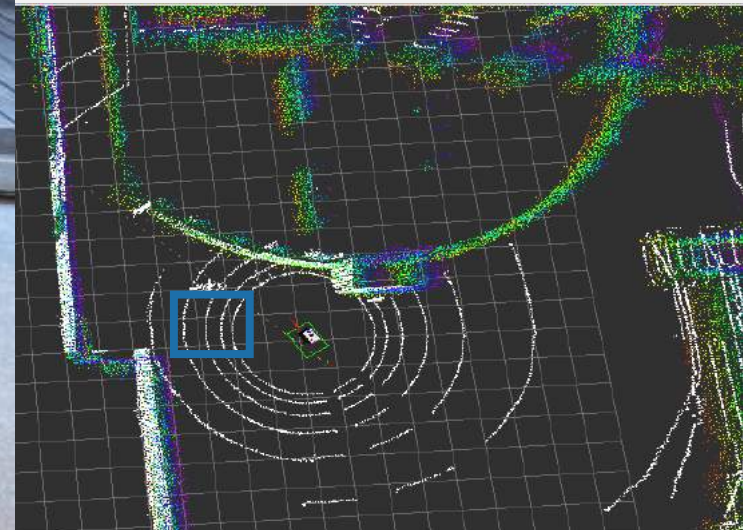
Dimension (without cart)	1200 x 1000 x 750 mm
Speed and Payload	6 km/h with 1500 kg
Climbing Ability	10 degree with 150 kg payload
Battery	Li-ion, 5050 mAh
Operating Time per Charge	8 hours
Ingress Protection Rating	IP54 (outdoor)
Turning Radius	1.6m



Multi-Purpose Mobility Robots – The MiniMover Family



Object recognition with distance estimation



LiDAR - Simultaneous Localisation And Mapping (SLAM)

I'm nobody.....



I can be anybody.

The Problems



Severe shortage in human labour

According to the government's findings in 2019, Hong Kong could be short of somewhere between 170k and 255k workers by 2027 due to a declining number of younger people entering working age.



Ineffective & Error-prone

Human beings cannot work 24/7 and subject to human errors



Prevalence of disease due to human-to-human contact

Potential outbreak of infectious diseases



The Solution

Autonomous Delivery Mover, MiniMover I



Unmanned delivery

Perform last-mile delivery tasks with collision avoidance in a more frequent and less labour intensive way



Site-specific handling

Move to destination autonomously
(including taking lift ride & passing through doors!)



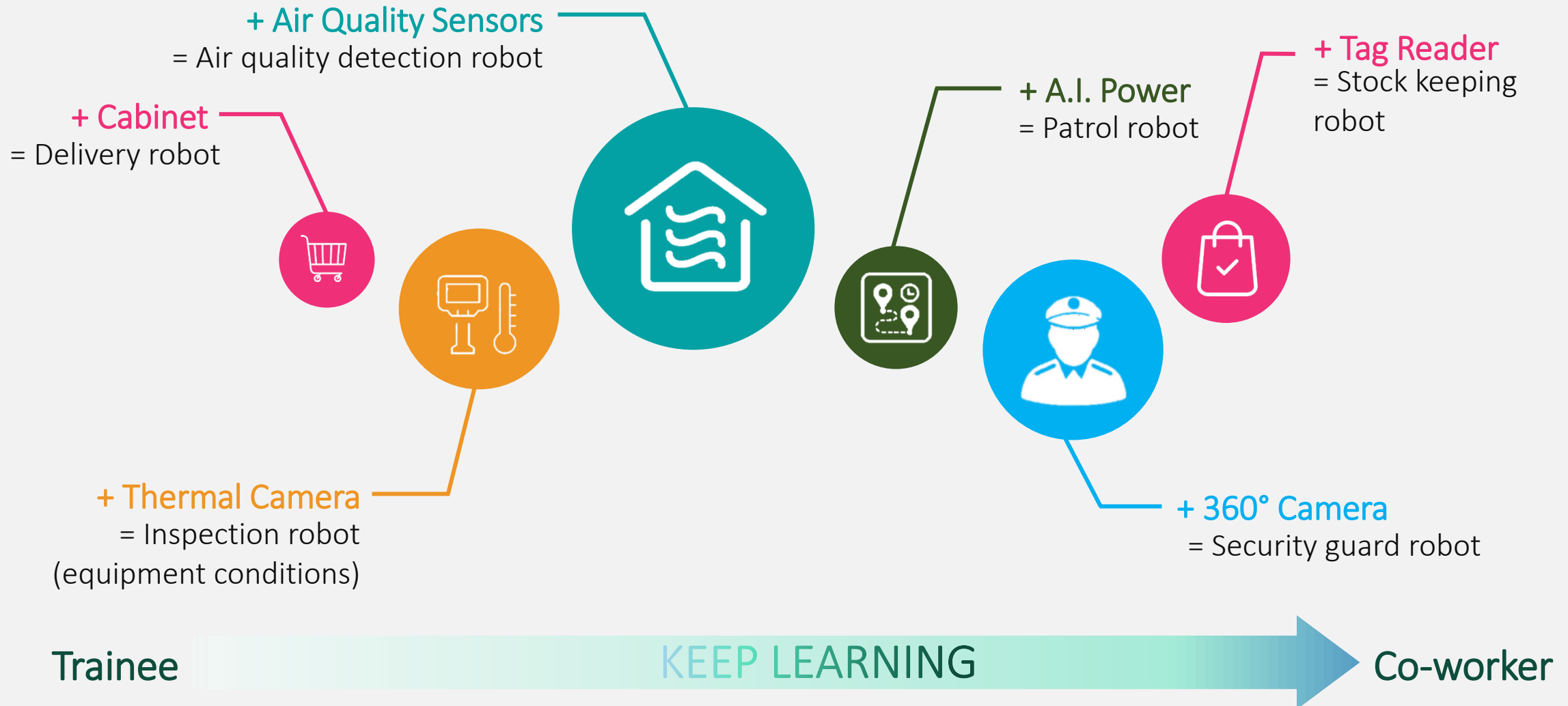
A.I. algorithms for inspection/ patrolling

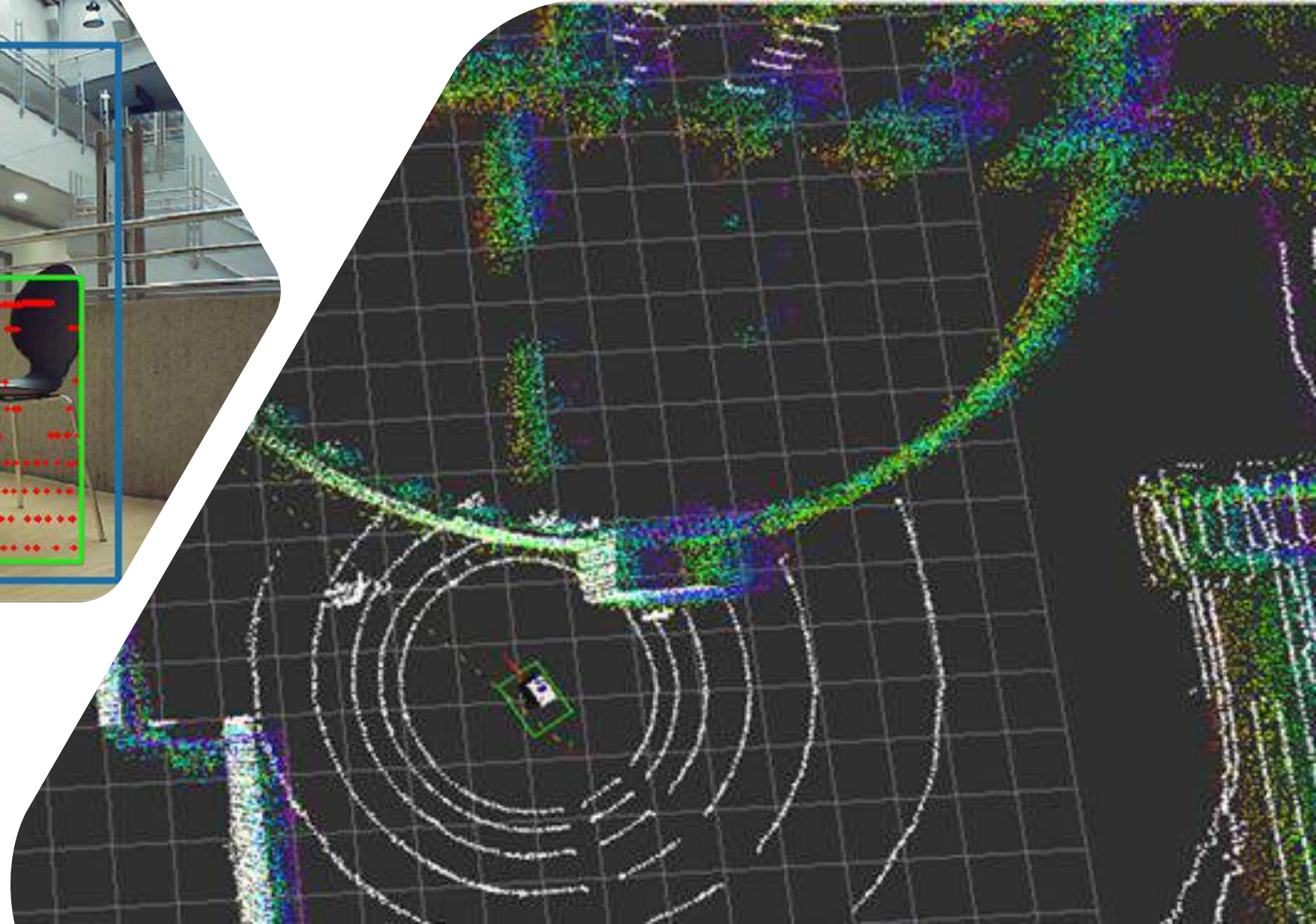
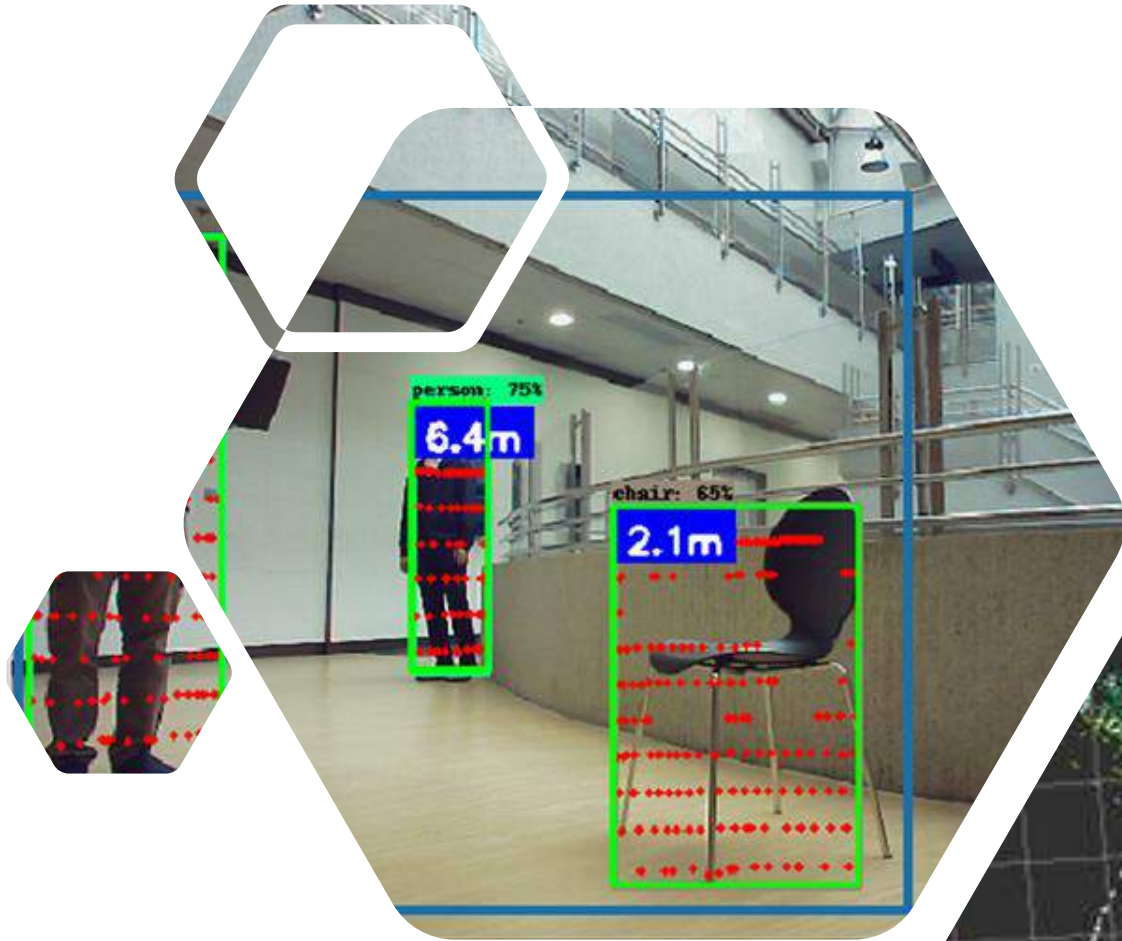
Co-work with staff to enhance operational efficiency
at customised sites

The Solution



Hatching Point for Future Expansion Ideas





Security
guard
robot





The Solution

Autonomous Patrol Robot, MiniMover II



Unmanned patrol for multiple devices

Perform patrolling and surveillance tasks with collision avoidance



5G-enabled teleoperation

Drive from a remote location with real-time video streaming enabled by 5G connectivity



Improve workplace safety

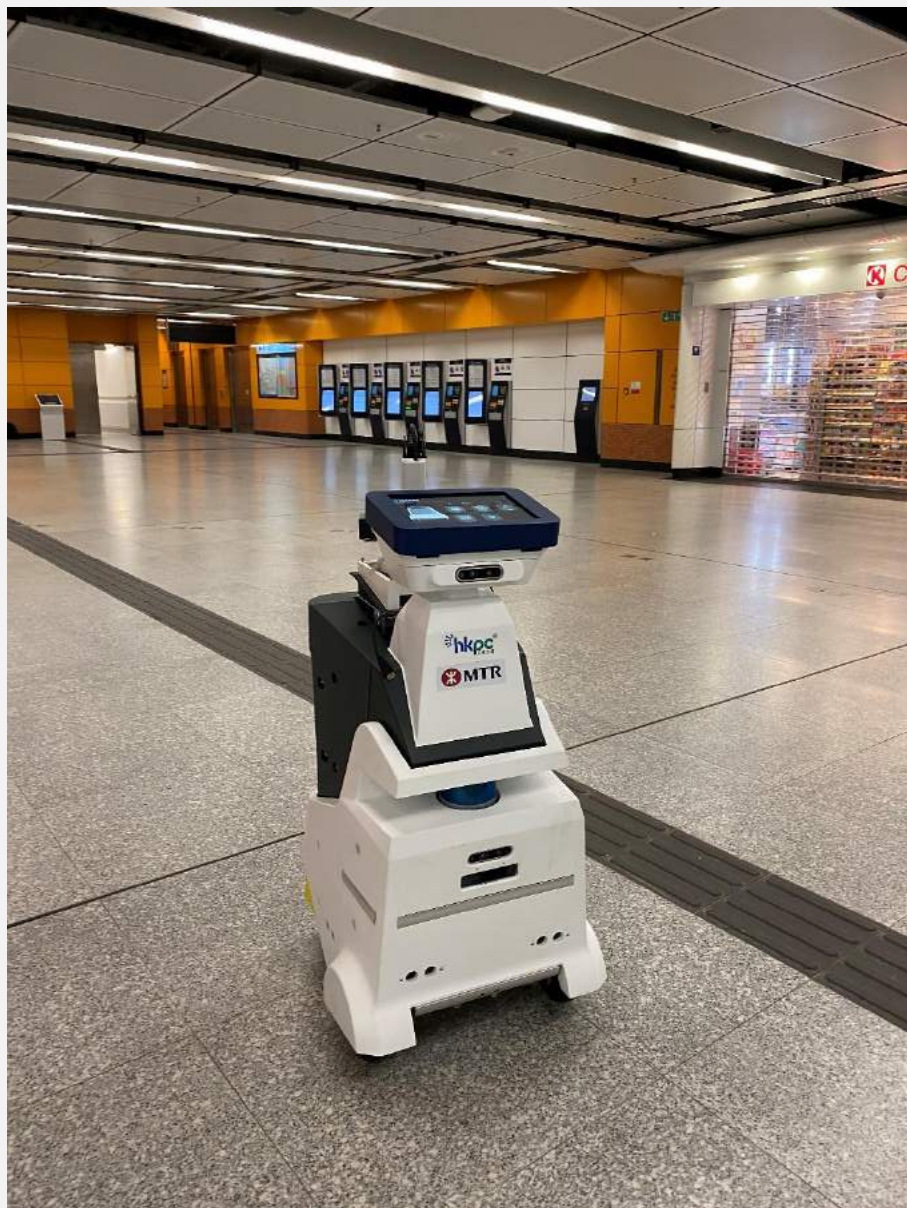
Enhance workplace safety and resource utilisation

The Solution



The Solution

Autonomous Inspection Robot, Checker-T



Co-worker

Assist station operators on regular inspections to enhance railway service and operational efficiency



Autonomous inspection

Patrol during non-traffic hours (NTH) to check facility conditions, including lighting and signage



A.I. algorithms for inspection/ patrolling

Co-work with staff to enhance operational efficiency at customised sites



*Efficiency x3
Accuracy >95%
Manpower -75%*

Smart Asset
Management
Robot

AI Object Recognition on 720P & 4K UHD video

● Evaluation performance

Video Resolution	# of frame	Inference Speed
720P	390	0.018s/frame
1080P	390	0.033s/frame
4K	390	0.100s/frame

Remark: Experiments were performed on Windows 10 Pro 64-bit, Intel® Core™ i7-8850H CPU 2.60GHz, CUDA 10.1, NVIDIA GeForce GTX 1080.

● Object detection on 4K video has:

● **Better** performance on small objects

- 21 and 25 objects were detected on 720P, 1080P video respectively while **48 objects on 4K video, improved by 128% and 92% respectively**

● **More confident** prediction

- Predictions have higher confidence score, e.g. 0.56 → 0.82 on 'truck' detection, **improved by ~50%.**

AI Object Recognition on 720P & 4K UHD video

720P



4K



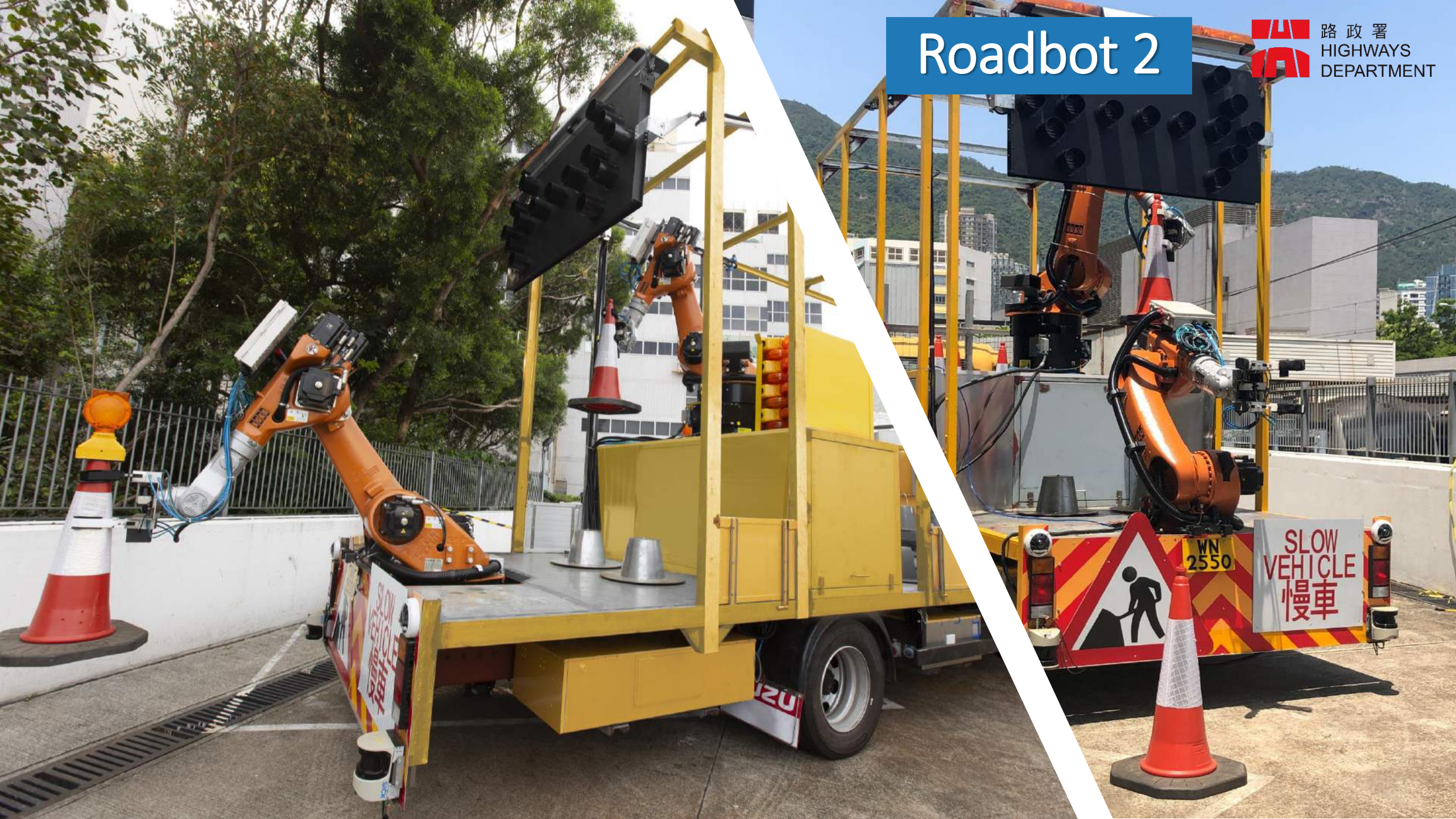
Robotic Dog → 5G + AI enabled



Drones → 5G + AI enabled



Roadbot 2









Thank You !

