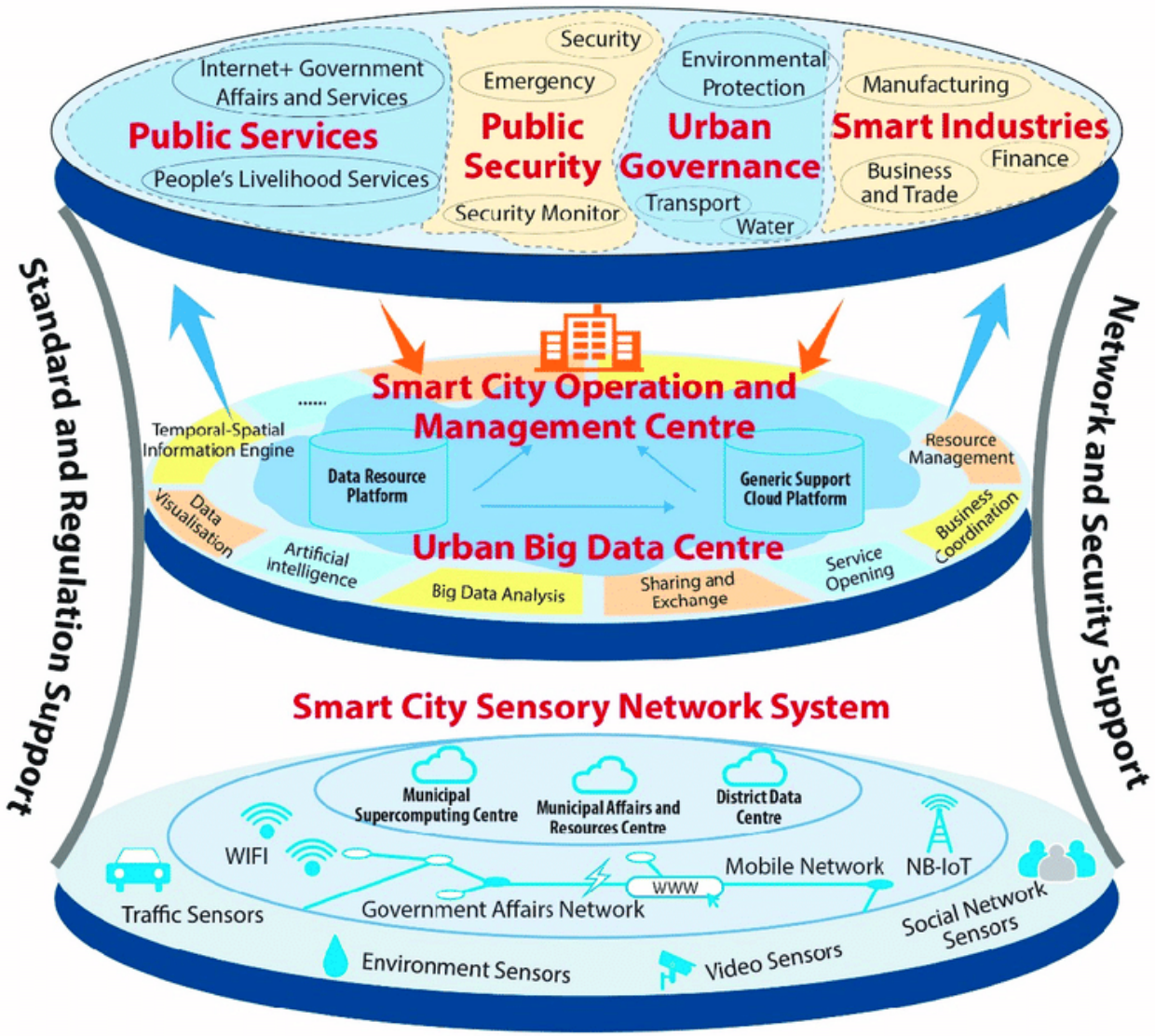
JHCTECH Insights

Embedded Systems for Smart City Applications

1

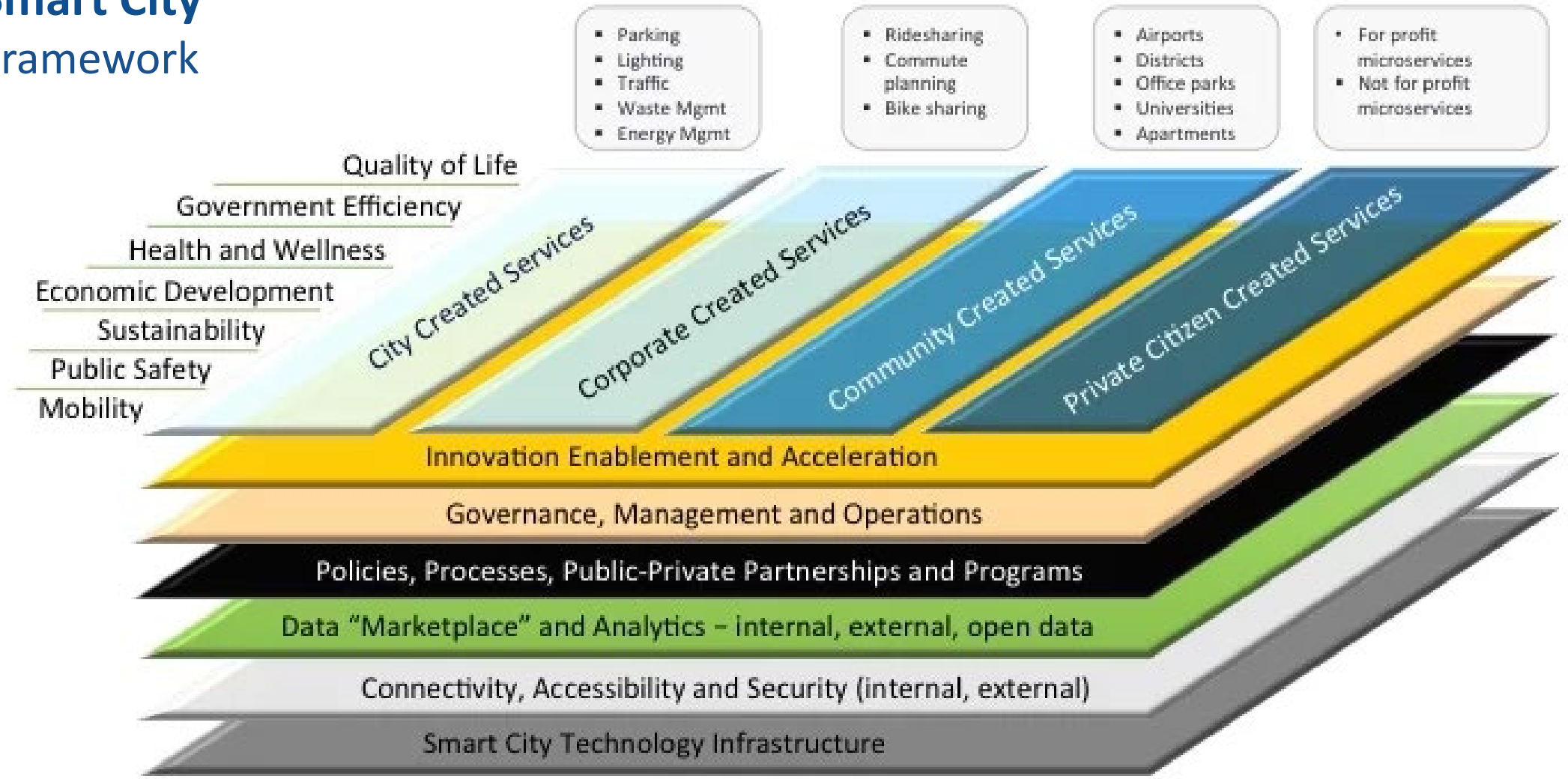
Smart City
Embedded Computing Demand

Smart City
Framework



Shenzhen Smart City Structure. Source: Shenzhen Government

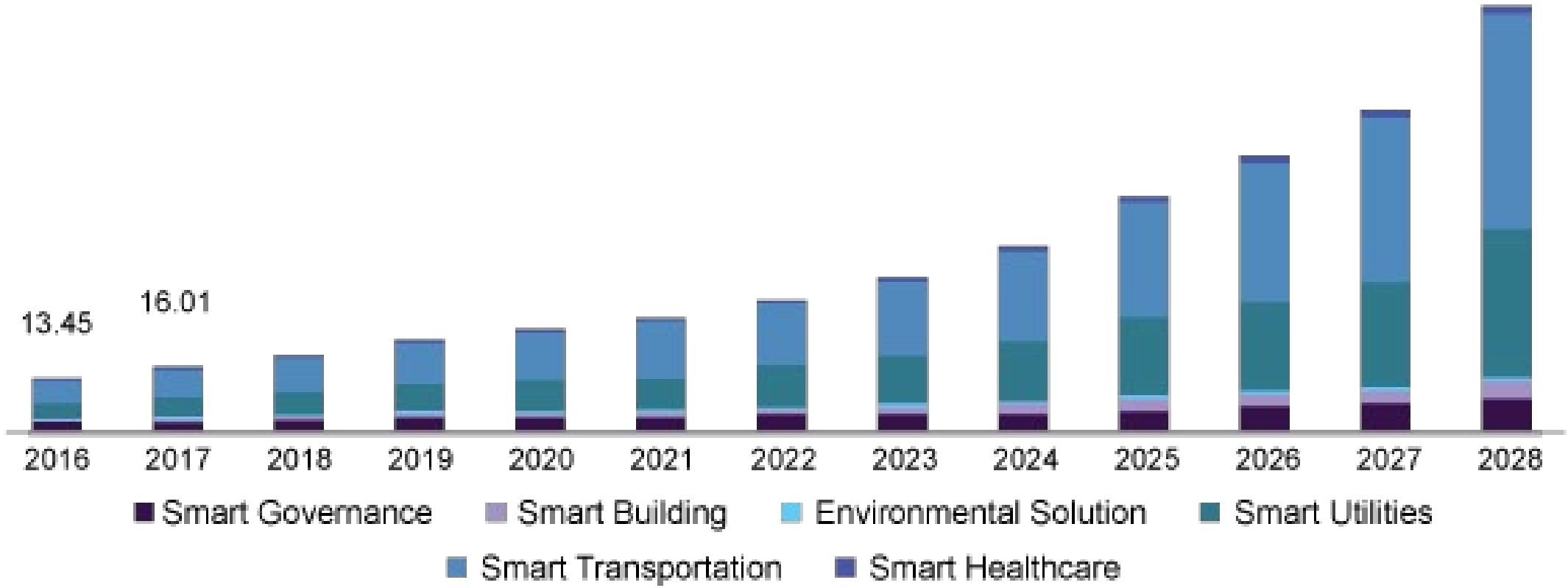
Smart City
Framework



Source: StrategyofThings.io

Smart City Ecosystem Framework

U.S. smart cities market size, by application, 2016 - 2028 (USD Billion)



Source: www.grandviewresearch.com

MCKINSEY GLOBAL INSTITUTE

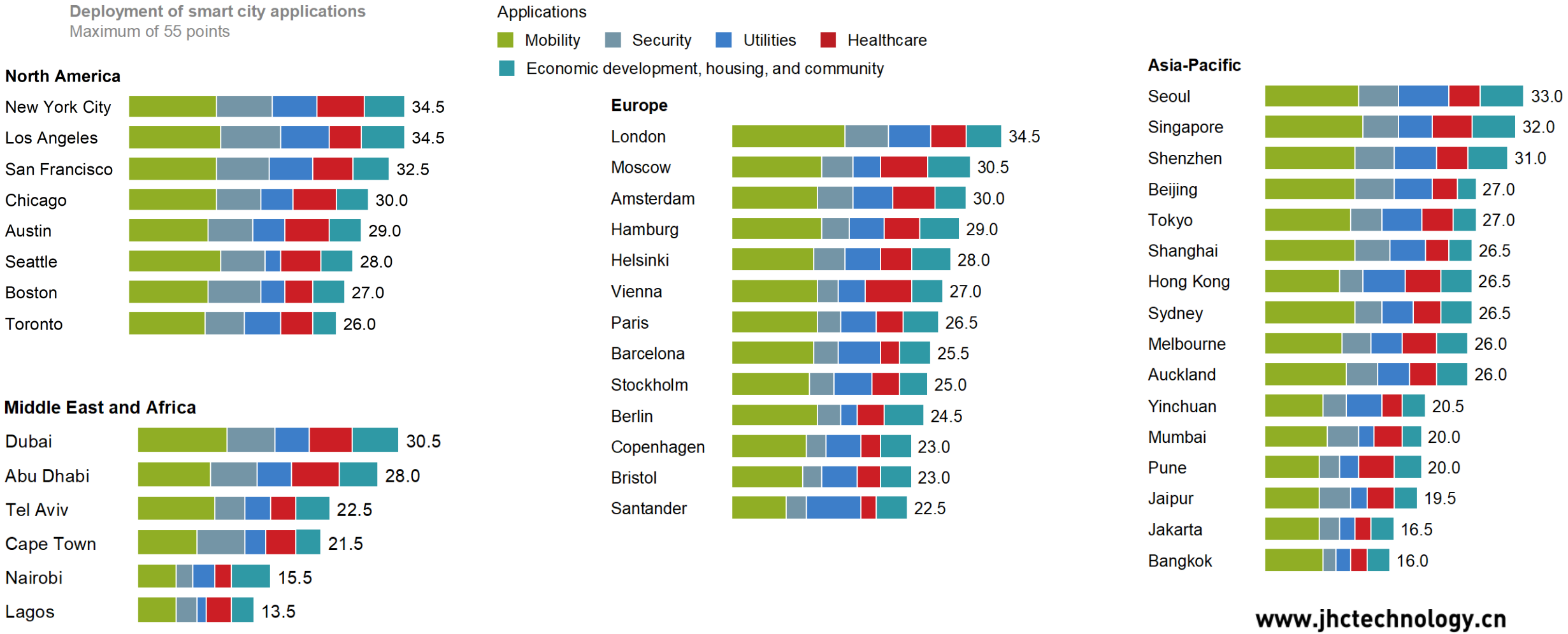
Smart cities: Digital solutions for a more livable future

Exhibit

MGI looked at the number of current smart city applications being deployed in 50 cities around the world.

NOT EXHAUSTIVE

Deployment of smart city applications
Maximum of 55 points



Smart City
Framework

Digitalisation

- Sensors
- Storage
- Communication
- **Processing**

Automation

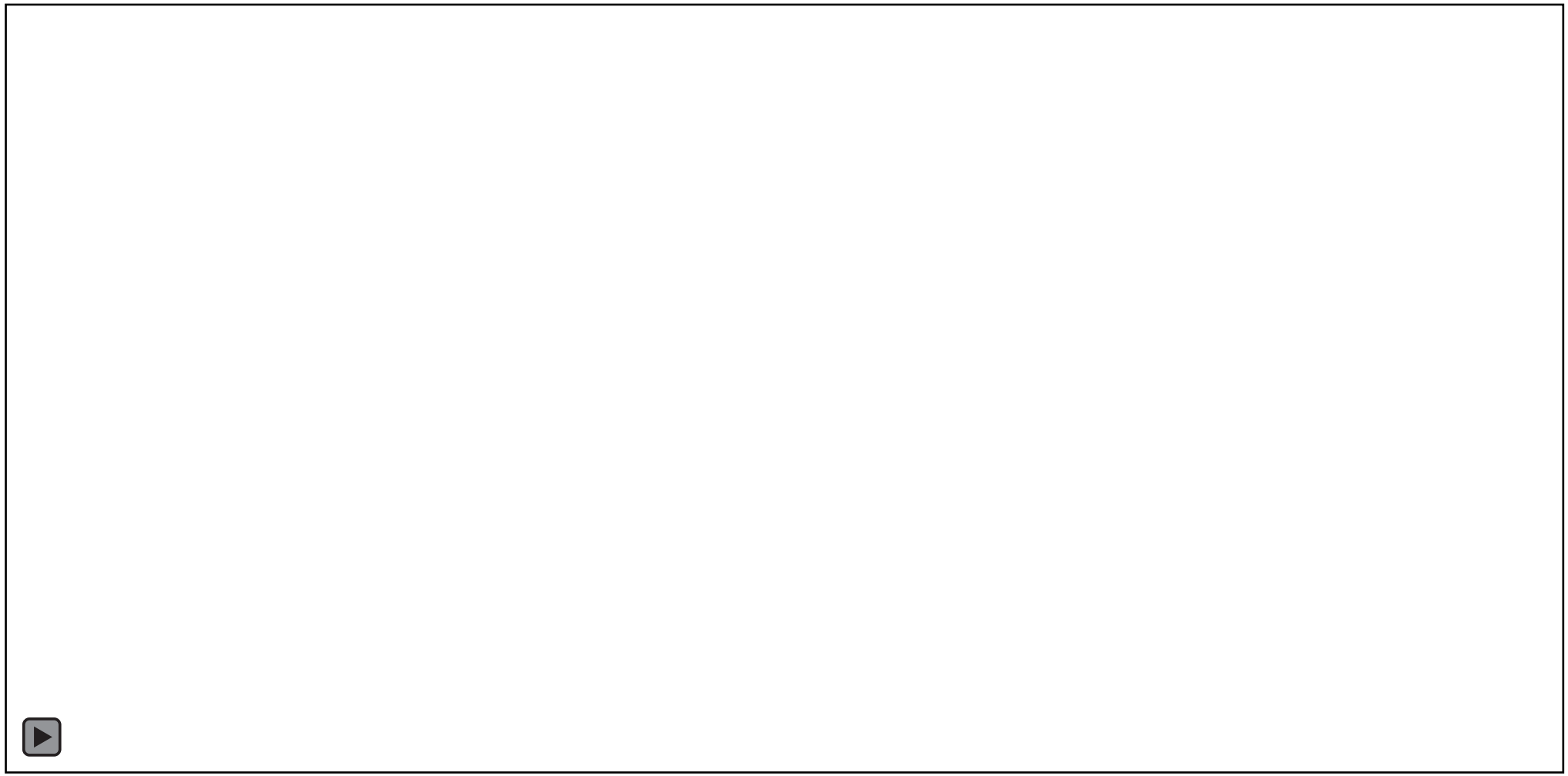
- Process Automation
- Automation Optimisation
- Self-Learning and Self-Diagnostics / Machine Learning
- Real AI (no human reliance) algorithms

JHCTECH AI Ready Embedded Computing Solutions

Autonomy **Control** **Computing** **Connectivity**

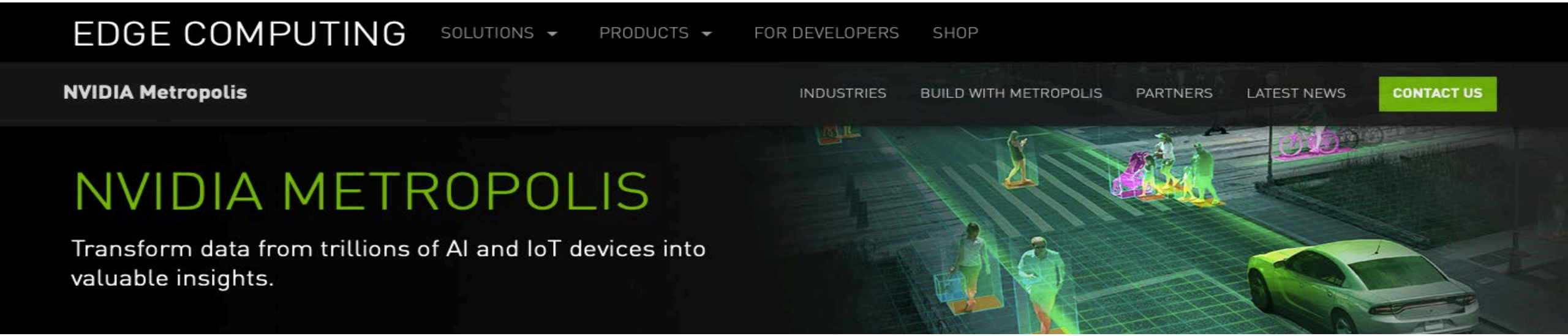
Embedded Computing

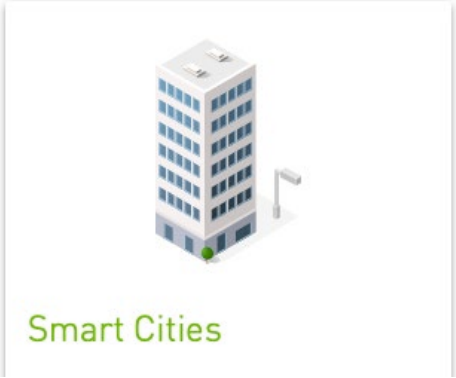
Intel Direction

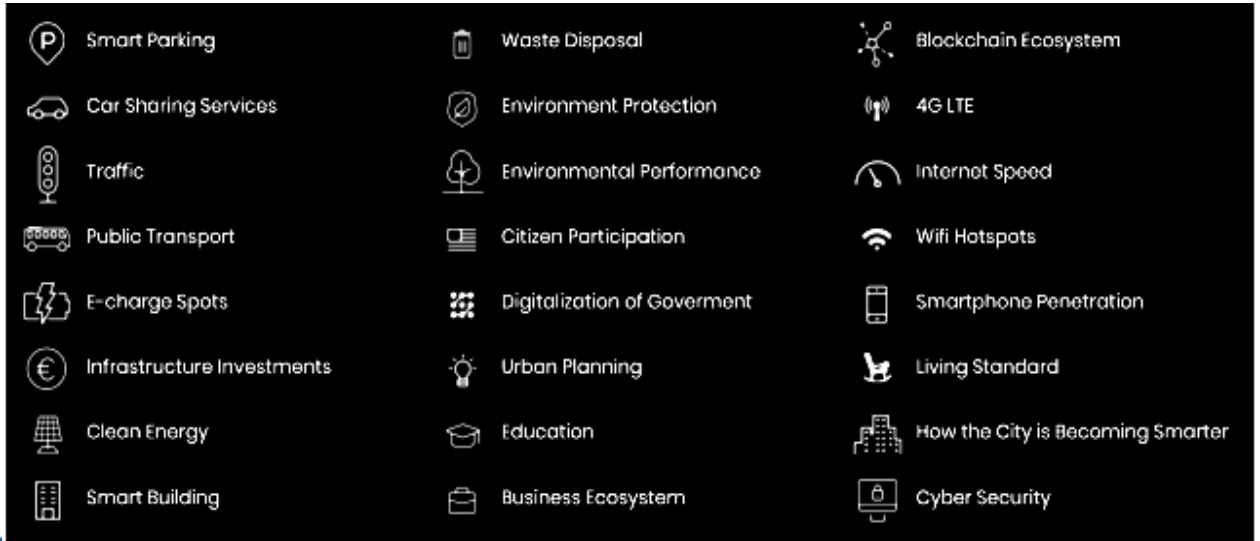


Embedded Computing

GPU Direction (Nvidia)







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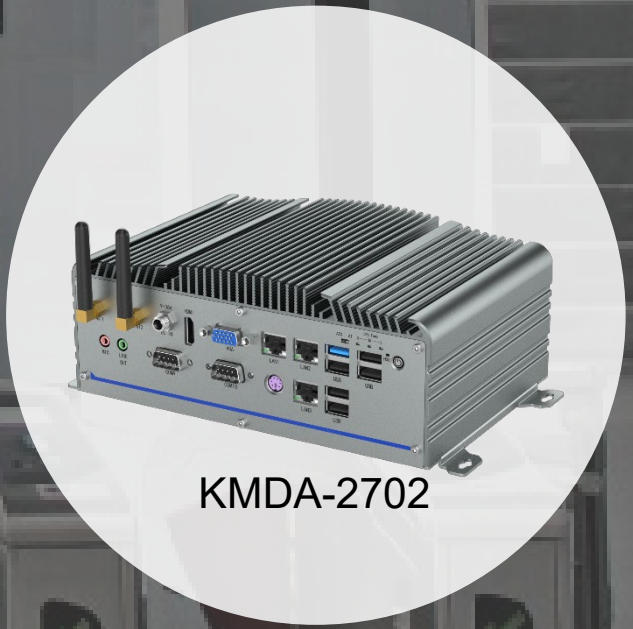
Solution&Application

3

ITS-- Rail Transit System

AFC System

Automated Fare Collection System



KMDA-2702

AFC

Automated Fare Collection System is an automation system based on computer, communication, network, automatic control and other technologies to realize the whole process of ticket sales, ticket checking, billing, charging, statistics, clearing and management. It is widely used in urban subways and light rails. In the field of public tolls such as intercity railways, in recent years, a new generation of AFC solutions, innovative application and diversified payment, have been successfully used in major urban rail transit projects.

Application Requirements

- High reliability and could work stably for a long time
- Rugged design, good thermal design, with wide operating temperature range
- Multiple COM interfaces that can communicate with multiple gate channels simultaneously

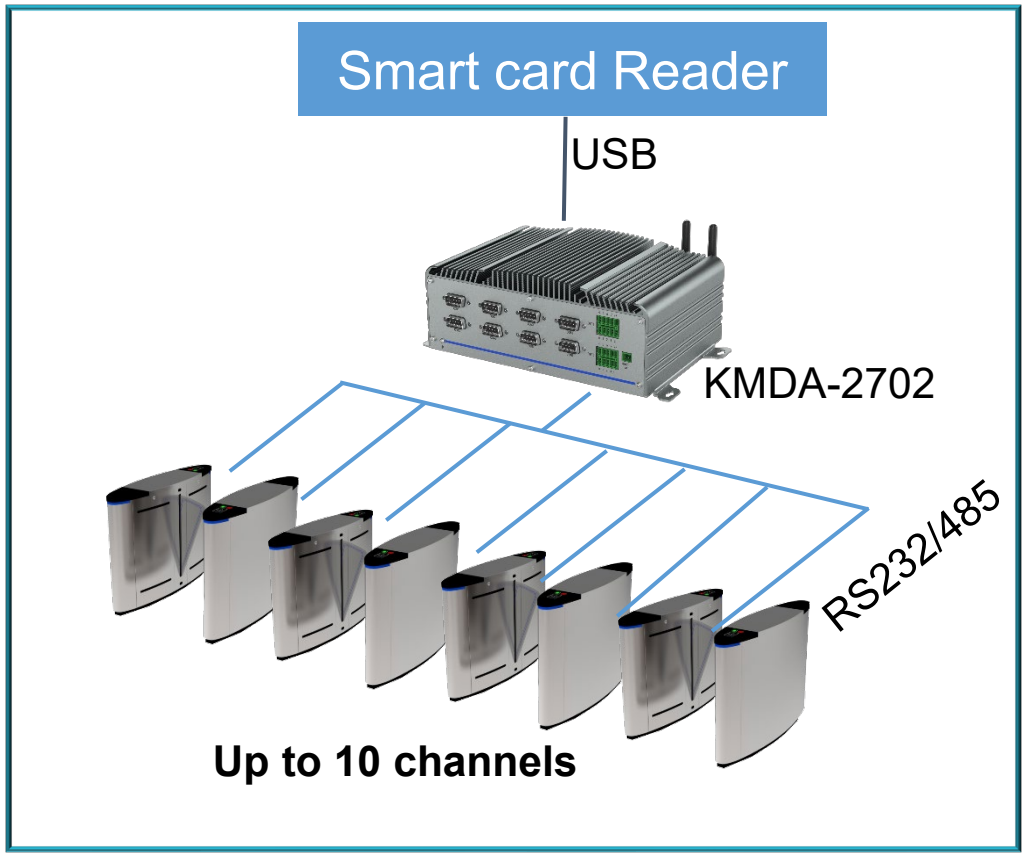
JHCTECH Solutions

- KMDA-2702 uses industrial grade components, it has high stability and can uninterrupted work for 7*24h.
- The special thermal design, fanless design, support a wide operating Temp. range(-20~70℃)
- KMDA-2702 support up to 10*COM, could meet the needs of most automatic fare collection system

KMDA-2702 Specifications

- Intel® Celeron J1900 CPU, 4cores, 4threads
- DDR3L 1333MHz，up to 8GB
- 3*LAN, 7*USB, 10*COM, 16-bit DIO
- DC 9~36V

Application Topology



Rail Vehicle Applcation

- Passenger Information Systems (PIS)
- Closed-Circuit Television (CCTV)
- Driver Machine Interface (DMI)
- Media and Entertainment Systems (MES)
- Vehicle monitoring and diagnosis system

PIS---Passenger Information System

数据库服务器
Database Server

有线和无线交换机
Switch

WIFI+LAN

SIGM-2650

SIGM-3250

Display

Broadcast

A service system that provides passengers with various types of information in the train. Under normal circumstances, the passenger information system provides real-time dynamic multimedia information such as travel instructions and train schedules. The on-board PIS system provides audio broadcasting platform, video program broadcasting platform, emergency alarm, warning platform and emergency call platform for passengers and the central control room; it is composed of PA broadcasting system, on-board video system, and intelligent video monitoring system.

SIGM-2650

Harbin Metro Line 1 PIS System

The Harbin Metro PIS passenger information system project uses JHCTECH SIGM-2650/S002 products as the main control of the play control system.

Monitoring And Diagnosis System

Sensor

IP Camera

DAQ

WIFI+LAN

Database Server

Switch

Computer

Intelligent analysis of the hardware equipment of the whole vehicle, troubleshooting of hardware abnormalities during the operation of rail transit vehicles, instead of manual point-to-point detection, all the investigation data are uploaded to the ground central control room in real time, so as to ensure that the abnormal hardware equipment can be quickly solved.

SIGM-3250

Maglev Train Health Inspection

The maglev train inspection project uses JHCTECH SIGM-3250 product as the track health monitoring and inspection detector.

SIGM-3250 collects the information collected by the acquisition module installed on the train, and analyzes the collected results through the software pre-installed on the SIGM-3250; then connects to the external network through a 4G router to communicate with the management center. The physical computer sends the collected and analyzed data to the management center to realize the monitoring of the train hardware system.

Sensor

Camera

Collector

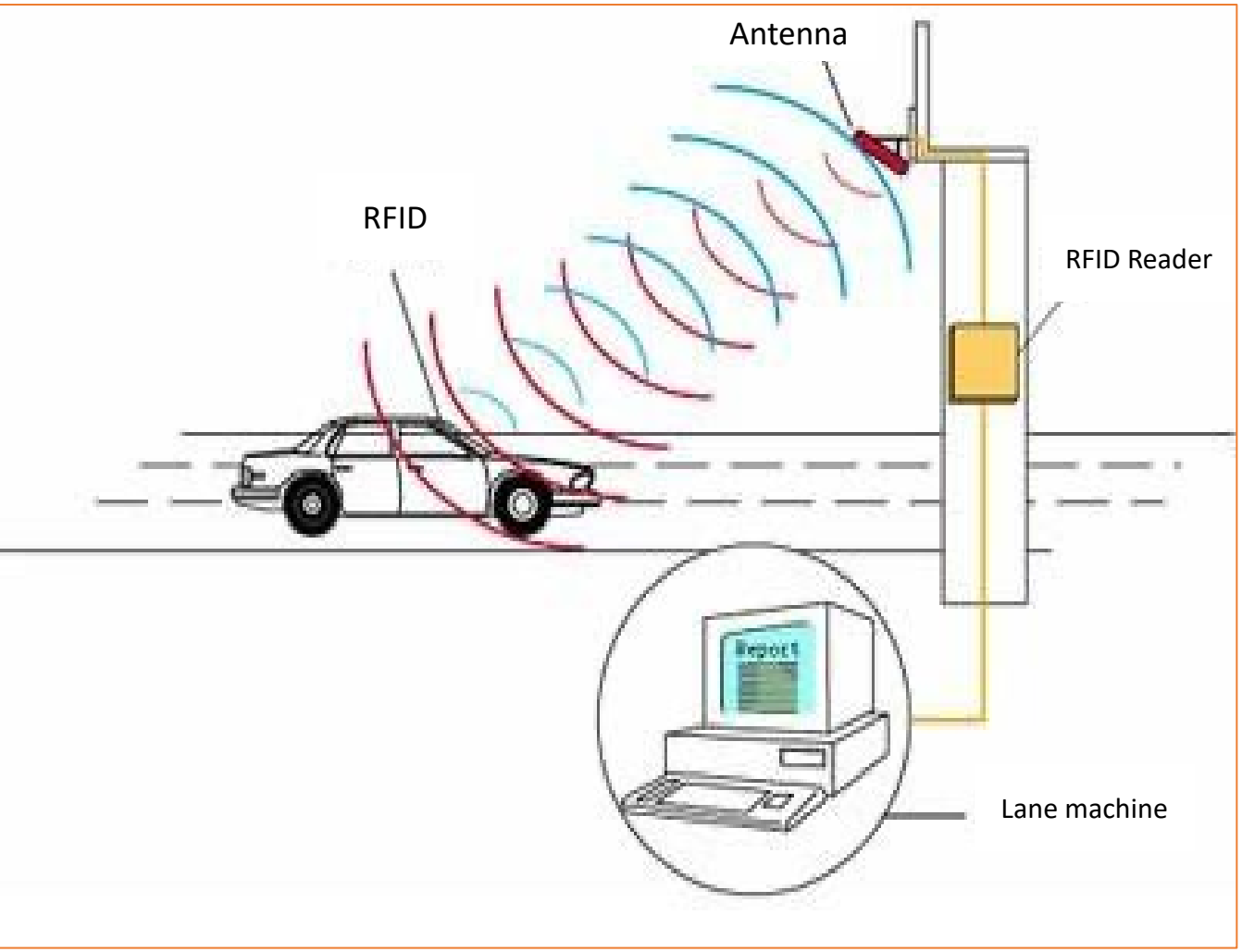
SIGM-3250

Wifi+LAN

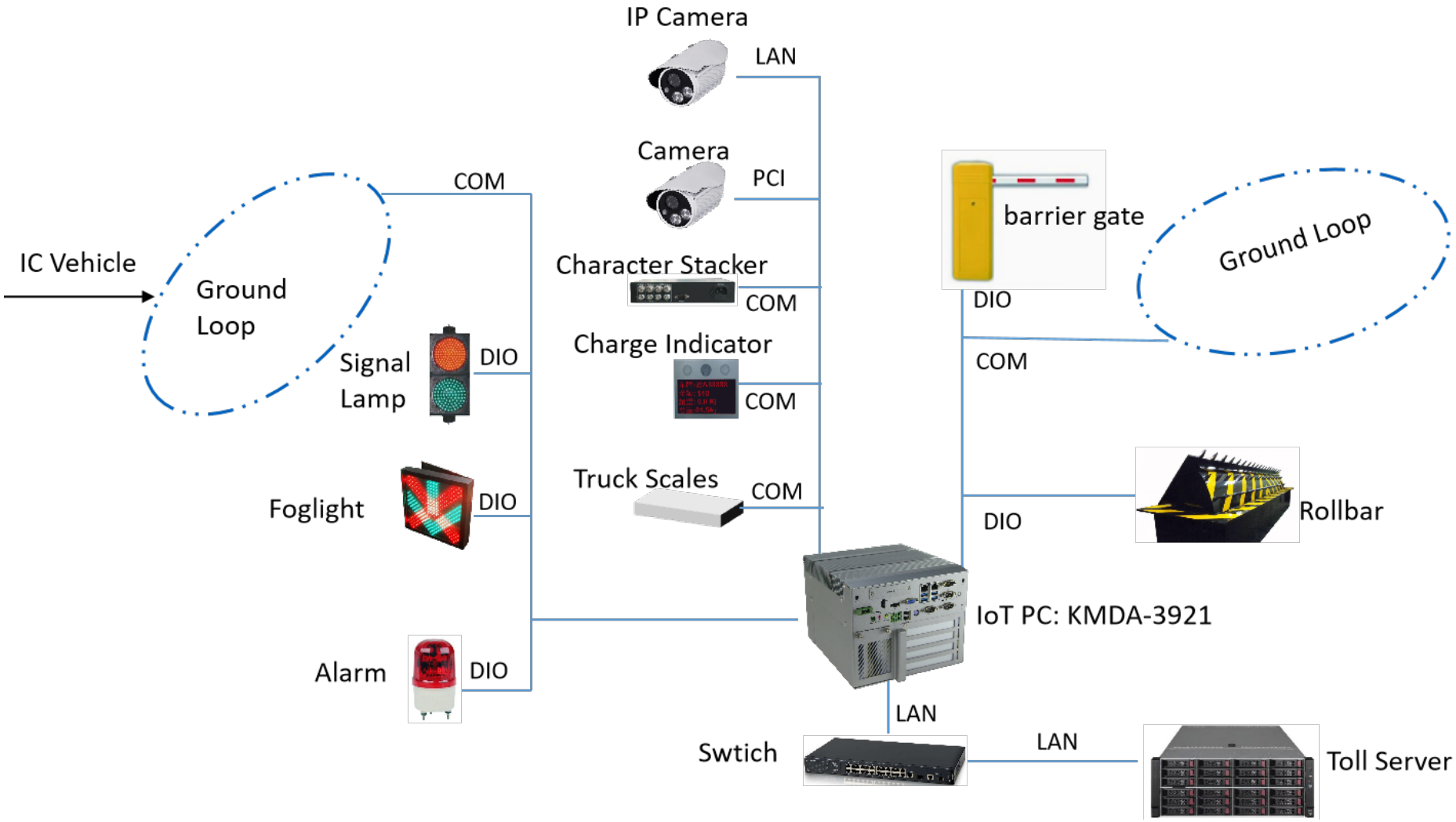
Control Center

4 ITS– Electronic Tolling System

Electronic Toll Collection System



Anti-Shock Moisture-proof Dustproof Wide operatio temperature	7*24 hours non-stop
Multiple OS Easy for maintenance	Extensible PCI slot



ETC/MTC Mixed Lane
KMDA-3921

ETC Lane Controller

KMDA-3921/S001

i3-6100 2C/4T 3.7GHz

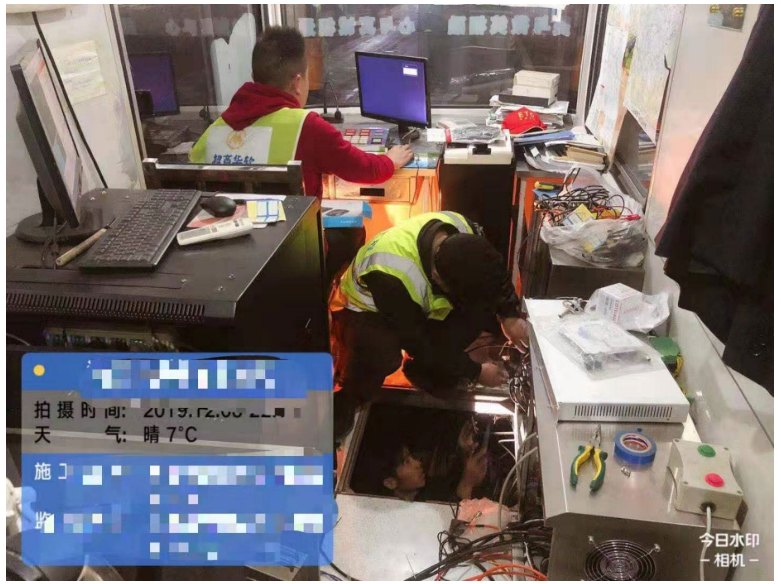
8G DDR4，128G SSD+1T HDD

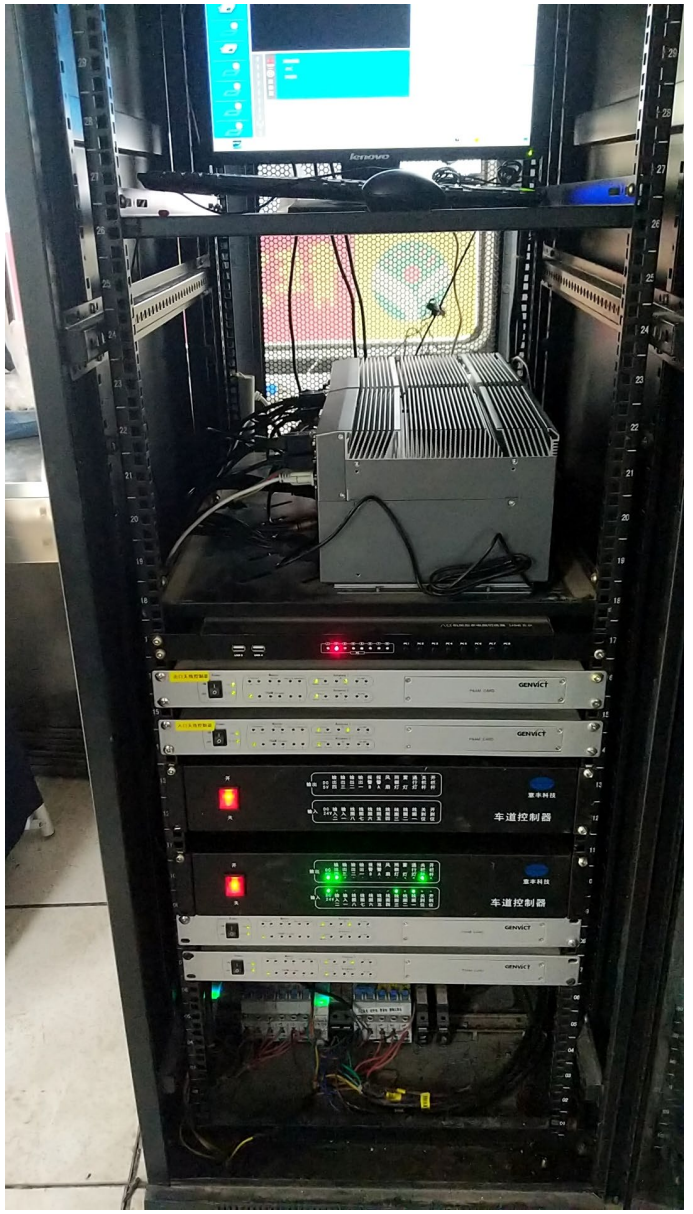
ETC Lane Controller

KMDA-3921/S001

i3-6100 2C/4T 3.7GHz

8G DDR4，128G SSD+1T HDD





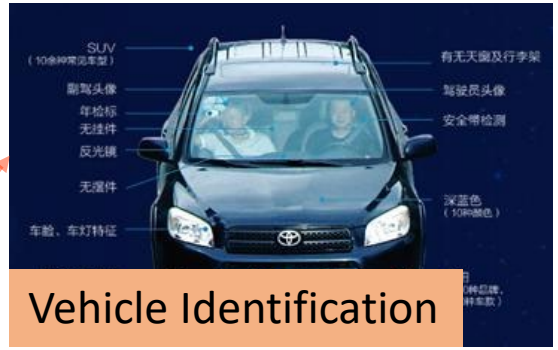
Intelligent Toll Inspection System

Status and Problems

There is a lack of effective technical means to identify and collect information on illegal vehicles (such as modified, unlicensed, blocked, overweight, over-aged, etc.). And upload the collected data to the database for comparison, classification and prediction, so it is hard to improve the efficiency and accuracy of highway toll audit. How to realize “Accurate feature recognition and accurate vehicle type matching” by fusing car face recognition and body feature data, and from "Artificial Toll Audit" to "Intelligent Big Data Toll Audit“?

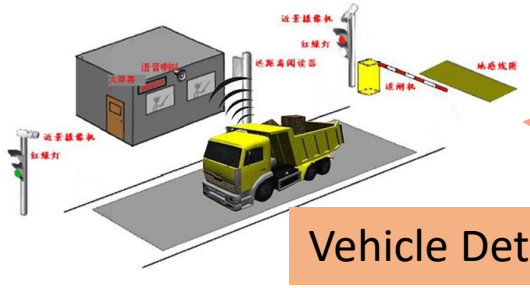
License Plate Recognition


Blazed Grating



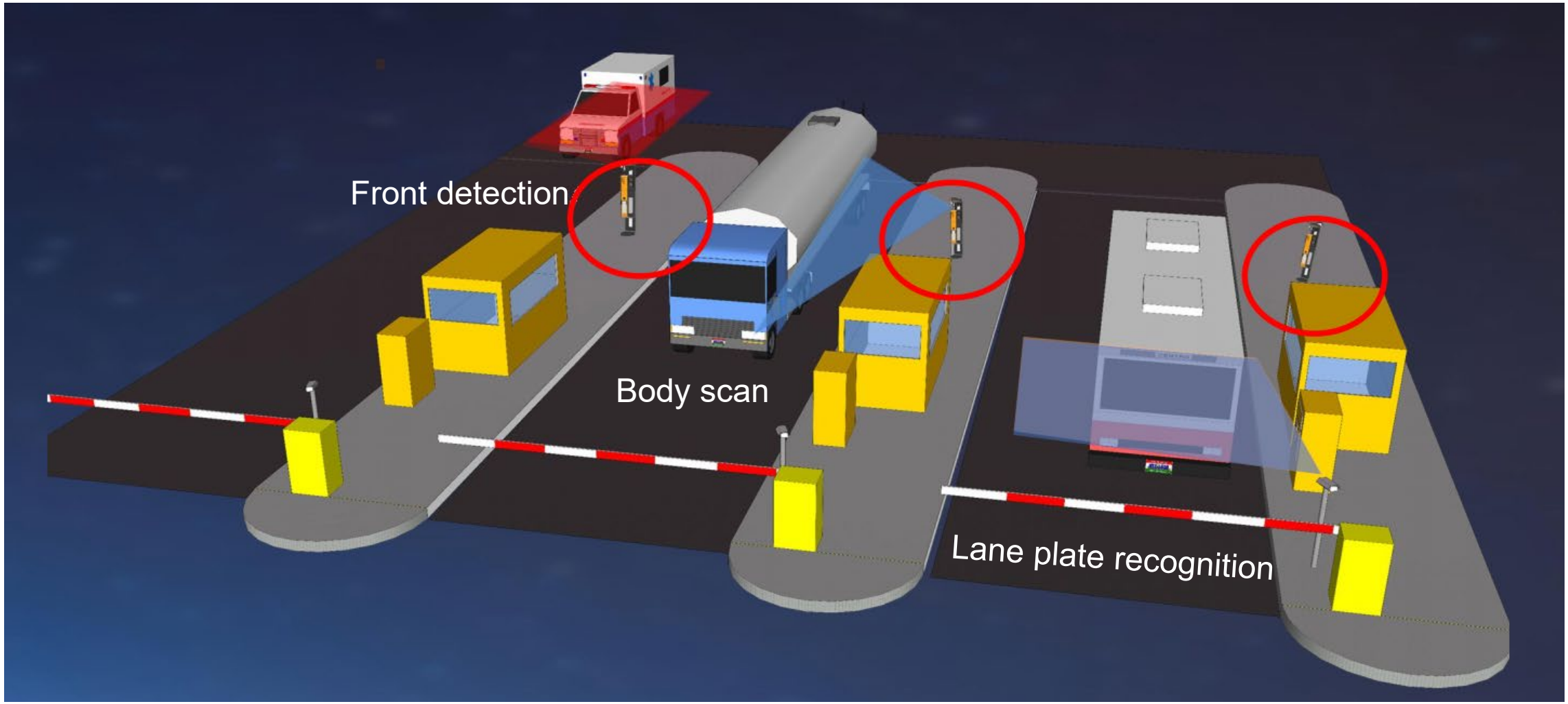
Vehicle Identification

Lack of vehicle identification, information acquisition technology

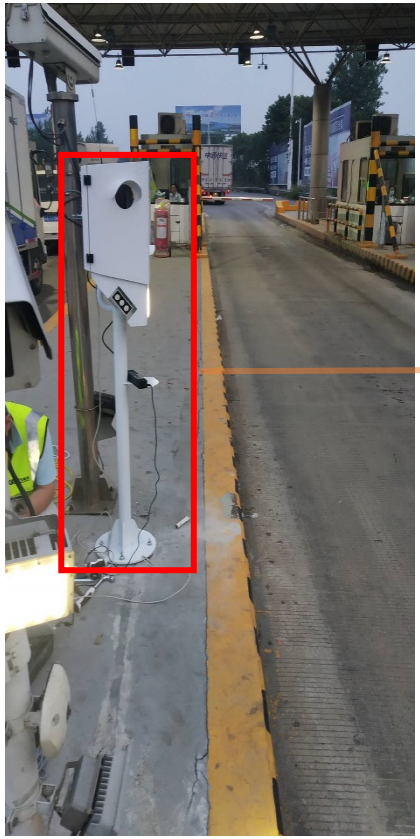

Vehicle Detect


License Plate Matching

Solution Model



Hardware System

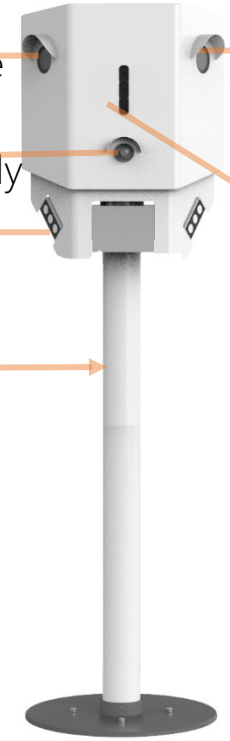


A camera to captures car's face

A camera to captures car's body

Fill light

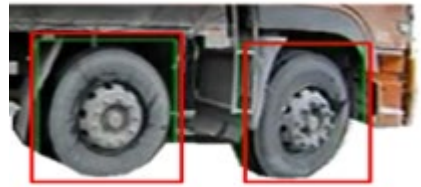
A camera to captures the rear of a car



Road toll inspection system integrated machine

Edge computer integrated Intel VPU

Car face information



Body and tail feature information

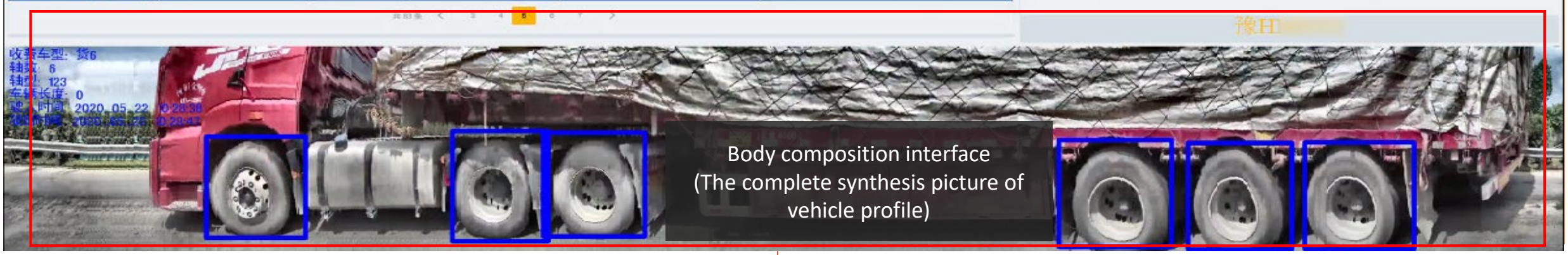
Integrated intelligent Camera, parallel VPU compute and IoT, complete vehicle model recognition, solve technical problem such as abnormal vehicle supervision, charge data inspection and etc.

Software System

At short range of less than 1 meter from vehicle, use multi-frame image feature fusion and depth feature match technology, to adopt picture from overlong vehicle, then restore vehicle image and extract feature vector.

Vehicle information feedback interface

Vehicle traffic video interface



Body composition interface
(The complete synthesis picture of vehicle profile)

Overall Structure

Lane front subsystem

Front lane toll
AI identification

Service area
in/out vehicle AI
identification

Lane capture
image

Section front subsystem

AI edge computer

Car face snapshot

ETC virtual station
snapshot

Service area car face
snapshot

Section center subsystem

A road center
AI host

B road center
AI host

C road center
AI host

N road center
AI host

Provincial network center subsystem

A provincial center
AI recognition

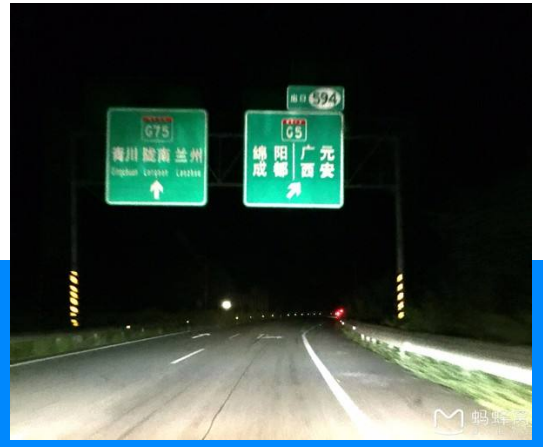
N provincial center
AI recognition

Provincial audit platform
application server

JHCTECH

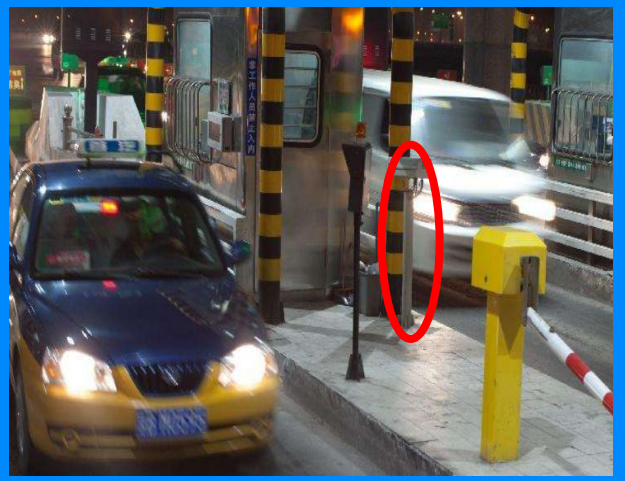
Application Case

G5 Guangyuan - Shaanxi Road toll station



G80 Guangdong-guangxi Junction road toll station

G15 Guangdong-west Expressway toll station



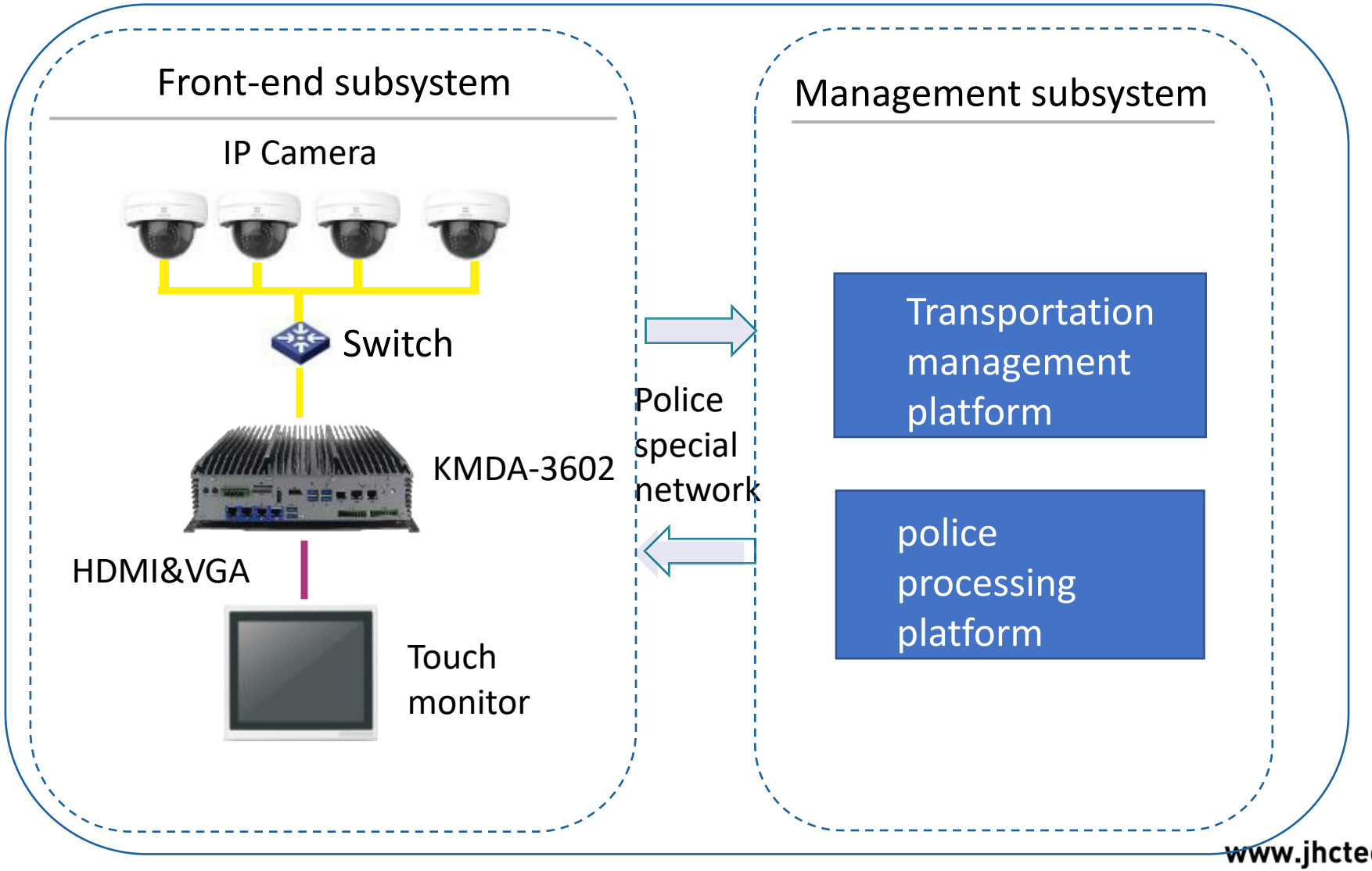
intel IoT Solutions Alliance

5

Smart Traffic Security

As smart cities evolve in urban areas around the world, smart security can play a powerful role in improving quality of life and the safety of our societies. Technologies such as Mobile Enforcement System, facial recognition, and license plate reading are becoming more widely used to help ensure public safety.

Mobile Enforcement System



Police vehicle/police motorcycle mobile patrol monitoring system

The system uses high-definition camera shooting, computer forensics and computer technology, can be in the process of patrol, easy to road vehicles illegal forensics, once found illegal vehicles, you can capture forensics, easy to follow up processing.

Panorama: KMDA-3602 comes with 4-8 POE network ports, and can be connected with up to 8 cameras, which can realize multi-directional capture.

Mobile: high expansion capability of communication interface, wireless 4G/LTE and GPS communication support, can achieve wireless communication.

Police vehicle/police motorcycle mobile patrol monitoring system

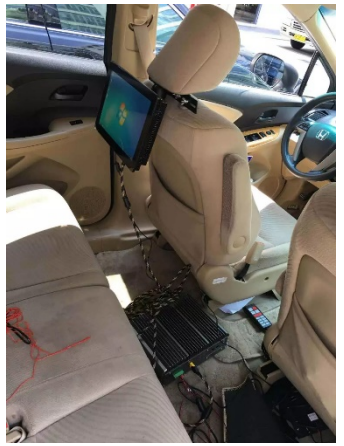
Take photos of illegal parking

- Snap pictures when vehicle line pressure lane change
- Illegal trespass on a bus lane
- snap pictures when motor vehicles do not allow pedestrians
- Snap pictures when driving out of a lane
- Bayonet function (blacklist detection)

System function

- Scene law enforcement video recording function
- Automatic identification of vehicle license plate number
- Snap pictures when Illegal trespass on a non-motorized lane
- Full view page view and video recording function

Police vehicle integrated patrol law enforcement system



Used Environment: Highways, Urban roads, etc.

Features: Mobility, flexibility and adaptability

Smart Security-- Gateway Access for Video Surveillance

Technical requirement

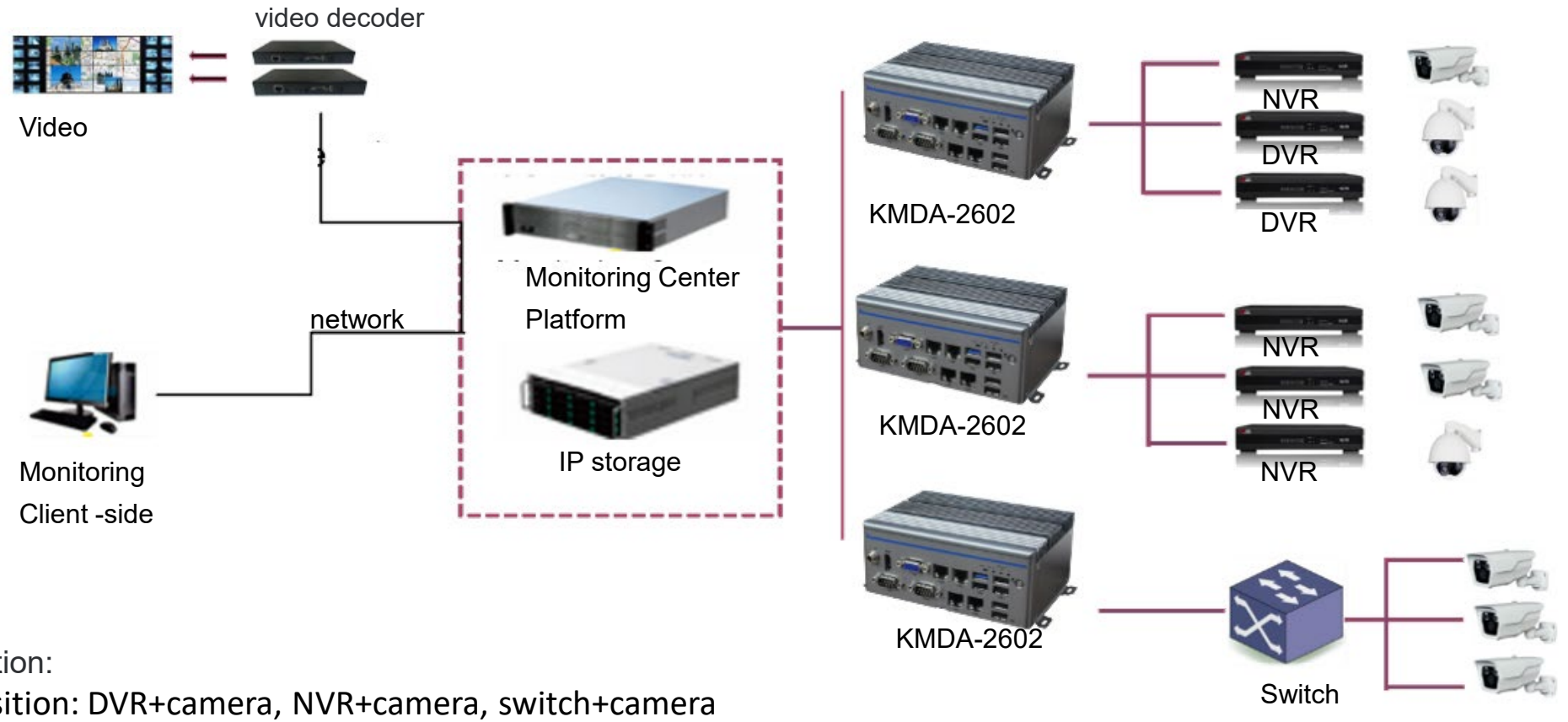
- Support multiple video stream protocol conversion (H.264/H.265/mpeg2/mpeg4, etc）
- Transcode multiple videos at the same time
- The network bandwidth can support the concurrent transmission of multiple channels of video
- High energy efficiency ratio, adapt to different site installation requirements


KMDA-2602

Gateway Access Hardware Solution: **Low power consumption, high reliability, long-term operation, multi-channel transcoding processing capability, dual gigabit network bandwidth, economical embedded computer.**

Smart Security– Gateway Access for Video Surveillance

Topography



System Composition:

1） Video acquisition: DVR+camera, NVR+camera, switch+camera

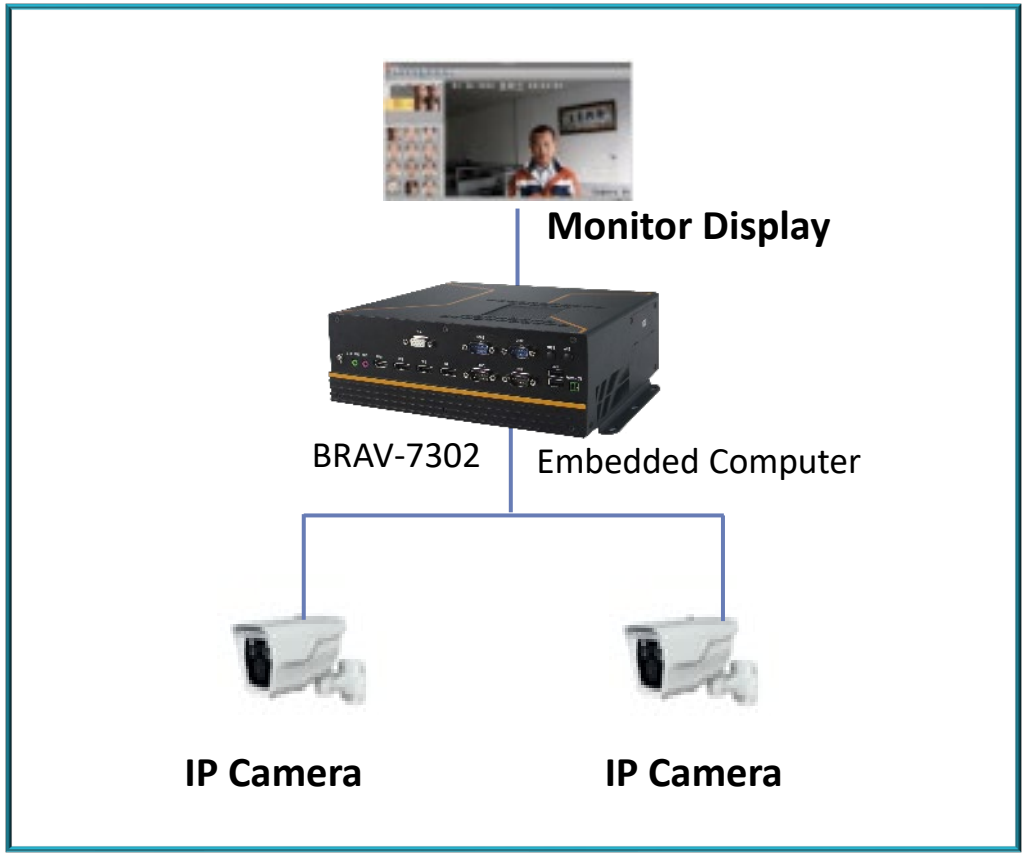
2）Access to transmit: Gateway access for video surveillance（KMDA-2602 Embedded Box PC）;

3）Transmit Network: Police video private network, city management video private network Community Video LAN;

4）Monitoring Center： Department CCTV、Districts CCTV and City CCTV。

Smart Security– Facial Recognition Capture System

Topography



Through the network digital camera and the face recognition capture system to realize the capture and display of the face recognition at the entrance and exit of the community or other vital areas. The captured face pictures are associated with the video recording, so that the video can be played back when querying face capture records.

Main Modules:

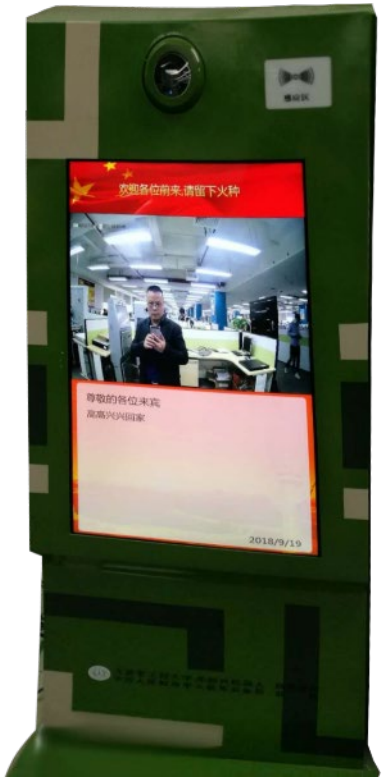
- Face capture and tracking
- ace recognition and comparison
- Face modeling and retrieval
- Real person identification and image quality detection

Smart Security– Facial Recognition Access Control

System Composition

- **Large size Front Display**, get access to personnel identification results
- **Rear Touch Screen**, the guard can view real-time video and identify the results
- **ID card reader**, support face ID card authentication, face recognition camera, built-in speakers
- **BRAV-7302 Embedded PC,** realize face analysis, comparison, recording, storage, alarm, video recording and other functions

Application scenario



Smart Security– Facial Recognition Access Control

Features

- Personnel face video detection, capture, recognition, alarm notification and other functions
- Support the integration of face and ID card authentication
- All-in-one system supports offline work
- The face database can be imported in batches

JHCTECH Advantages

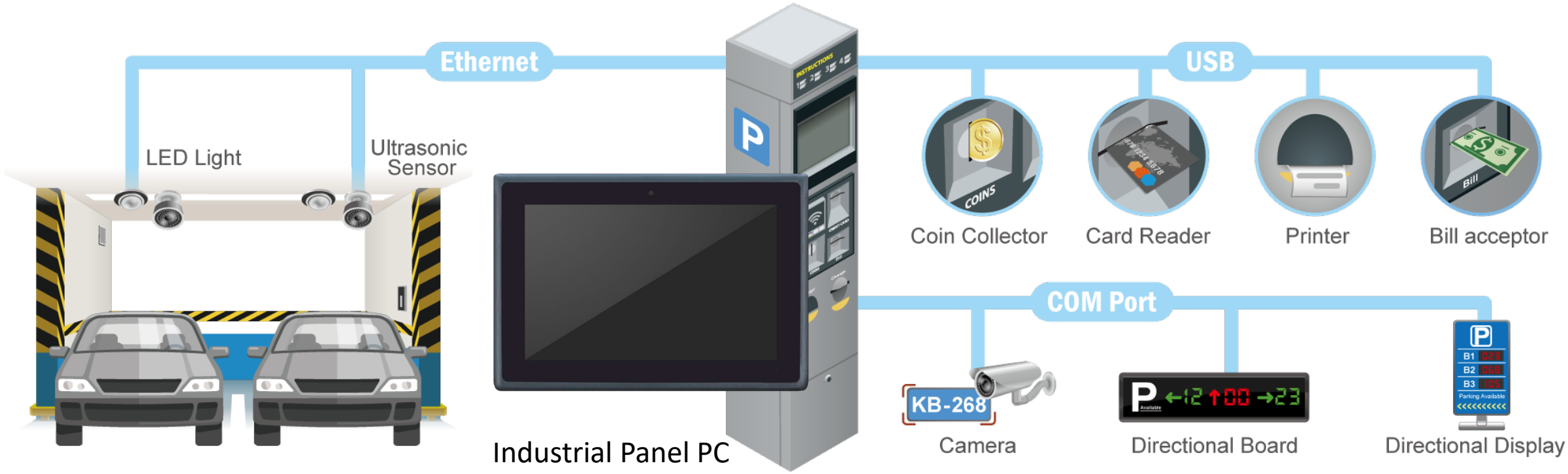
- The GPU+CPU AI architecture solution can accelerate the process of face recognition, analysis, and comparison, and the accuracy rate is very high;
- 2*HDD/SSD, a storage disk for face capture and a storage disk for video recording, which is convenient for data management
- Compared with servers, this solution has low power consumption and compact size, which is suitable for more flexible and narrow installation environments
- The industrial computers support DC wide-voltage power input, and have high stability and reliability.

Intelligent Parking System

Main Features

- Compact size, ideal solution for payment kiosk.
- DIO for barrier control.
- Economy cost and flexible installation.

Application Scenarios



Stay in Touch

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