



Sharing on Autonomous Driverless Tractor

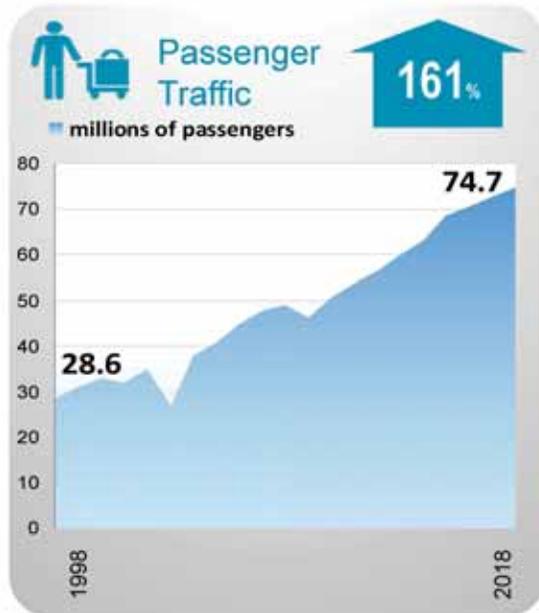
Hong Kong Airport Authority



HKIA is a Leading International Airport in the World

Rank #3 in International Passenger Traffic

Rank #1 in cargo traffic for consecutive 9 years



Expanding into **Three-Runway System** by 2024

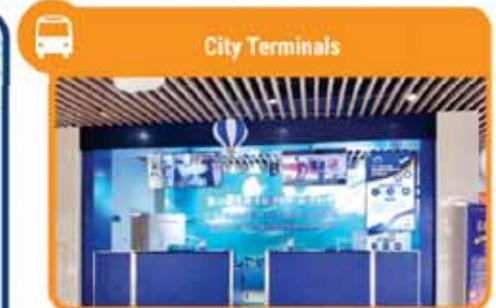
100 million passengers

9 million tonnes cargo

102 flights per hour



The Greater Bay Area Cross-Boundary Connections





Autonomous Driving in HKIA

Primary Goals are better cargo & baggage delivery, and provide hazard free environment



On Time Delivery



Hazard Free Environment

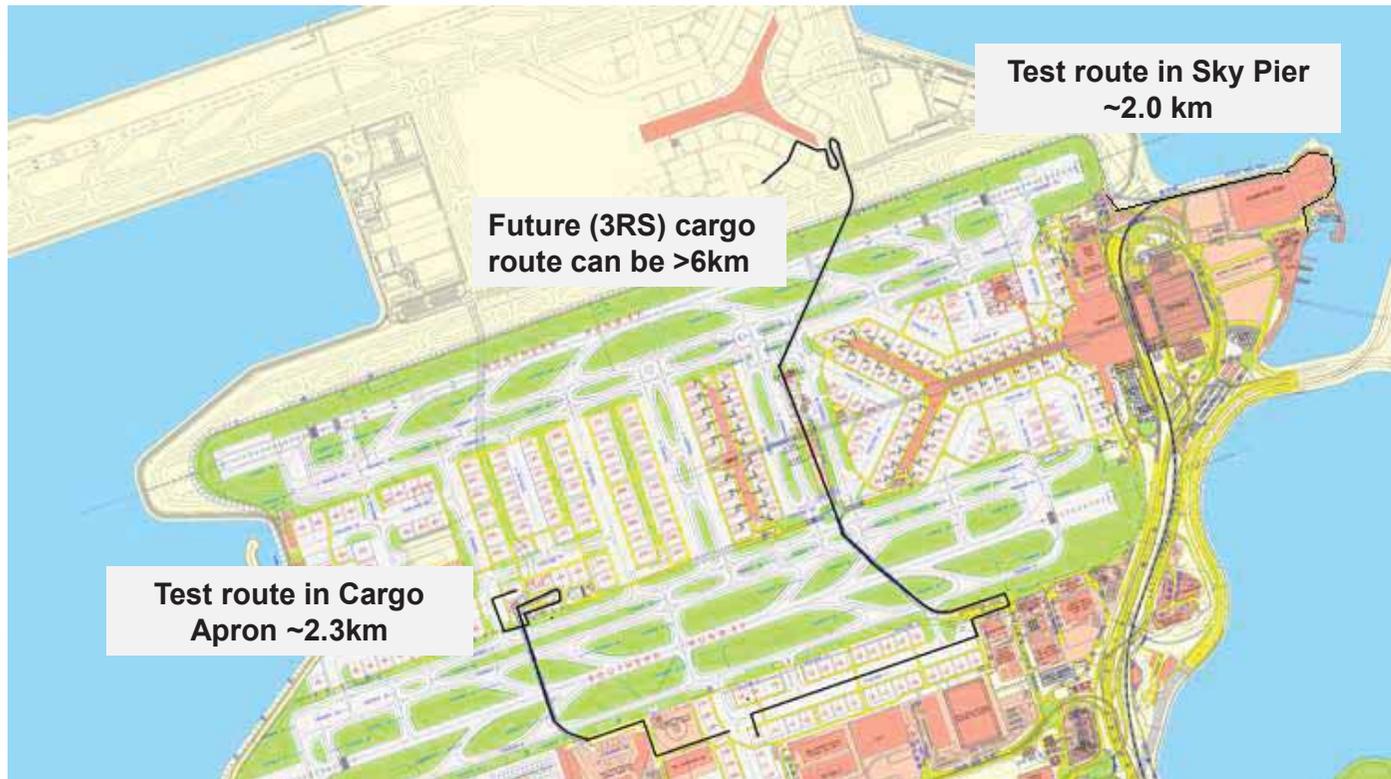


Non-tedious Job



Effectiveness and efficient

Autonomous Electric Tractor (AET)



- Shortage in tractor drivers in general
- Expect demand for drivers under 3RS operation is even higher
- Tractor mileages ~20000km



Autonomous Electric Tractor (AET)

Choose the autonomous solution provider

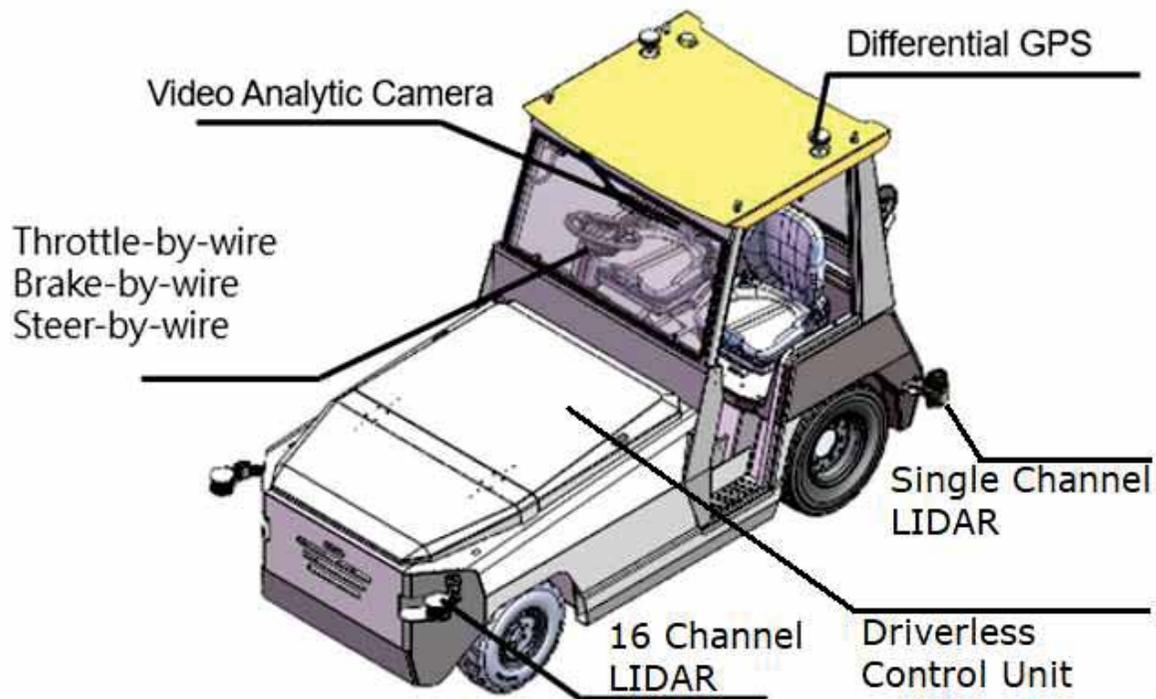


Make	Linde	Toyota	Charlatte	Goodsense	Sukorun	HangFu
Model	P250 (SWB)	3T25	F137-V3	TB25-F	VD30	HFDQY250
Visit	✓	✗	✗	✓	✗	✓
						

Choose the tractor manufacturer



Autonomous Electric Tractor (AET)



UISEE 驭勢

Teksbotics 德思卢博



Smart Mobility Roadmap for HKIA



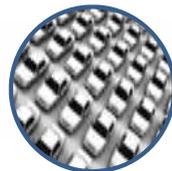
Autonomous Driving Technology



Smart Transport Infrastructure



Digital Twin of Smart Mobility



Fleet Management System

Use machine learning on positioning and routing

HD Camera



DGPS base station for high accurate position

D-GPS



Measure the distance for obstacle avoidance

LIDAR



Detect objects in short distance range

Ultrasonic Radar

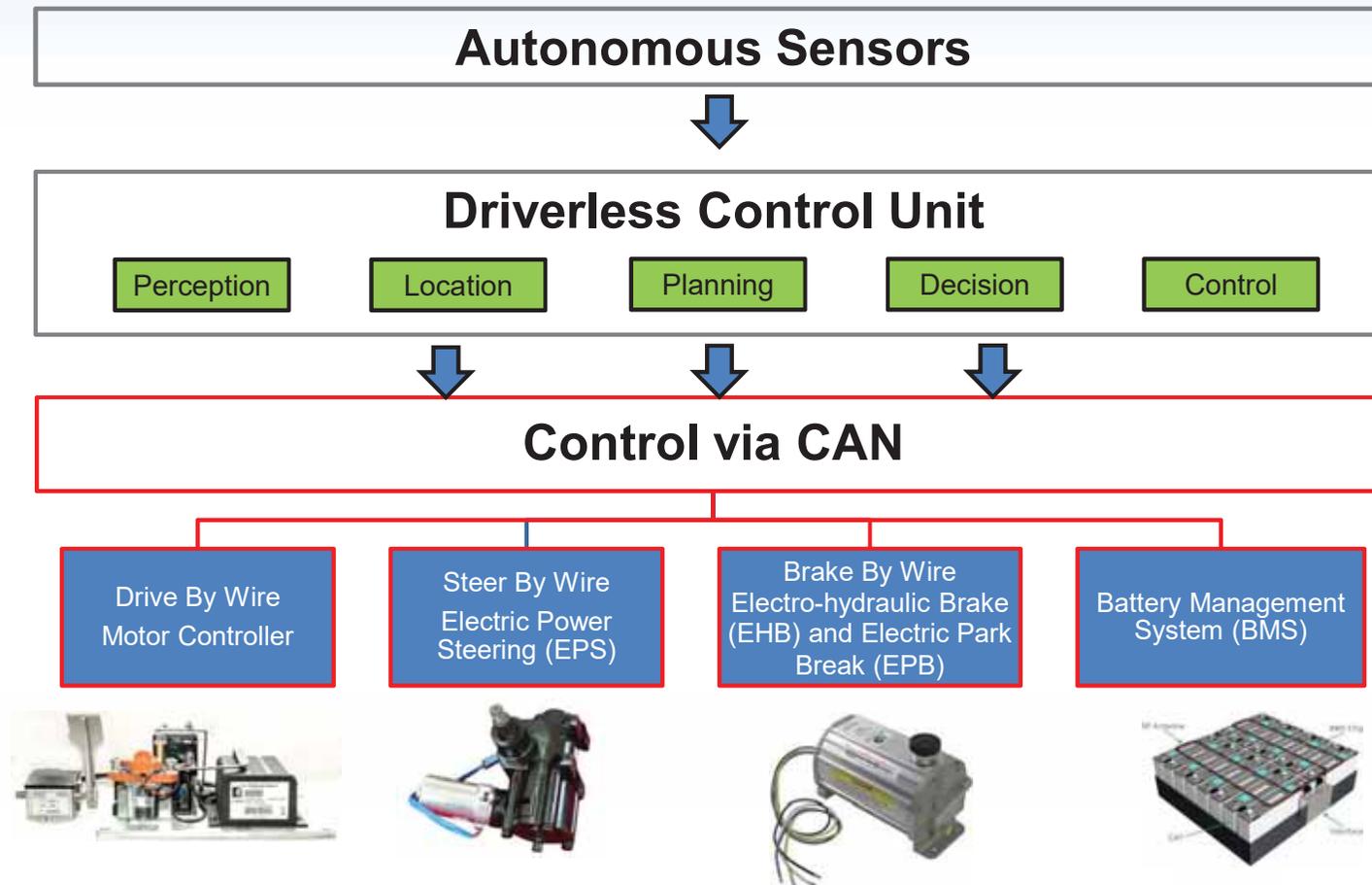


Detect objects that adjoins vehicle body

Pressure sensors



X-By-Wire and Controller Area Network (CAN) Connection



Smart Mobility Roadmap for HKIA



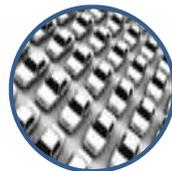
Autonomous Driving Technology



Smart Transport Infrastructure



Digital Twin of Smart Mobility



Fleet Management System



Smart Mobility Roadmap for HKIA



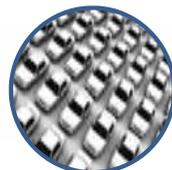
Autonomous Driving Technology



Smart Transport Infrastructure



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Fleet Management System



Smart Mobility Roadmap for HKIA



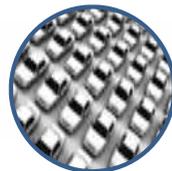
Autonomous Driving Technology



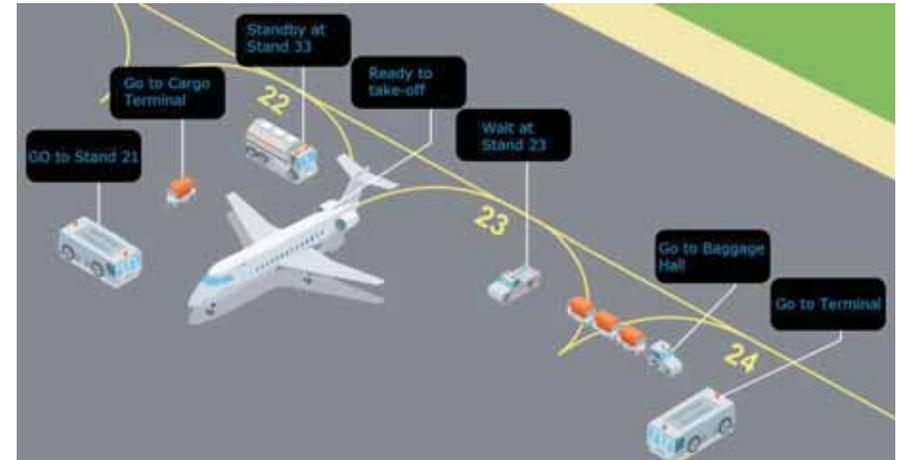
Smart Transport Infrastructure



Digital Twin of Smart Mobility



Fleet Management System



AET Safety Design

HD Camera
D-GPS
LiDAR
Ultrasonic
Pressure sensor

Autonomous
Technology

Risk Matrix

Frequency	Consequence				
	Catastrophic A	Hazardous B	Major C	Minor D	Negligible E
Frequent 5	5A	5B	5C	5D	5E
Occasional 4	4A	4B	4C	4D	4E
Remote 3	3A	3B	3C	3D	3E
Improbable 2	2A	2B	2C	2D	2E
Extremely improbable 1	1A	1B	1C	1D	1E

Risk Assessment



Independent Safety
Override System



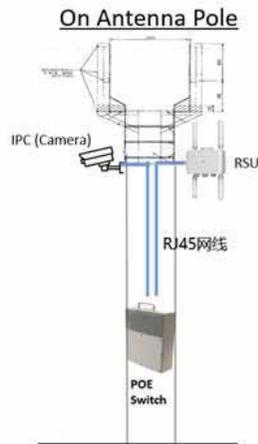
1-channel
coverage
10m

16-channel
coverage
35m

V2X
Communication



Remote Monitoring and
Control



Simulation before Reality

- Regression Test
- Scene Generation
- Multiple Object Detection (MOT)
- Stress Test



Operation Trial in HKIA

- Air-to-sea & sea-to-air baggage delivery between SkyPier Baggage Hall and Gate A1:
 - SkyPier Baggage Hall to Gate A1 (Driverless Mode)
 - Gate A1 to T1 Baggage Hall (Manual Mode)
 - No AVSECO ride-along (Onboard CCTV and E-Lock)

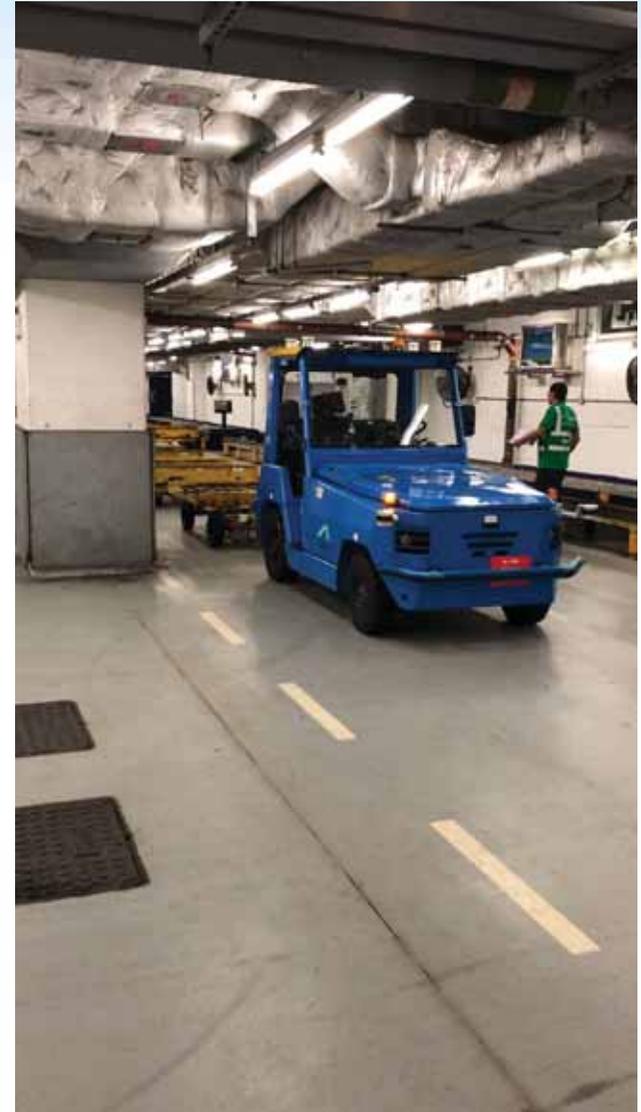


History of AET

- Pilot run in the test route from Aug 2018 to Now
- No manual intervention since Oct 2018



Operation in Baggage Hall





香港 | HONG KONG
國際機場 | INTERNATIONAL
AIRPORT

*Together we create a
smarter airport for Hong Kong*

與先行者同行 與開創者共創

Biometrics ■ Mobile Technology ■ Robotics ■ Digital Twin ■ Big Data Intelligence