

EDGE X FOUNDRY™

Vertical Solutions Working Group

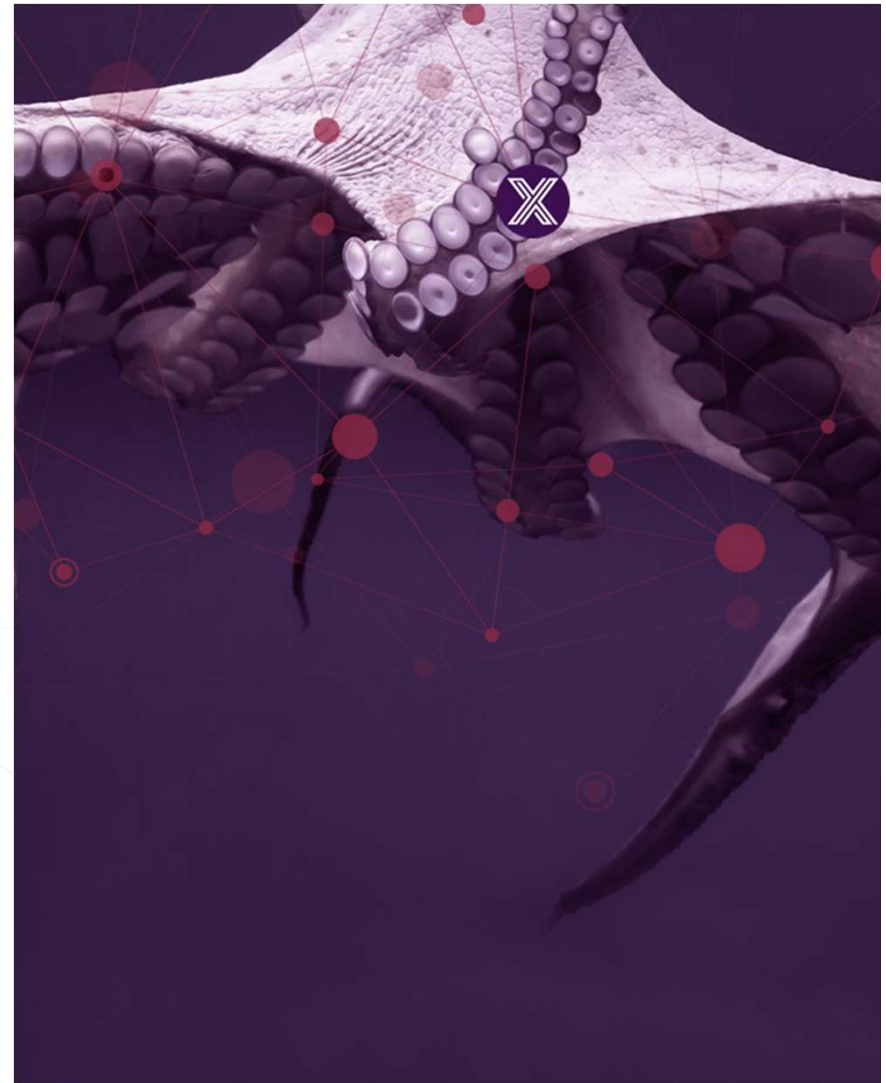
July 14, 2020

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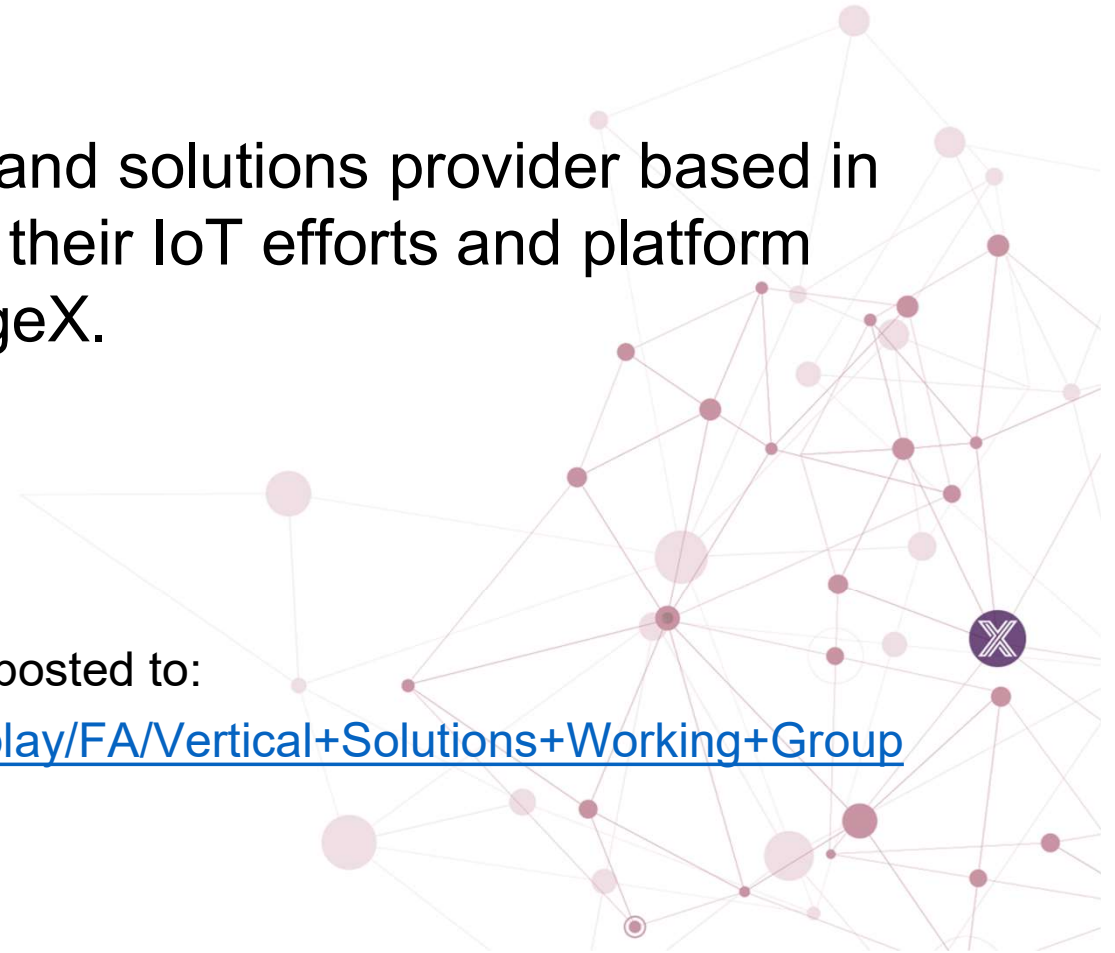
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Agenda

ThunderSoft, a product and solutions provider based in Beijing China, to present their IoT efforts and platform including their use of EdgeX.

Meeting recording & slides to be posted to:

<https://wiki.edgexfoundry.org/display/FA/Vertical+Solutions+Working+Group>



A decorative graphic on the left side of the slide, consisting of several overlapping, wavy, pinkish-red lines that curve from the bottom left towards the top left.

ThunderSoft in Edge Computing

2020.7

Content

- ❖ ThunderSoft Overview
- ❖ ThunderSoft & EdgeX
- ❖ Edge Computing Verticals

ThunderSoft Overview

ThunderSoft Overview



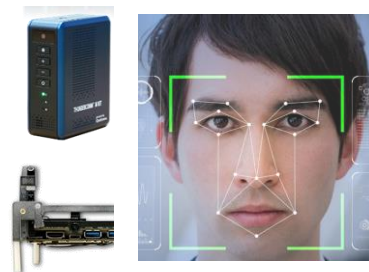
Company Profile

- Smart System Tech. Provider
- Founded in 2008
- IPO in 2015
- 6300+ Employees
- 90% Engineers
- Serves 1000+ Global Customers
- 20+ Cities Worldwide



Core Business

- **Smart Business Units**
 - Smart Mobile
 - Smart IoT
 - Smart Automotive
 - Smart Vision & AI
- **Full System Coverage**
 - Device – OS, Camera, Security, AI, Connectivity, Audio, Graphics...
 - Edge – Microservices, Docker...
 - Cloud – FOTA, MDM, MAM ...



Tech & Products

Vision
Tuning, ISP, Camera Stack Customization, Algorithm, Depth Camera, Multi-camera, HDR ...

SoM
Turbox 850, Turbox 625, Turbox 410, Turbox 9206, AI Kit, IP Camera

AI
Model Design, Algorithm Optimization, Data Training, Data Labeling, Benchmarking

Security
TEE, Authentication, Encryption, System Hardening, FOTA, Device Management,



Global Presence

- **Business Cooperation**
- **Technology Collaboration**
- **Global Tech. Centers**
 U.S. Korea Japan India
 Malaysia
 Finland Bulgaria ...

Where are we from?

Smart System Service & Technology Provider



AI & Vision



Smart IoT



Smart Vehicle

Smart System



2008	2009	2010	2011	2013	2014	2015	2016	2017	2018
founded	Japan branch	Qualcomm Smartbook	Qualcomm Joint Lab	Intel/MS Joint Lab	JV with Intel	JV with ARM	JV with Qualcomm	TurboX SoM & OS	IoT Scaling
NEC 红旗 Linux		Investment from Qualcomm, ARM, Spreadtrum, NL	Spreadtrum Joint lab	Camera Turn-key	H5OS Security	IPO 300496	Rightware Acquisition	MM Solution Acquisition	AI Dev Kit
									India/Malaysia Branch



Smart Phone Business Overview



Global Customers

- OEM, ODM, Carriers, Internet Vendors, Startups
- Serves customers worldwide
- Flexible business and development model



One Stop Services

- Joint Lab with Qualcomm
- System Bring-up, Customization, Upgrading, Tuning & Optimization
- Kernel/Driver/FW/App/Cloud Development, System Validation



Turn-key Solutions

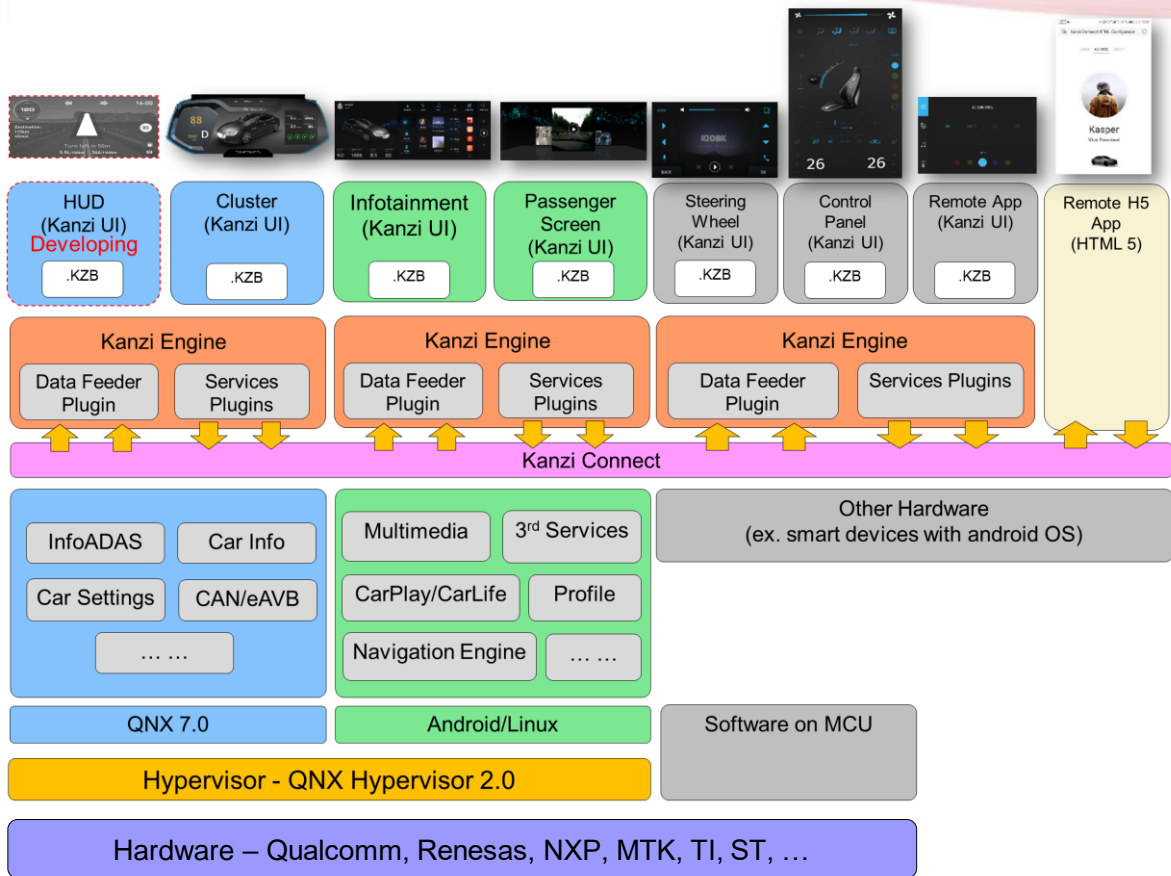
- 1st Tablet & QRD for Qualcomm
- Solution Smartphone, Tablet, Feature Phone
- Turn-key Solution for Camera, Security, Carrier Certification, Auto Test Tools



Differentiation Technology

- Dual-screen Phone, Secure Phone, Industrial Tablet, Module Phone...
- Optimization, Algorithms, Security, Linux OS, Multi-camera

Smart Automotive Overview



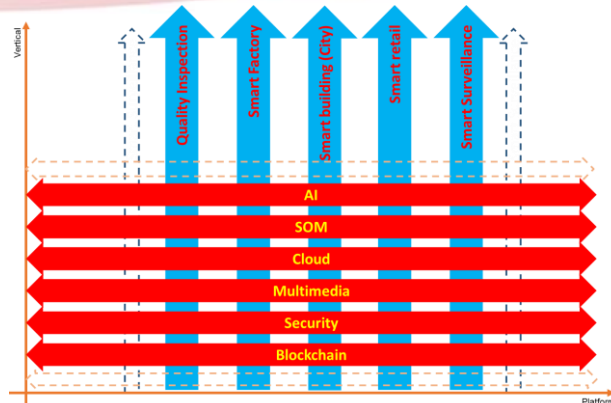
车厂

Tier-1

芯片

合作伙伴

Smart IoT Business Overview



ThunderSoft & EdgeX

Edge Product & Technology Overview

Edge Product & Solution

Solution				
	Smart Industry	Smart City	Smart	Smart Automobile
Device				
	AI Kit	Edge Box	Robotics Kit(RB3)	Robotics Kit(RB5)
SOM				

Edge Technology

Cloud		FOTA, MDM
AI on Device		Face Detection, Face Recognition, Motion Detection.....
Middleware		Device Virtualization, Microservices, Edge Streaming Framework
OS		

Global Customers

Edge Box Product



Carrier Cloud Device Integrator Device

E2E Solution

Smart Home	Distribution Station	Distribution Station	Street Light	Smart Home

Ecosystem

Edge Ecosystem With Cloud Vendor

Edge Ecosystem With Open Source Organization

AI/Edge Kit



TurboX AI Kit



AI Algorithms



AI Devices

Azure IoT 认证设备目录

浏览设备
认证设备和初学者套件

TurboX

成为合作伙伴 | 了解详细信息

2 找到的结果 用于 "TurboX"

- IoT Plug and Play
- Microsoft Azure IoT 初学者套件
- Azure IoT Edge
- 芯片制造商
- 云协议
- 连接器

Thundercomm TurboX AI KIT
By: Thunder Software Technology Co., Ltd.

TurboX Edge Kit
By: Thunder Software Technology Co., Ltd.

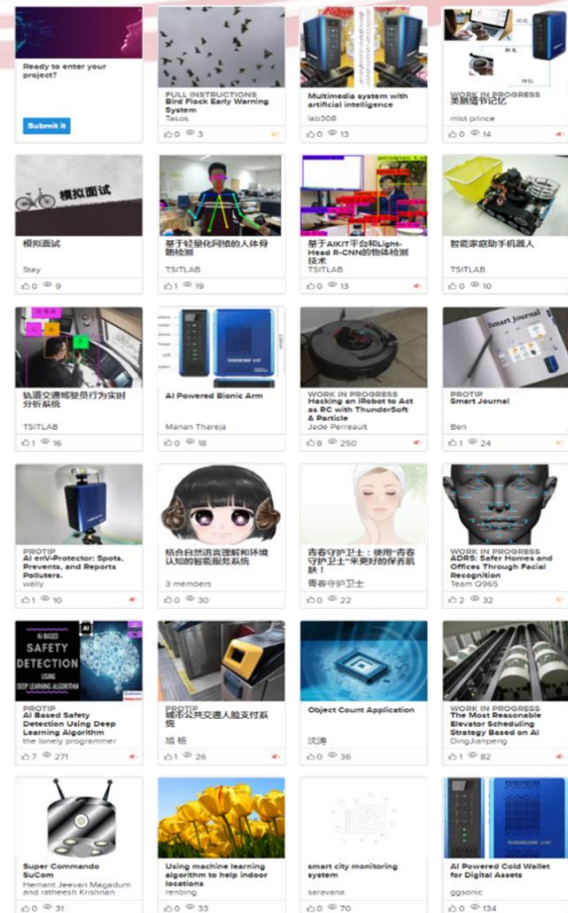
Cloud Ready



TurboX Edge Kit



AI Solutions



AI Community



OS Support



Powerful On-device AI Performance



Full Camera Stack



Rich AI Tools



AI Turnkey Solutions

TurboX Edge Platform based on EdgeX

Key Features:

Cross Platform

Support Android, Linux.

Microservices

Based on containerized technology to be more manageable, extensible, and portable.

Real-time Processing

Optimization for multi-camera real-time video processing.

Security

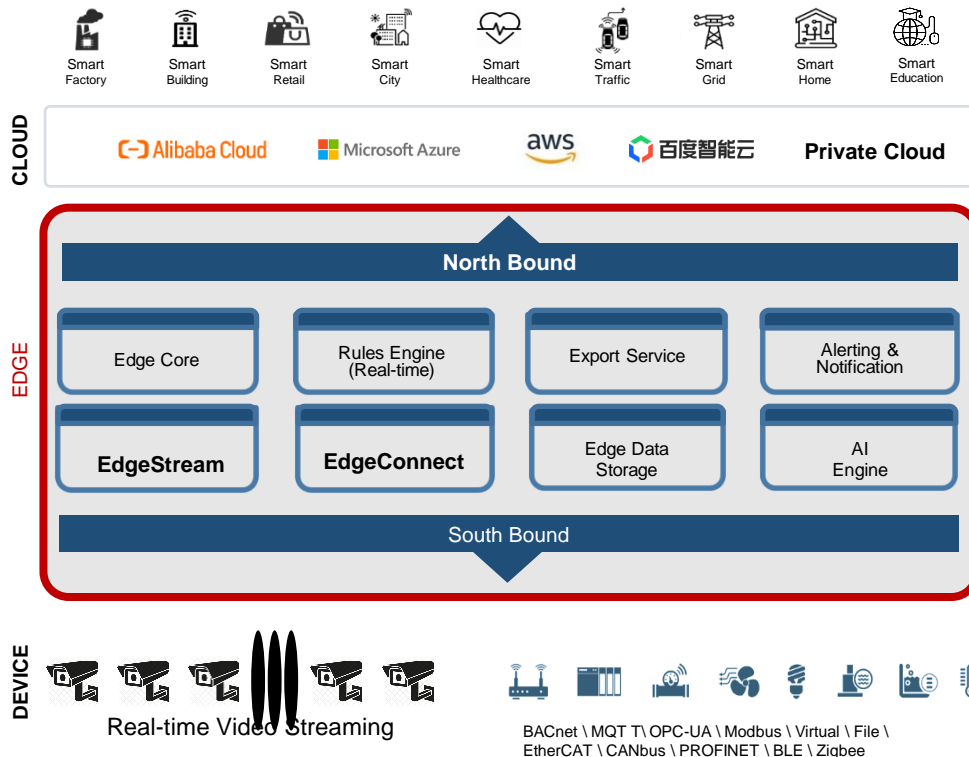
Provide system isolation, full -disk encryption, code protection functions.

Integrating Mainstream Cloud Services

AWS/MS Azure/Ali Yun/Baidu.

E2E Solution

Provide multiple Edge-Cloud solutions such as device management, FOTA, container management, etc.



EdgeX Engagements

• EdgeX Feature Enhancements

- ROS support
- ONVIF support
- More sensor/protocol support
- Cloud support
 - Pre-integrated cloud service SDK, including AWS Greengrass, MS Azure IoT, Ali Yun linkvision.
 - Support private deployment
 - Data caching on the edge side.
- Device Virtualization

• Ecosystem Engagement & Support



EdgeX Challenges Contest



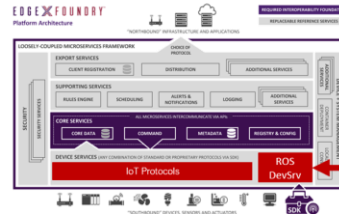
EdgeX China Project



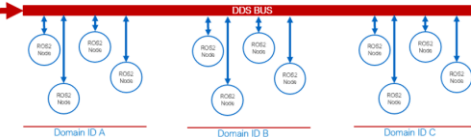
Edge Kits



ROS PoC & Solutions



ROS on EdgeX



Future Collaboration Areas

- ❖ Feature Enhancements
 - ▶ More sensor/protocol support
- ❖ Middleware Integration
 - ▶ ROS support
 - ▶ ONVIF support
- ❖ New Middleware Feature
 - ▶ Device Virtualization
 - ▶ Multimedia Framework support
- ❖ Cloud support
 - ▶ Pre-integrated cloud service SDK, including AWS Greengrass, MS Azure IoT, Ali Yun linkvision.
 - ▶ Support private deployment
 - ▶ Data caching on the edge side.
- ❖ “EdgeX+” Programs



EdgeX Enabling

Documentation, Demo, Tech Support



EdgeX Development Kit



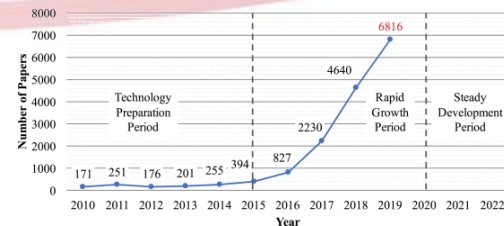
Enabling Vertical Adoptions

Edge Computing Verticals

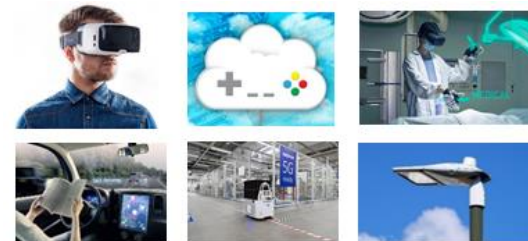


Perspective of the Edge Computing Market

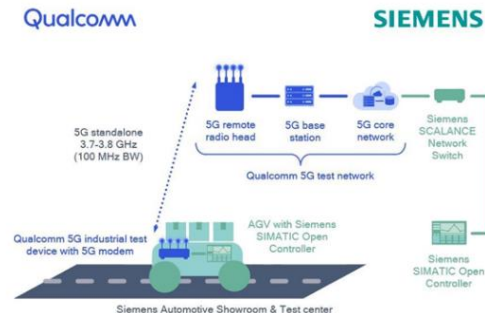
- ❖ Edge market is emerging.
 - ▶ Smart city, Industrial, Automotive, Robotics are the leading verticals.
 - ▶ More PoCs in smart home, smart office, healthcare, etc.
- ❖ Edge computing standardization process accelerates.
 - ▶ All (Alliance of Industrial Internet) is leading the effort with EdgeCross
- ❖ Both SoC and cloud companies are taking actions on Edge
- ❖ End2End Solution is something must-have for Edge.
 - ▶ Edge Technology => Edge Solution



of number of papers: Edge vs. AI



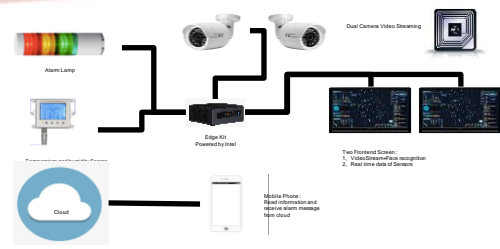
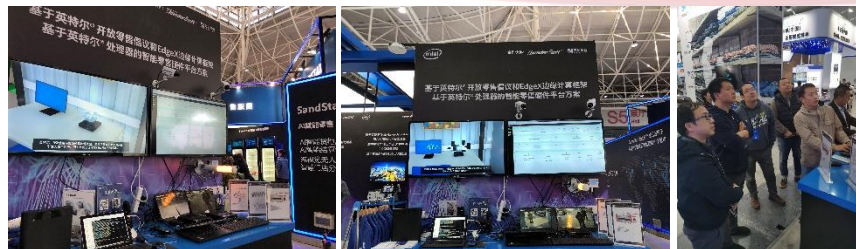
Adoptions driven by 5G, AI.



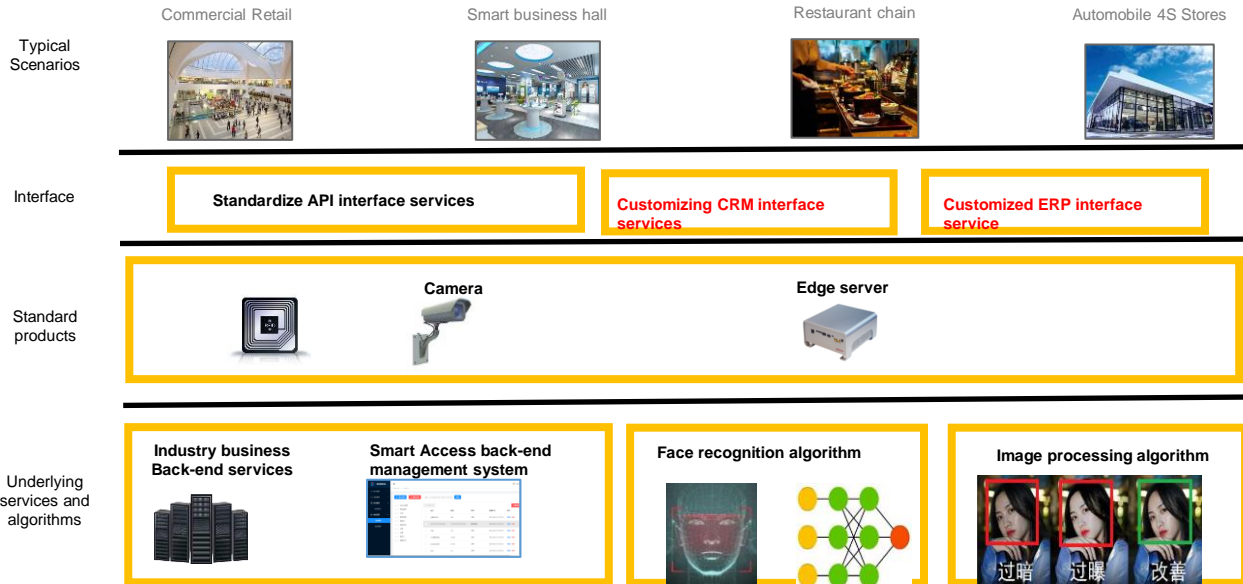
Transboundary Collaborations

Retail

China Shop Event DEMO



Smart Access Solution



Challenge

- The end-device fragmentation
- engineering capability and delivery ability of traditional SI are weak.
- The Edge-X original open source still requires a lot of R&D work and maintenance work from commercial deployment.

Solution

- AI enabled Rule Engine of Edge-X.Commercial Face ID Algorithm and VIP Management.
- On the South Bound, support 4channels 1080P@60fps decode.
- On the North Bound, support data access with mainstreaming cloud vendors, including Ali Yun, AWS, MS Azure, etc.
- Software-hardware integration end-to-end security solution, dual-validation device access mechanism.
- MDM (Mobile Device Management) and OTA services are added. Version management service for container mirroring is provided, based on Docker Compose.

Result

- Before ChinaShop Event, It took us just 1 day to connect to third-party vendors RFID sensor on Intel core I5 Platform.

Power Grid - Distribution Room Monitoring System

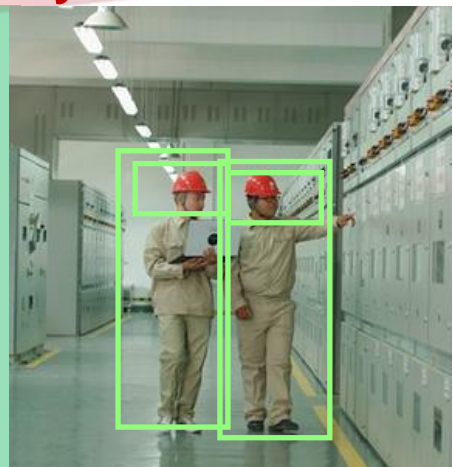
Use Case Description

Design an edge computing device in the power distribution room, with AI computing power, and multi-channel video processing capabilities, including authentication of the operator's identity and behavior Supervision, environmental awareness, illegal intrusion, etc. At the same time, the device collects data from other IoT sensors and devices in the power distribution room, and performs real-time monitoring and predictive maintenance.



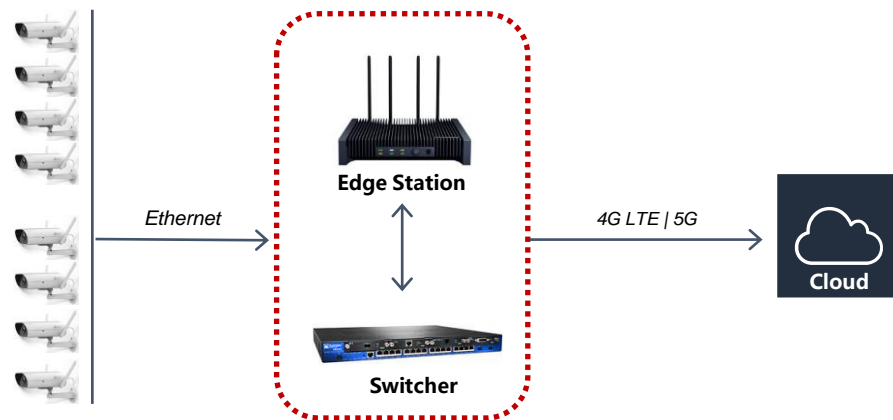
Application at Edge

- **Face recognition** - authentication of operators entering the power distribution room.
- **Human detection** - According to the requirements of the distribution room operation manual, two operators must be present at the operation site. One person operates, and the other person checks the operation process to ensure safety.
- **Safety helmet detection** - Operators must wear helmets and safety clothing when entering the distribution room
- **Distance detection** - the operator should keep a safe distance from the equipment during operation



Requirement

- With multi-channel video (16 ways) real-time analysis capabilities
- Support mainstream AI engine inference computing
- With multi-wired connectivity, Ethernet, industrial field bus, GPIO, etc.
- With 4G LTE / 5G network access.
- Meet the EMC standard of distribution room equipment



Smart Manufacturing

Challenge

- Efficiently improve the level of application intelligence in the industry

Solution

- Provide full-stack services such as devices, systems, algorithms, and optimizations.
- Simple solution, excellent performance, high reliability, high availability, high security, and scalability.

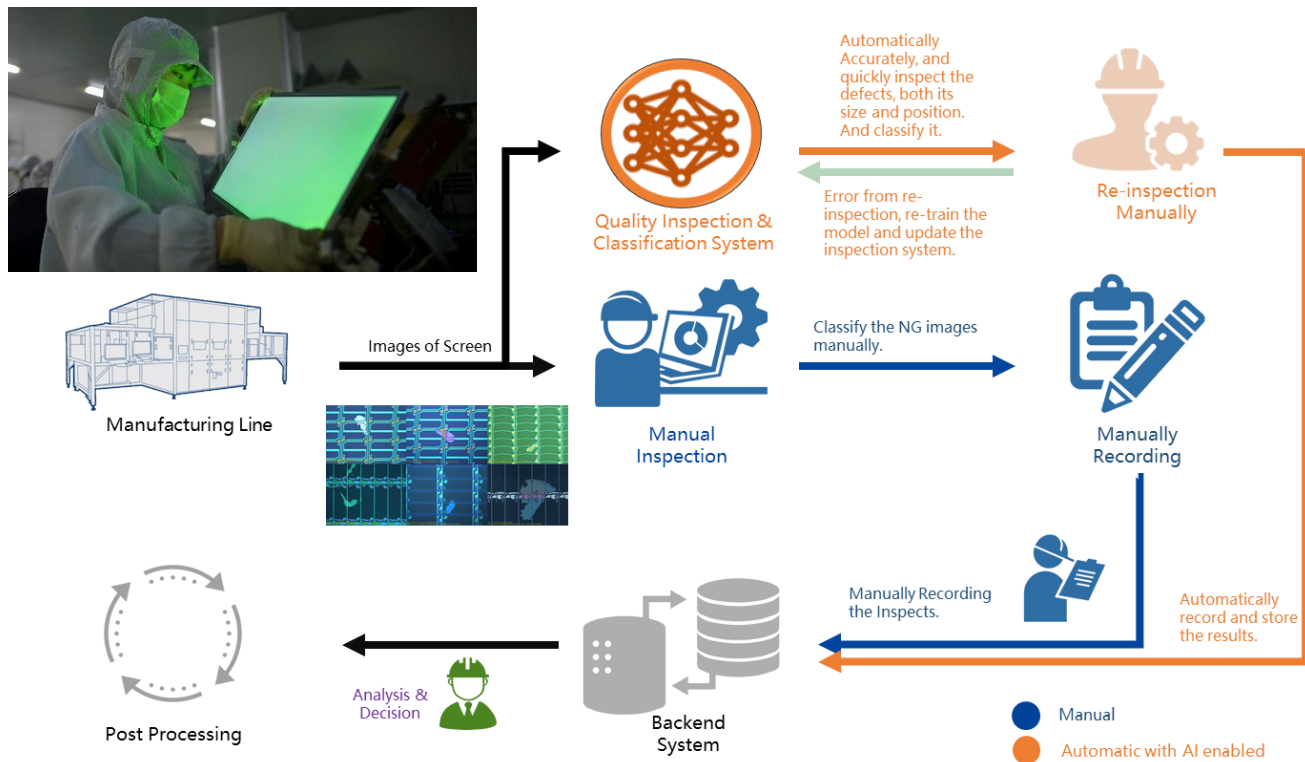
Result

- Detection time 1s/piece => 0.1s/piece.
- Detection accuracy 85% =>95%.

Retrospect

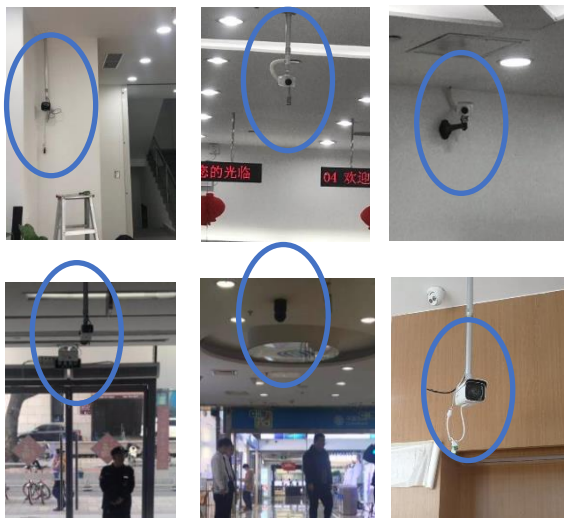
- Technology is not the key factor.
- The industry side cooperates with the technical side to establish a long-term and stable relationship.
- Iterative improvement.
- Intelligence Application is a system engineering.

All cloud or device side doesn't work, need hybrid.



Smart City/Office

- Connect to traditional IP Camera through Edge Kit for face detection, face recognition, VIP management and other applications.



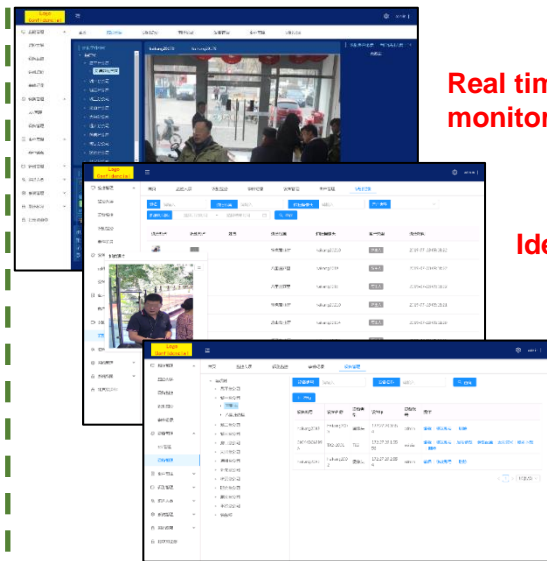
Face collection



Sales man client

Recognition result Pushed to the sales man's App

Customer details And recommended packages



Real time monitoring

Identification record

Device Management

Background management system

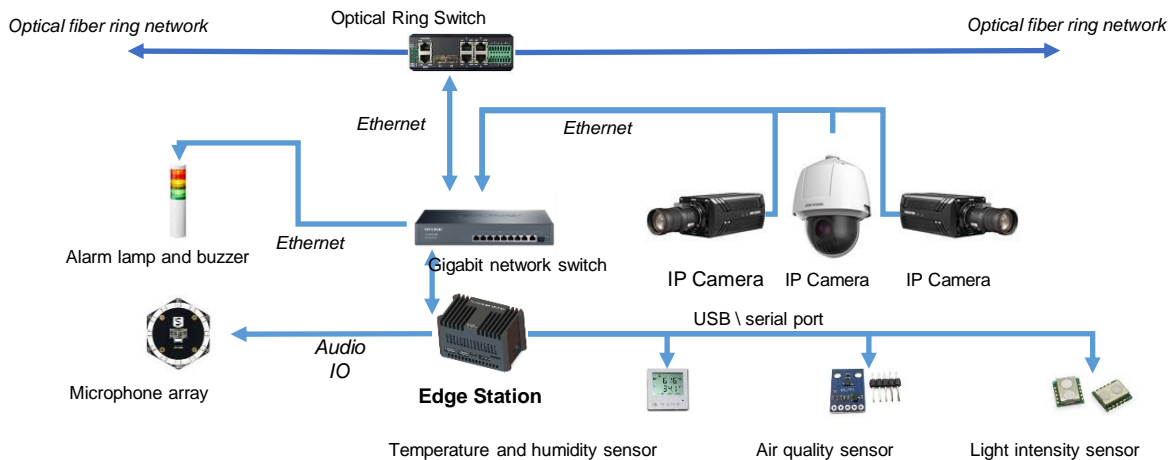
Smart Street Light

Use Case Description

The smart kit is installed on the 5G smart street lamp pole in a plug-in or embedded manner. Deployed on urban expressways, main roads, urban auxiliary roads and non-motor vehicle lanes. The Smart Kit can interoperate with industrial routers, smart gateway devices, fisheye panoramic cameras, high-definition fixed-focus cameras, smart lighting devices, and environmental sensors. With multi-channel video encoding and decoding and AI algorithm inferencing capabilities, it can realize the traffic status, surrounding events and road conditions.

Application at Edge

- Face recognition
- Flow statistics
- Traffic statistics
- License Plate Recognition
- Road condition recognition



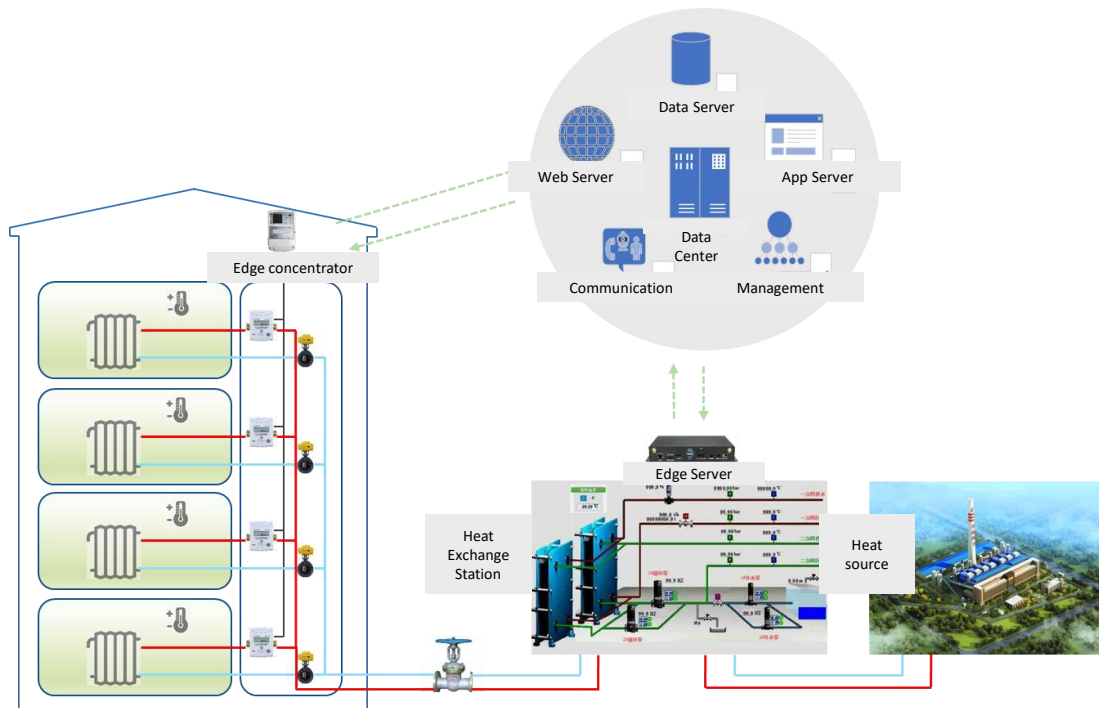
Smart Central Heating System

❖ TurboX Edge Platform

- ▶ Support Container
- ▶ Support Edge Middleware
- ▶ Support Real-time processing
- ▶ Support AI Inferencing

❖ Through the real-time collection, computing, and processing of heat exchange data to realize heat balance between heat station and user house.

- ▶ Real-time monitoring of temperature, flow and heat.
- ▶ Flow and heat monitoring of buildings or units.
- ▶ Heat balance algorithm for small flow, large temperature difference, and flow control.
- ▶ Big data analysis of digital diagnosis information such as water supply pipeline blockage, household water loss, pipe network aging, etc.



Robotics

- ❖ Sensor fusion
- ❖ SLAM
- ❖ AI camera
- ❖ 3D sensing



Robot is the Pearl of Edge Computing



Deliver Food

Sharship, Marvel, 云迹, Ali



Inventory Scanning

Fellow, Bossa Nova



Companion

Sony Aibo, LG, Samsung, Jibo, MIT



Commercial Cleaning

Braincorp, Softbank



Industrial Robot

FANUC, ABB



Home Robot

Amazon, iRobot,



Service Robot

Ubtech Cruzr



Logistics/Warehouse

Amazon, Ali, JD,

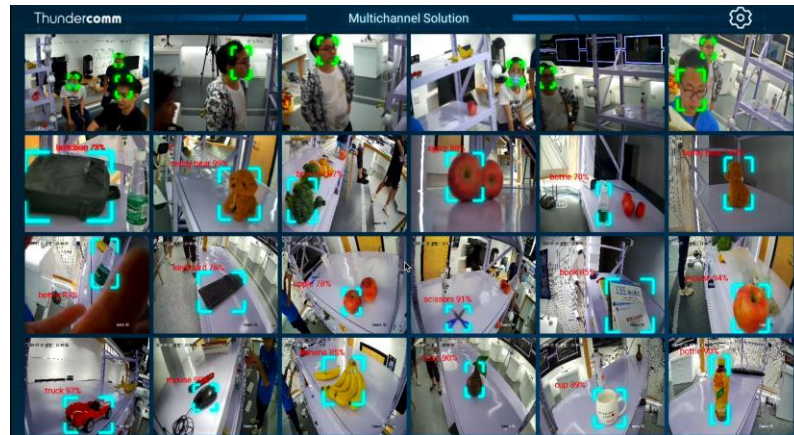


Toy

Ubtech Apha, ...

Smart Vehicle

- ❖ DMS
- ❖ ADAS
- ❖ True Surrounding View
- ❖ Multi-camera processing
- ❖ Functional safety





- Distributed Computing
- Real-time Processing
- Large Data Handling
- Board Ecosystem

Edge Computing

THUNDERWORLD

Edge Intelligence Conference

边缘智能大会

邀请函
Invitation

🕒 12.06.2019
Dec.6.2019

📍 北京维景国际大酒店
Grand Metropark Hotel Beijing

Thanks!

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