Automation Applications By Using mmWave with AI DVS, Thermal Image, RGB and Voice Processing Sensors
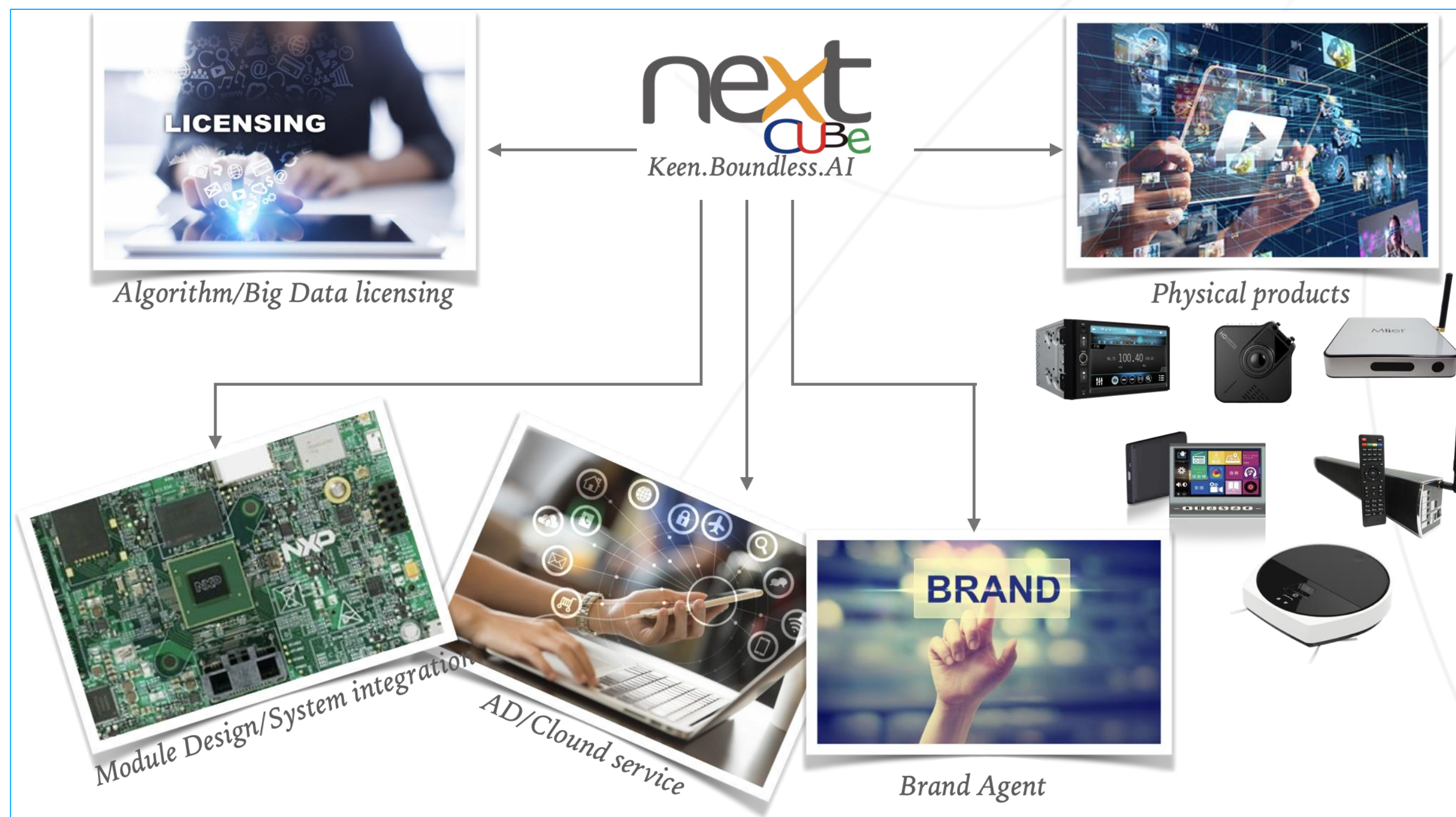
Rick Chiang

Product Manager at Nextcube Corperation
### Rick.Chiang@next-cube.com

About Next-Cube
AI expert of multimedia

LICENSING
Algorithm/Big Data licensing

next
cube
Keen.Boundless.AI

Physical products

Module Design/System integration

AD/Clound service

BRAND
Brand Agent

- ◆ We devote resource in R&D engineering and design electronic devices of heath care, industry, vehicle, smart home/city, etc.
- ◆ 25 AI exclusive international patents. (does not contain the current application).
- ◆ More than 90% of R&D staff has a master's degree or doctorate.
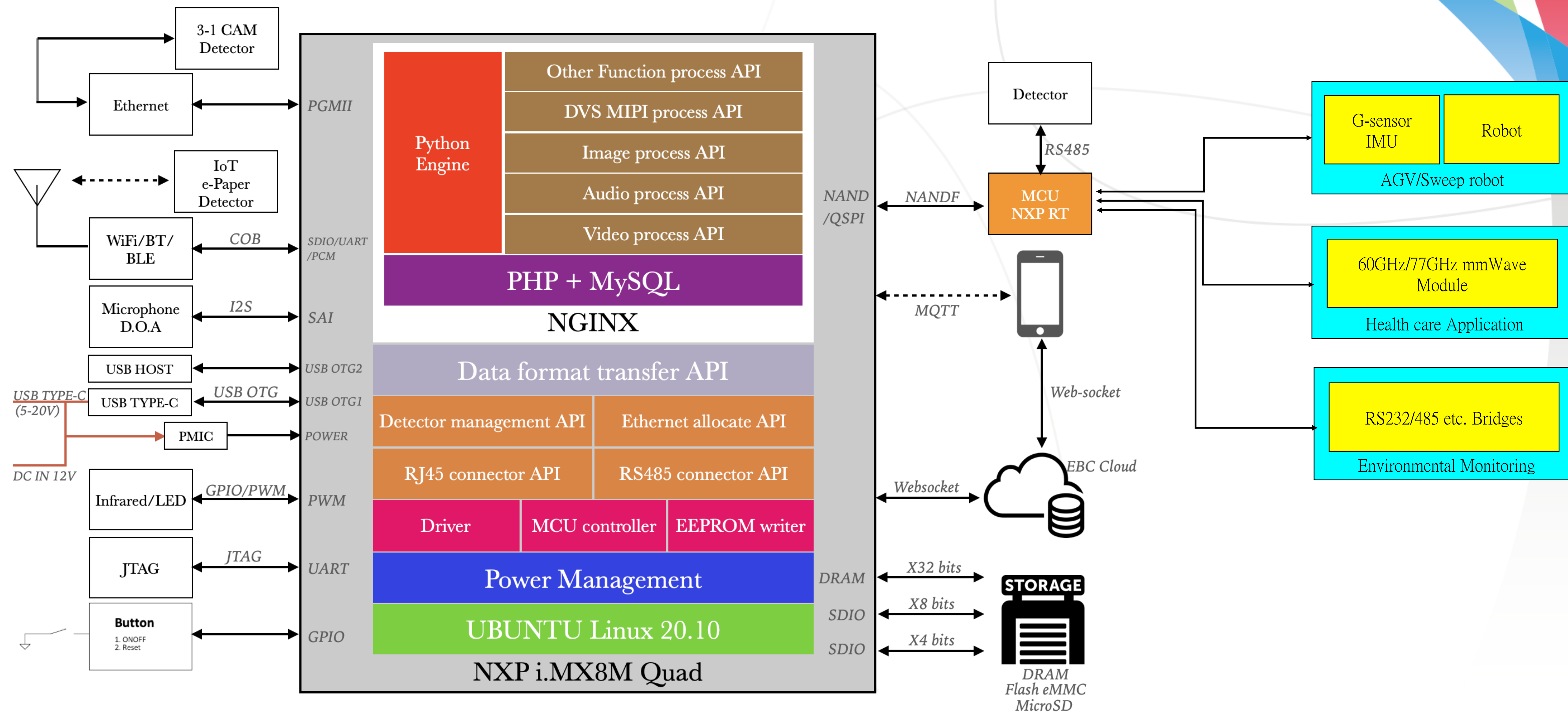- ◆ ODM / OBM / OEM capability and solution provider.
- ◆ Provide SDK solution.

AI Product & Solution Introduction
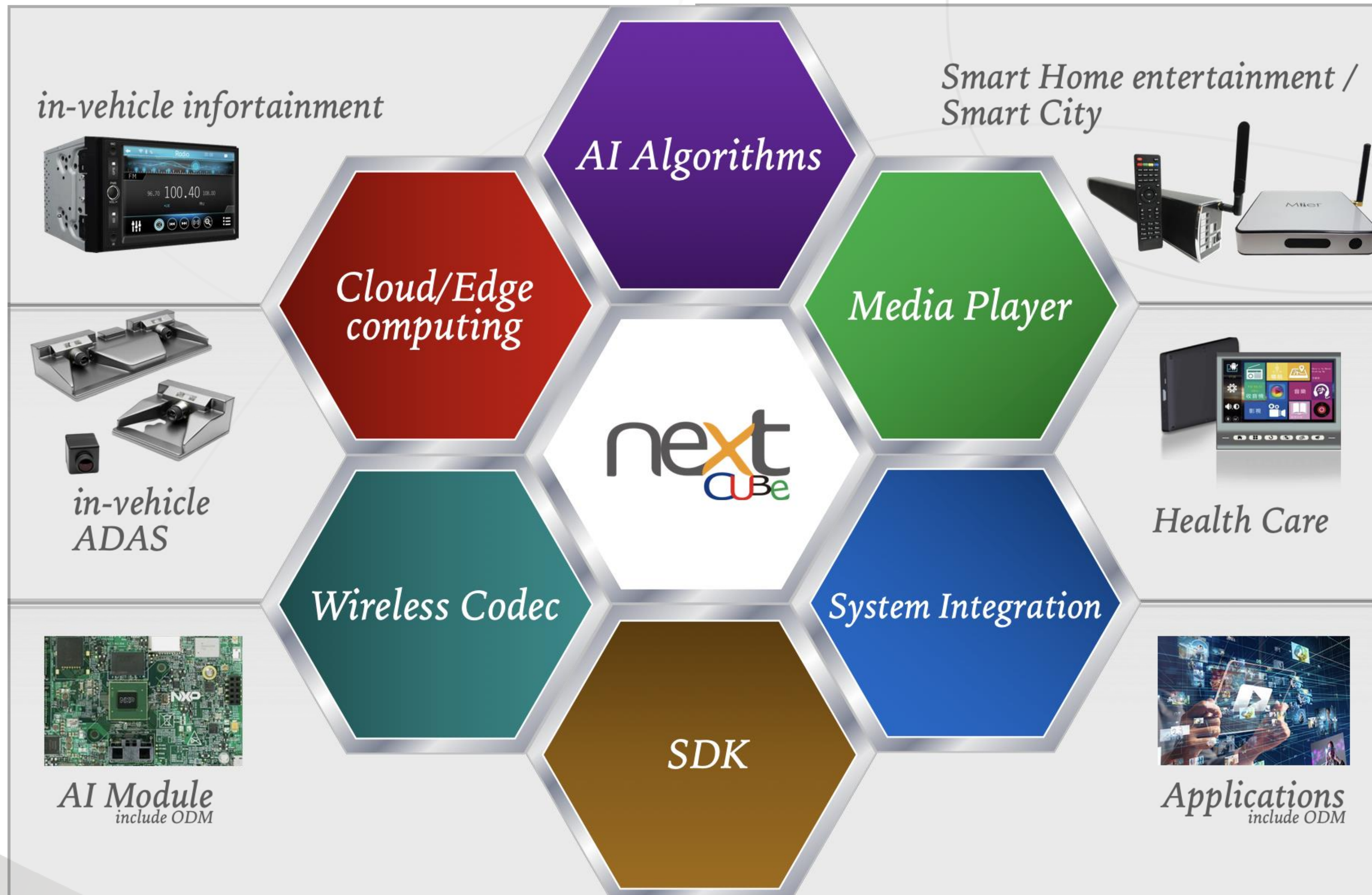
NXP Platform

NXP series product common architecture
The best solution of edge computing

Intelligence Home Appliance
Sweep Vacuum Robot / Multi-Vision Camera

Common Main features:

◆ Up to 4 lenses can be interchangeable(DVS, RGB, Thermal).

◆ Privacy protection with DVS lens.

◆ Feature recognition and identification / Object distance calculation / 3D mapping.

◆ Voice / Gesture remote control & Setting without APP.

◆ Health care, like falldown / cough and Hard Breath detection, etc.

◆ Active safety protection

- Distress signal detection.(Sound, Gesture)

- Danger behavior prediction.(Domestic violence, through the cordon, etc.)

- Vision intrusion detection.

- Abnormal noise detection.

- sitter-in

◆ D.O.A

◆ AIoT

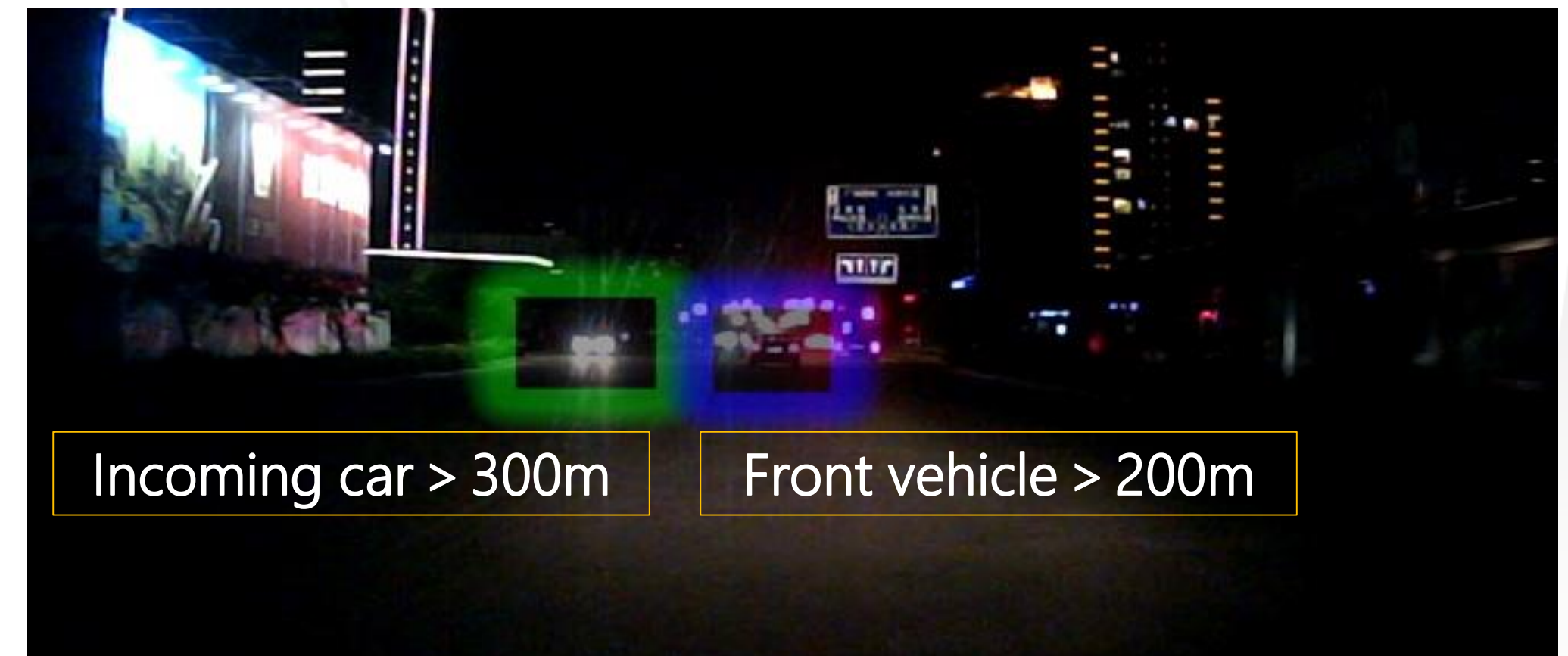|	
● NXP i.MX 8M Quad CPU	● Multi-vision interchangeable lens
● Advantech 2.9″ e-paper	● 4 way microphone array
● Advantech EWM-W306	

In-vehicle Application
ADAS / ADB

◆ Complex scene recognition

◆ Driver/Passenger behavior analysis

◆ Temperature measurement

Driver Monitoring System

Front Sensing

Surround View

Camera Monitor System

Occupant/Passenger Monitoring System

Rear View

The camera scans more than 15 times /S

Incoming car > 300m   Front vehicle > 200m

Judgment distance: each other's incoming car > 300 meters; the front vehicle > 200 meters; (According to the actual speed and road conditions, adjust the detection distance)

● NXP i.MX 8M mini CPU	● Multi-vision interchangeable lens
● NXP RT	● 4 way microphone array
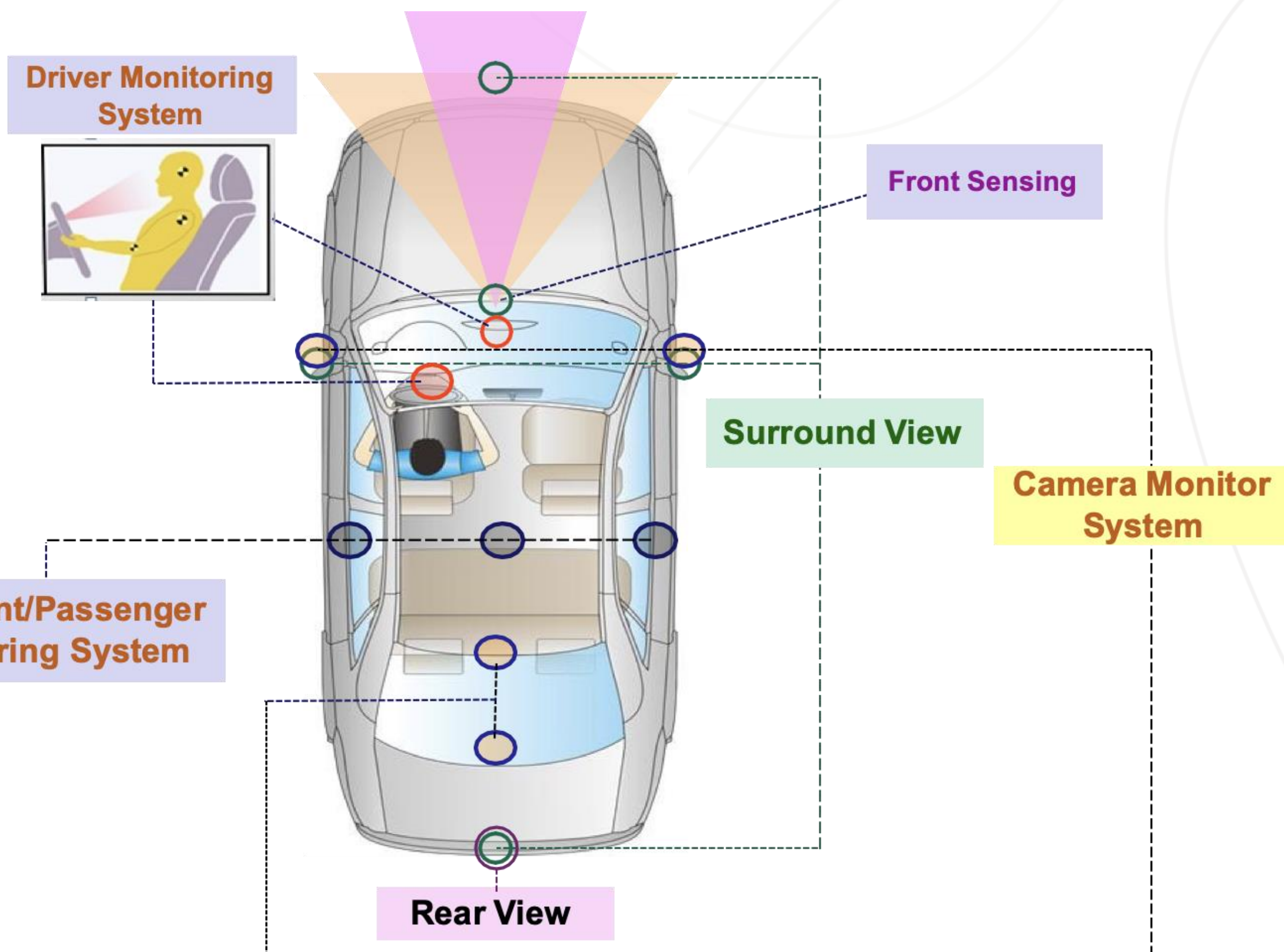
Consumer electronics Applications
AIoT Environment controller / OTT / SoundBar
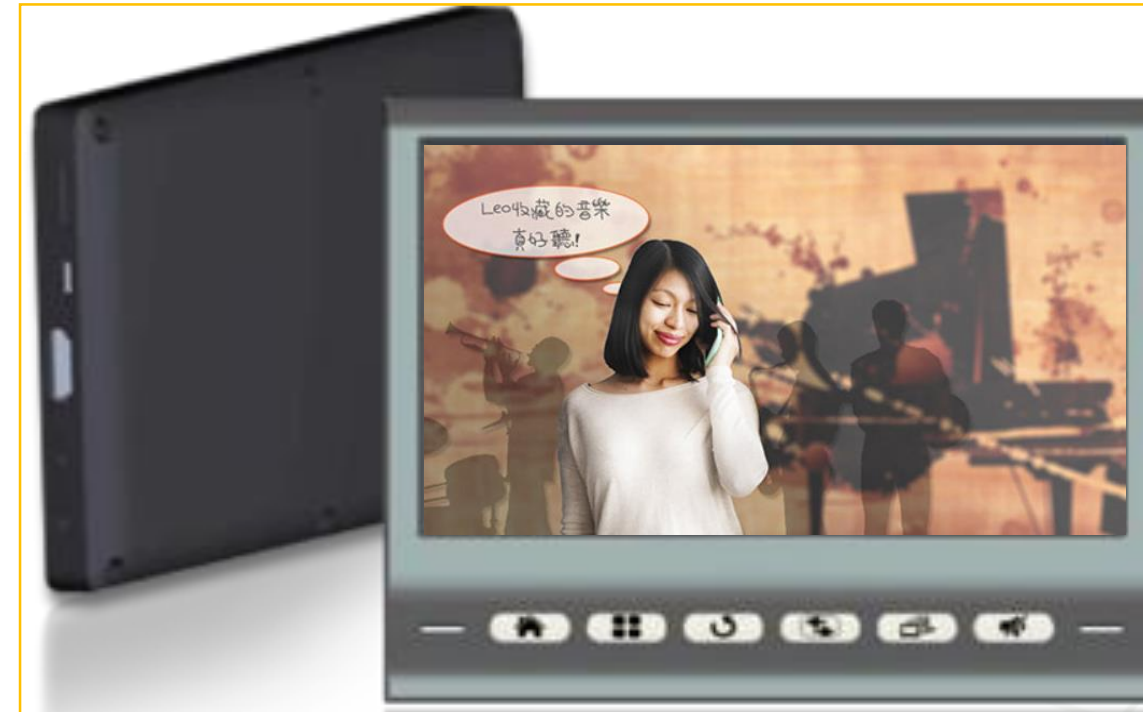
● NXP i.MX 8M Quad CPU	● Multi-vision interchangeable lens
● NXP RT	● 4 way microphone array
● Advantech EWM-W306 ● Suitable for Mulit-Vision Camera	

Common Main features:

◆ Feature recognition and identification / Object distance calculation / 3D mapping. **

◆ Voice / Gesture** remote control & Setting without APP.

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◆ Active safety protection

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    - Vision intrusion detection. **

    - Abnormal noise detection.

◆ D.O.A

◆ Environment status delectation & AIoT

**Must be paired with the camera

New Automation Application – Automotive/Smart Traffic

Traffic Management

traffic flow solution

parking violation & restricted area solutions

traffic violation solution

Wrong way detection with number plate recognition

Truck, motorbike & pedestrian violations

Queuing detection for traffic management
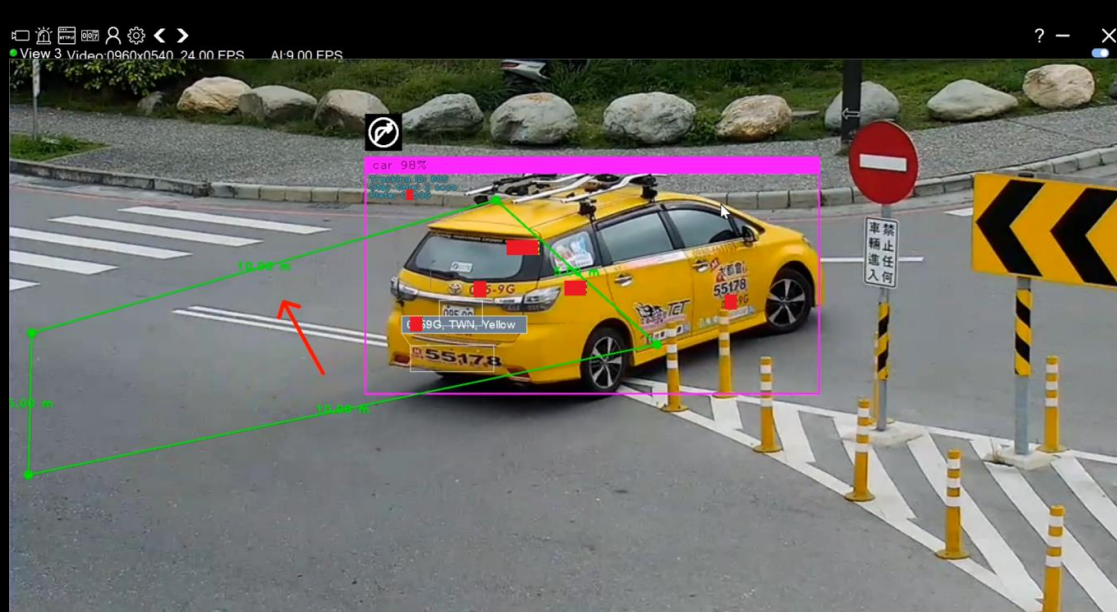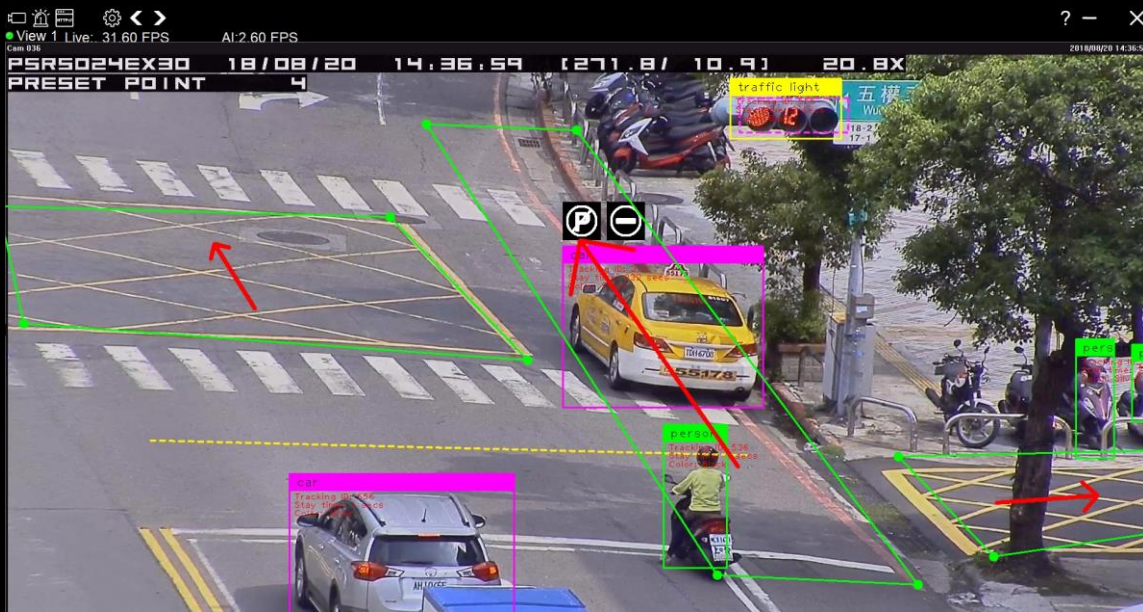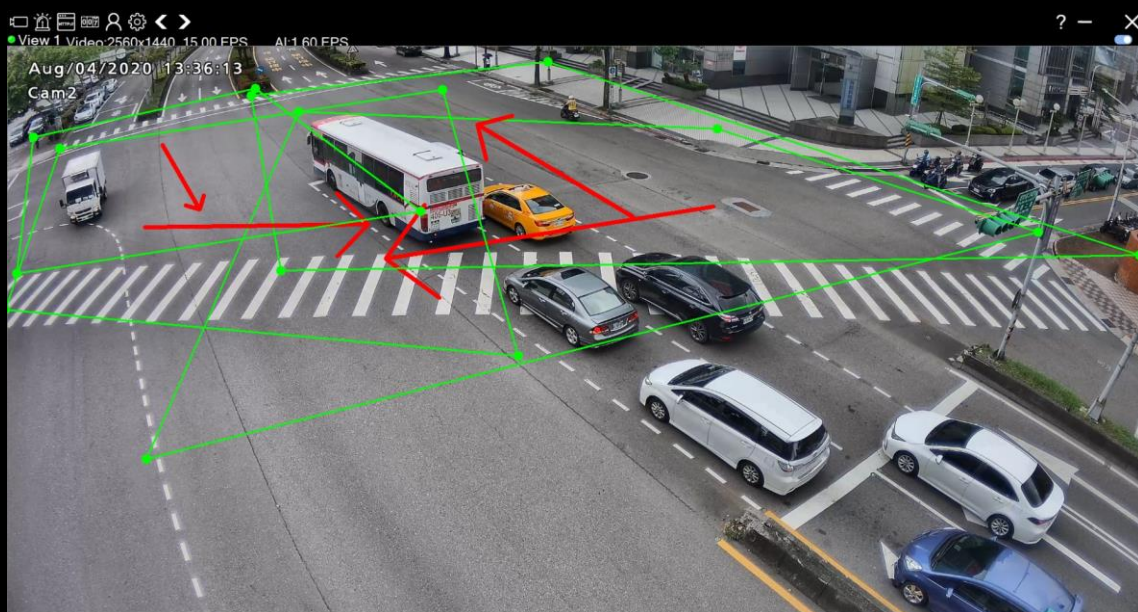
mmWave 60GHz Applications In Automotive

3D Obstacle Detection

Vehicle Occupant Detection

Driver Vital Sign Detection

Gesture Recognition

mmWave 60GHz Applications In Automotive

Sensor In Rooftop

Child Left Behind In Car Detection

Intruder Outside Car Detection
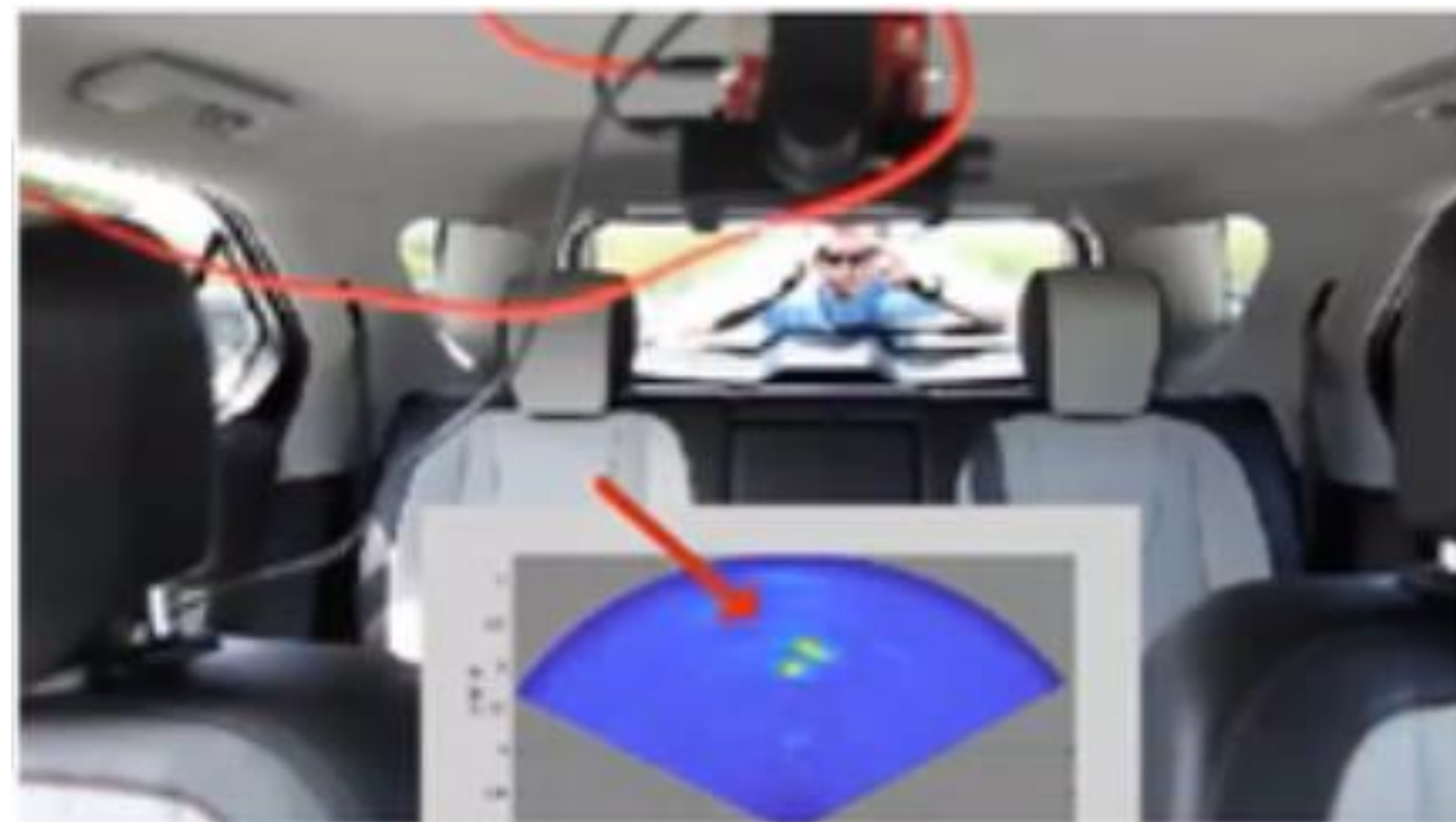
Multi Zoom Occupant Detection

DVS Applications In Automotive
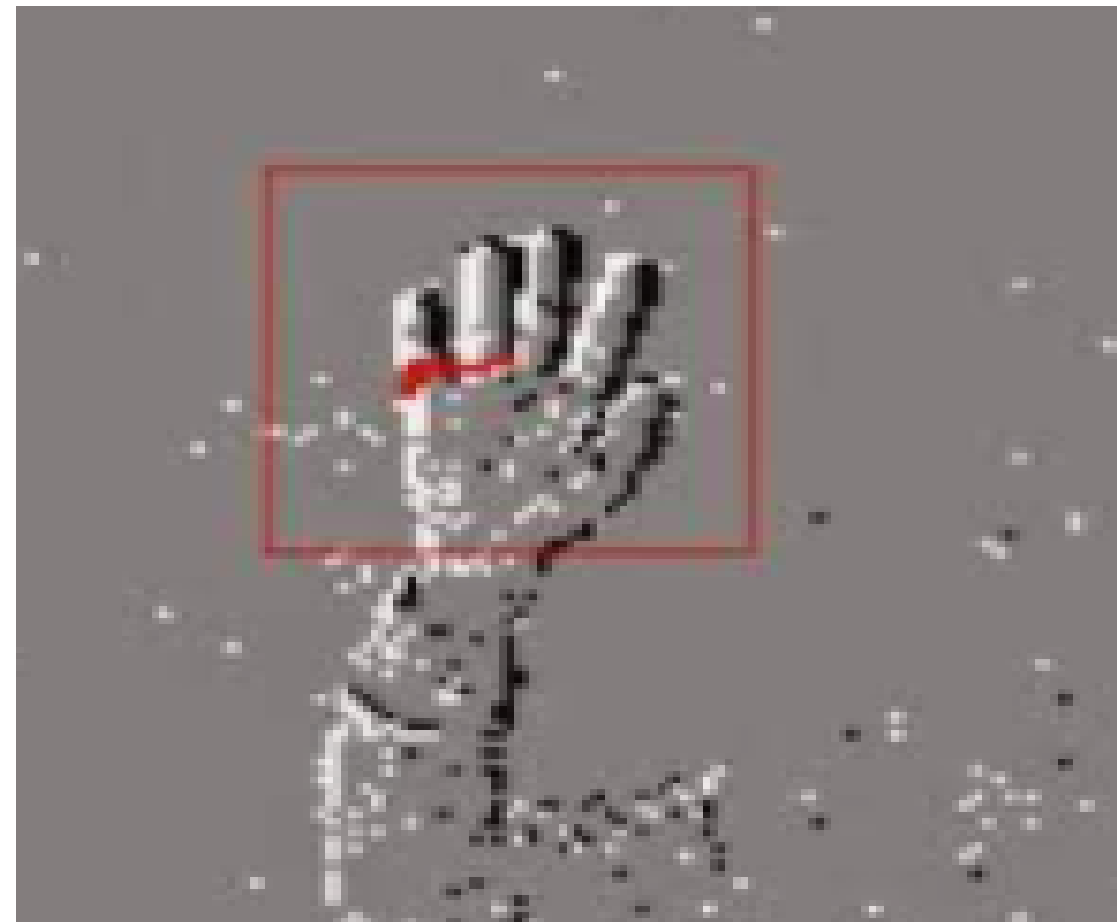
Gesture Detection

Motion Detection

SLAM
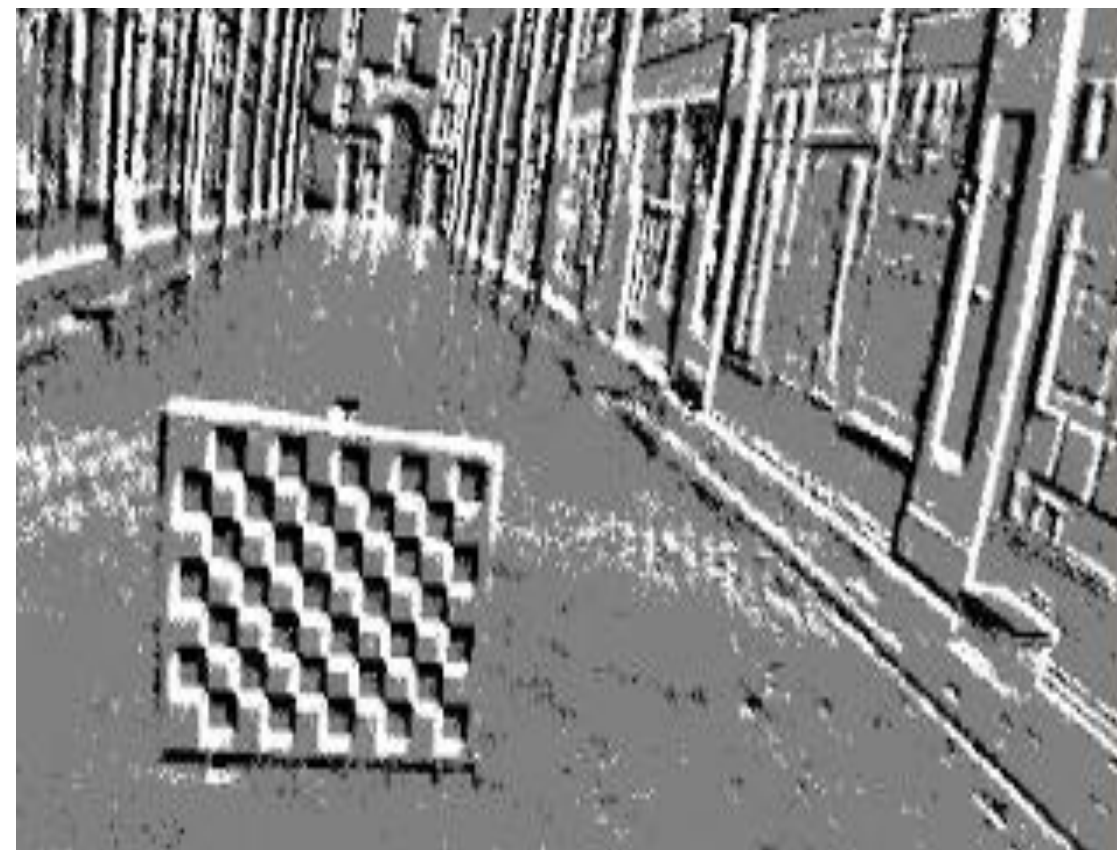
Object Tracking
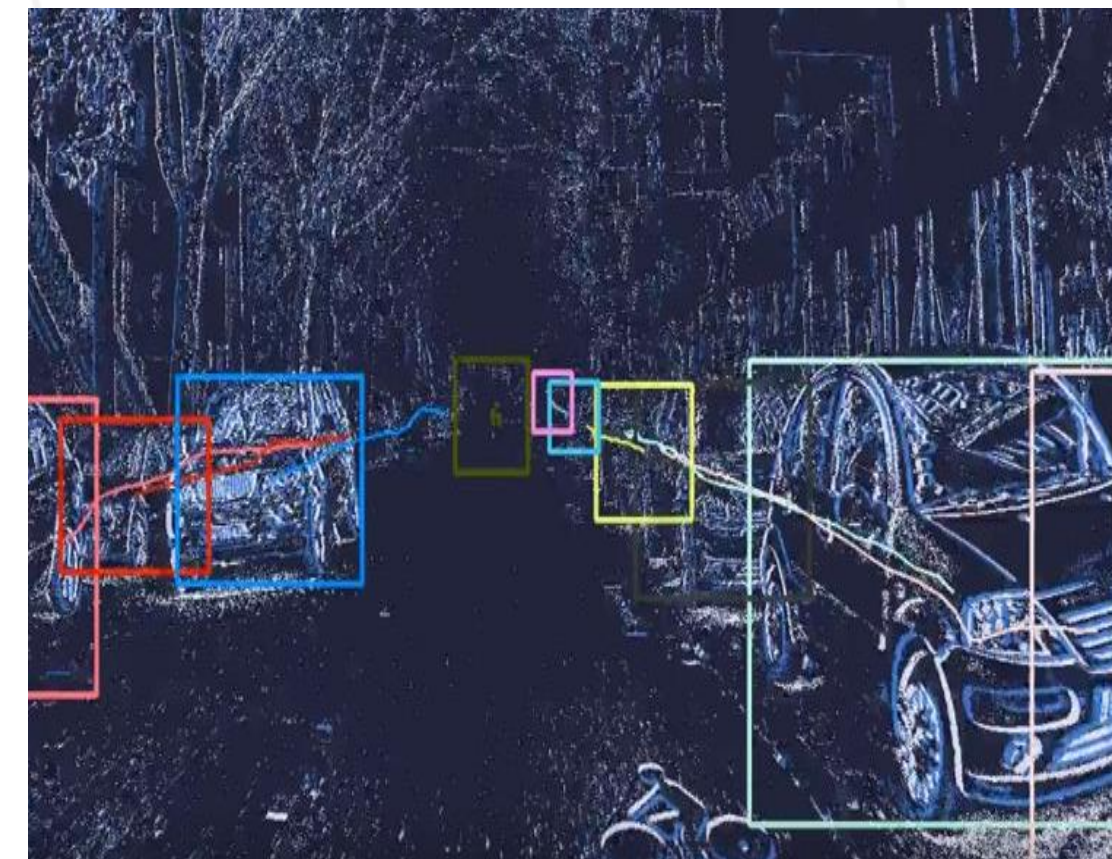
RGB Applications In Automotive

Emotion Recognition
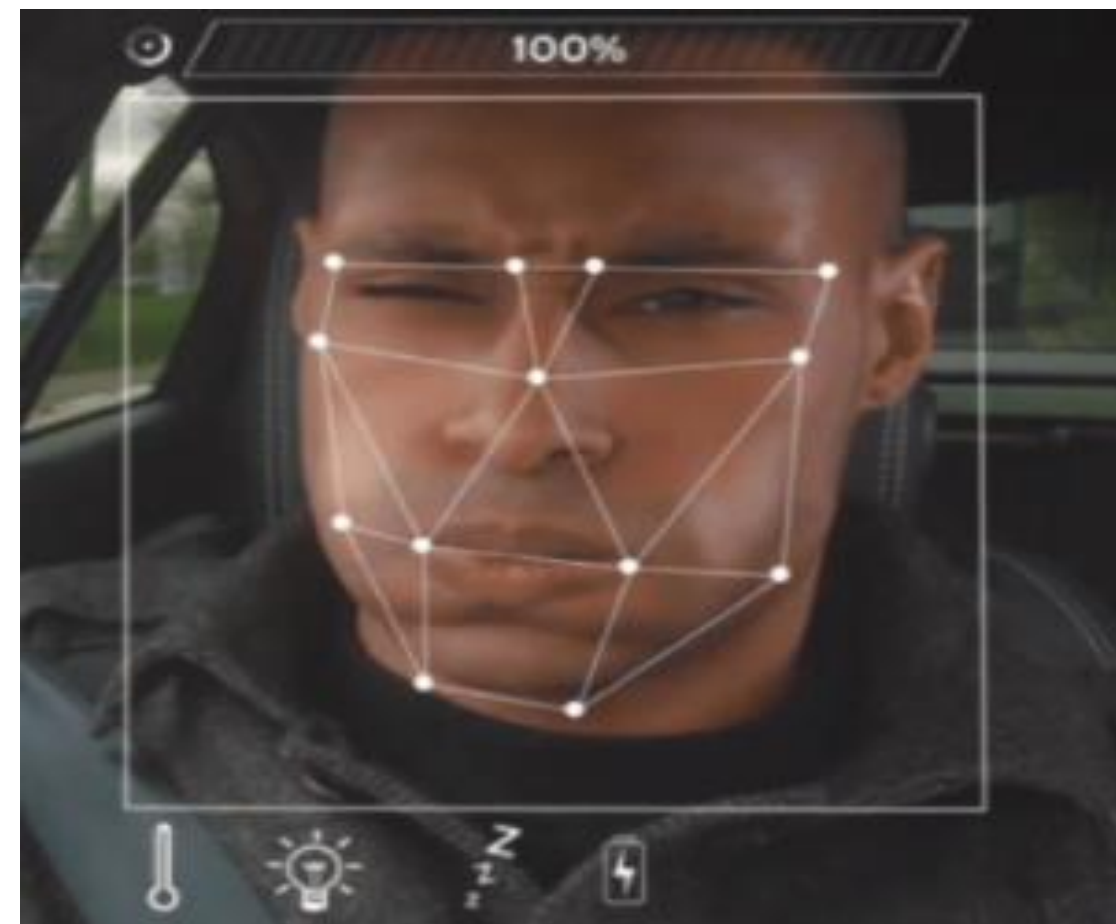
License Plate Recognition

Driver Behavior Detection

Adaptive Driving Beam
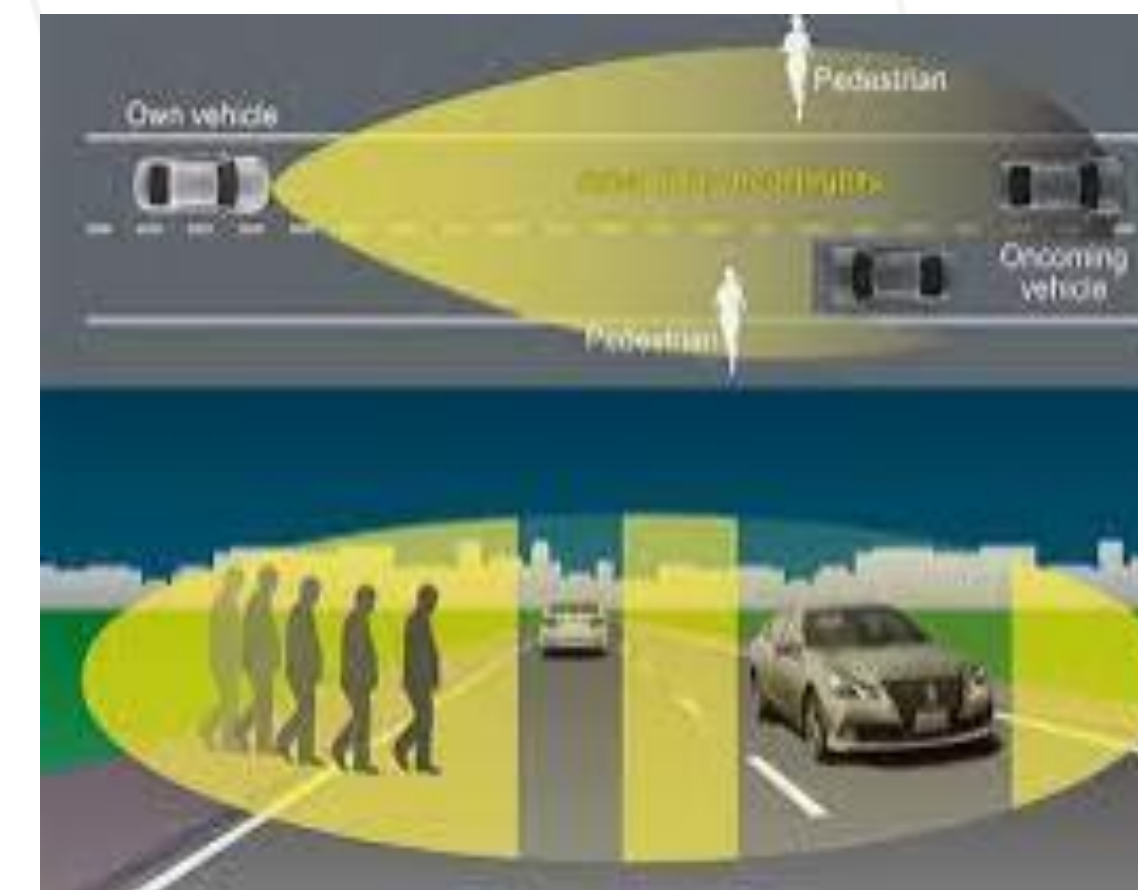
Thermal Image Applications In Automotive

Gesture Detection

Body Temp Measurement
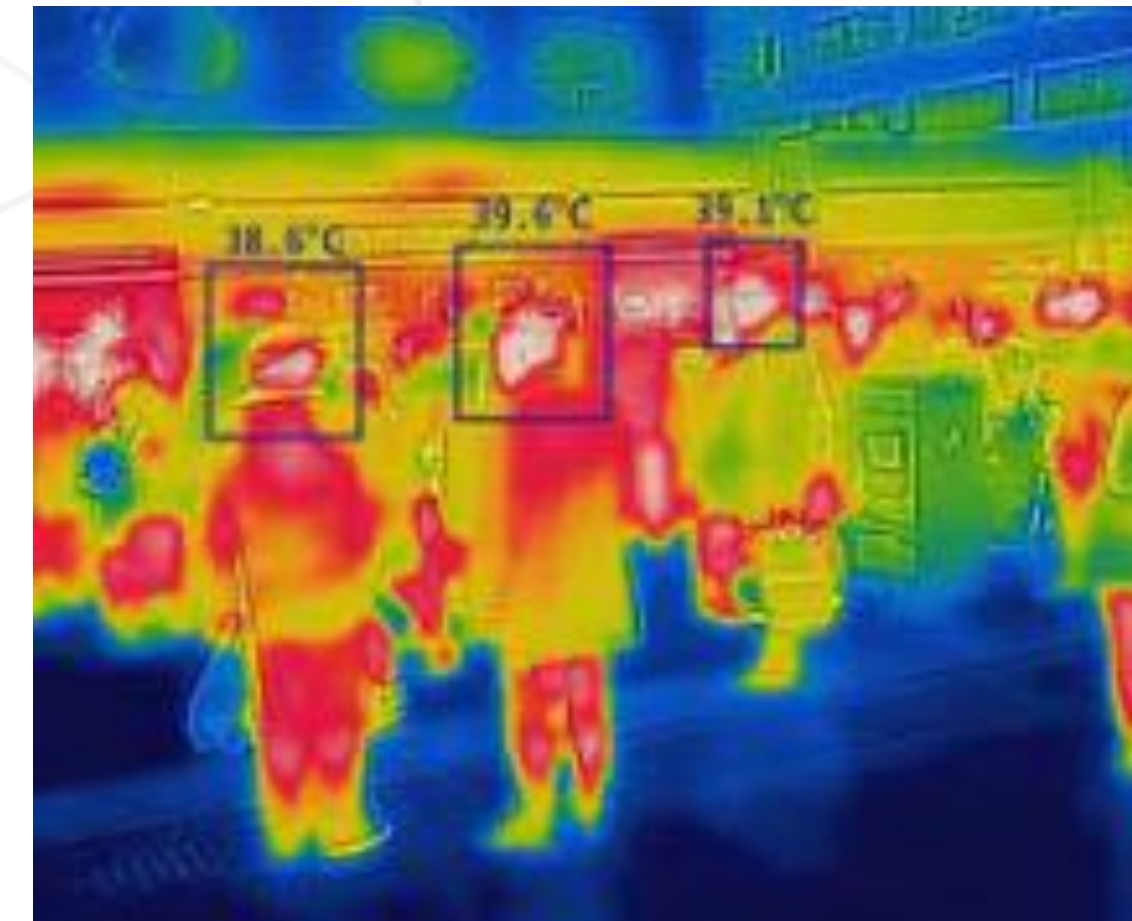
Motion Detection

Object Detection
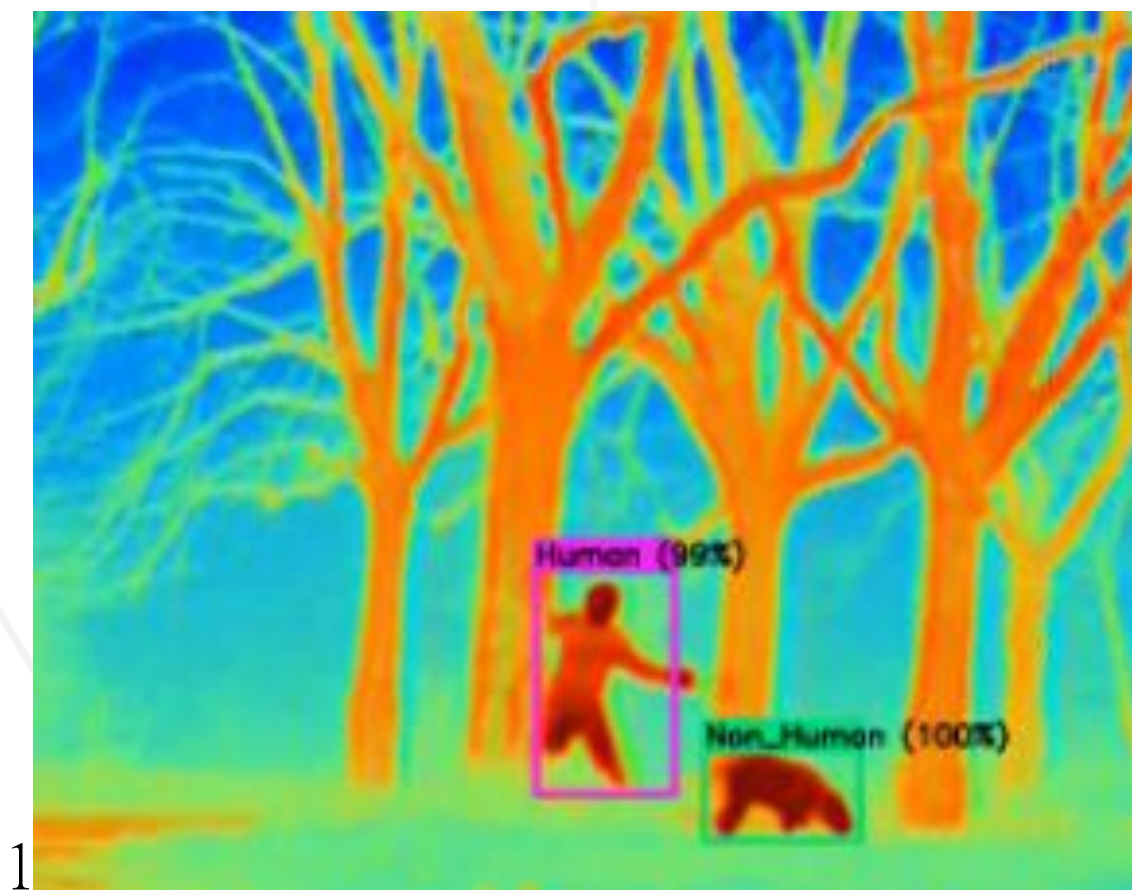
Performance Demo

AI For mmWave 60GHz Performance Demo
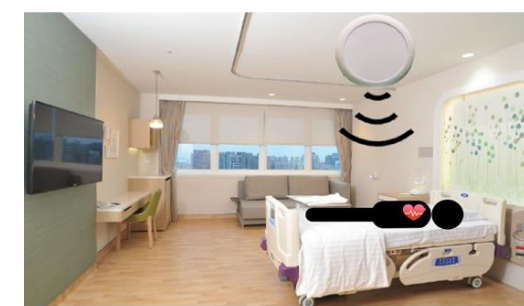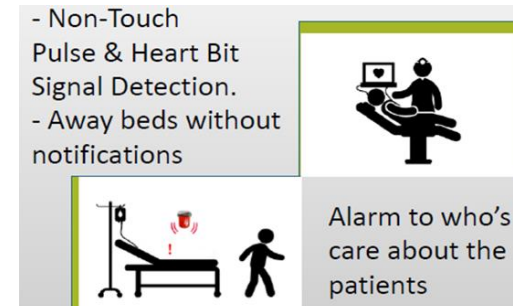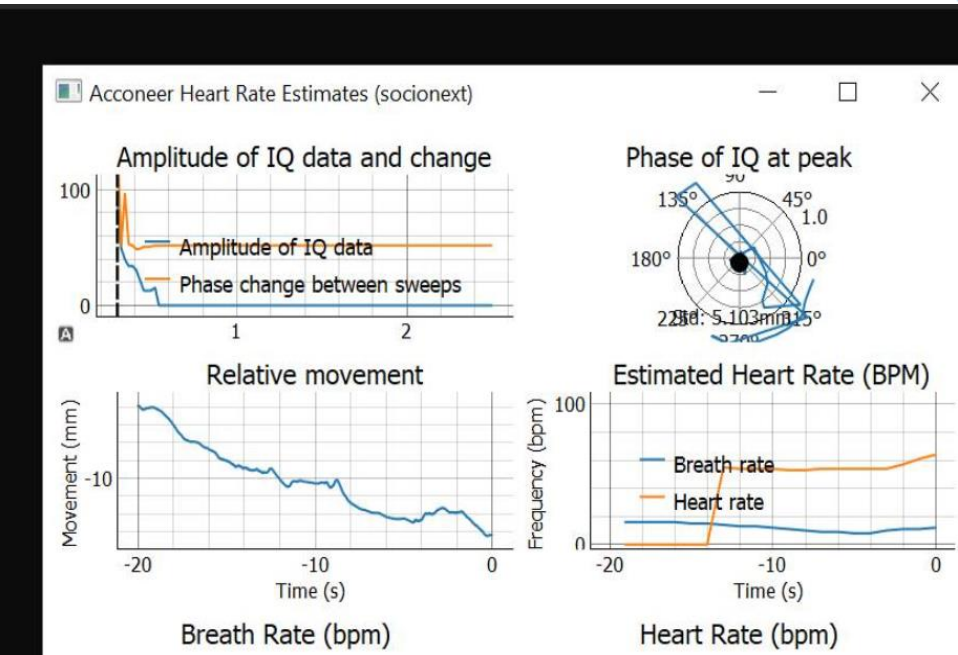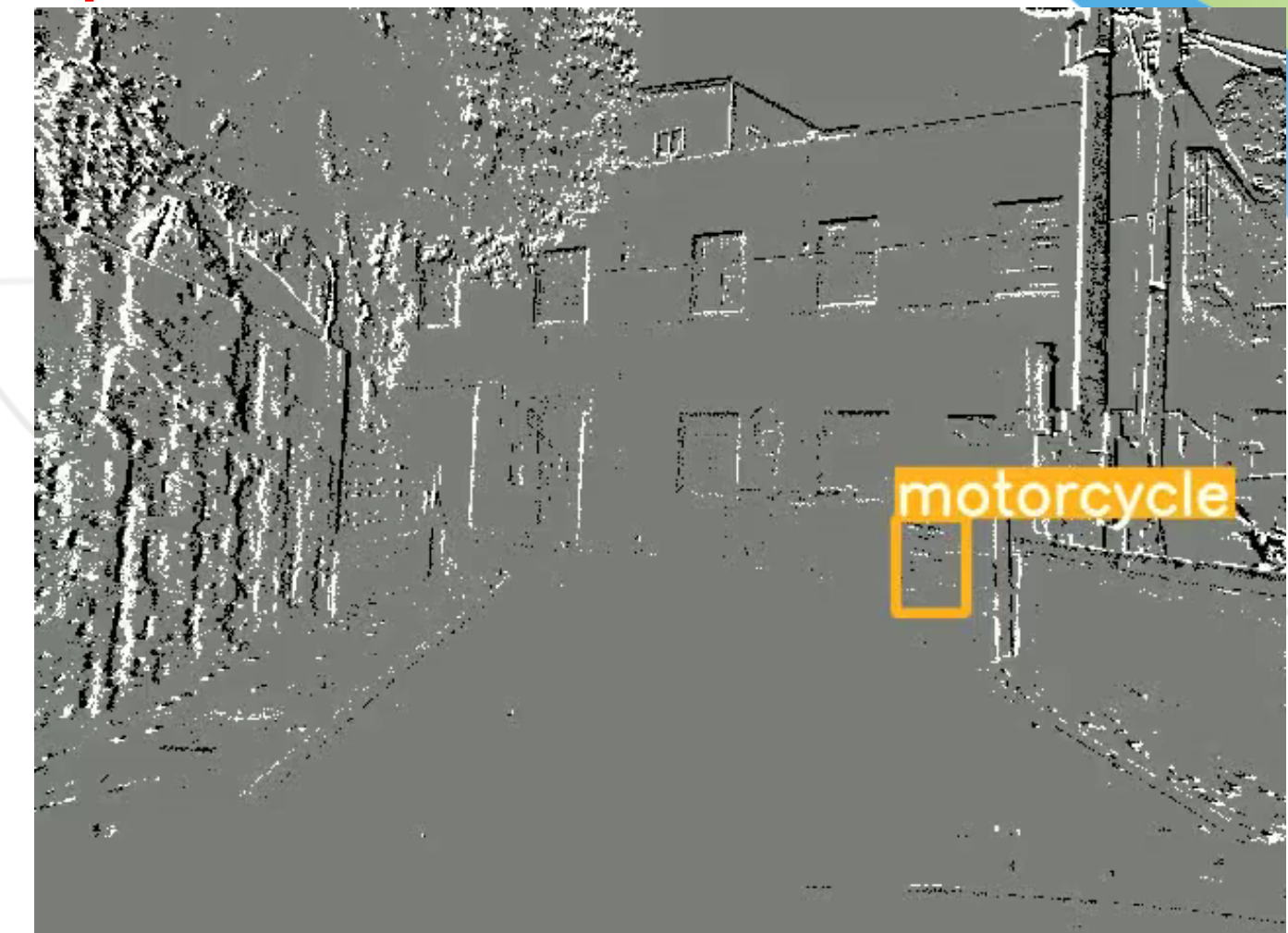
AI For DVS Lens Performance Demo
The Best Choice In-vehicle L4 & L5 Autopilot

Main Features

◆ Event-base Vision Sensors.

◆ High-speed/ Low-latency Response.

◆ Wide Dynamic Range Operation.

◆ Low Power Consumption

Applications

◆ Machine Vision

◆ Industrial Automation

◆ Advance Driver Assistance Systems(ADAS)

◆ Robotics, Motion Analysis And Monitoring

◆ Security and Surveillance Cameras

◆ Battery-powered IoT Cameras

Automotive/DVS Object Detection

Object Identification

Health Care / Falldown

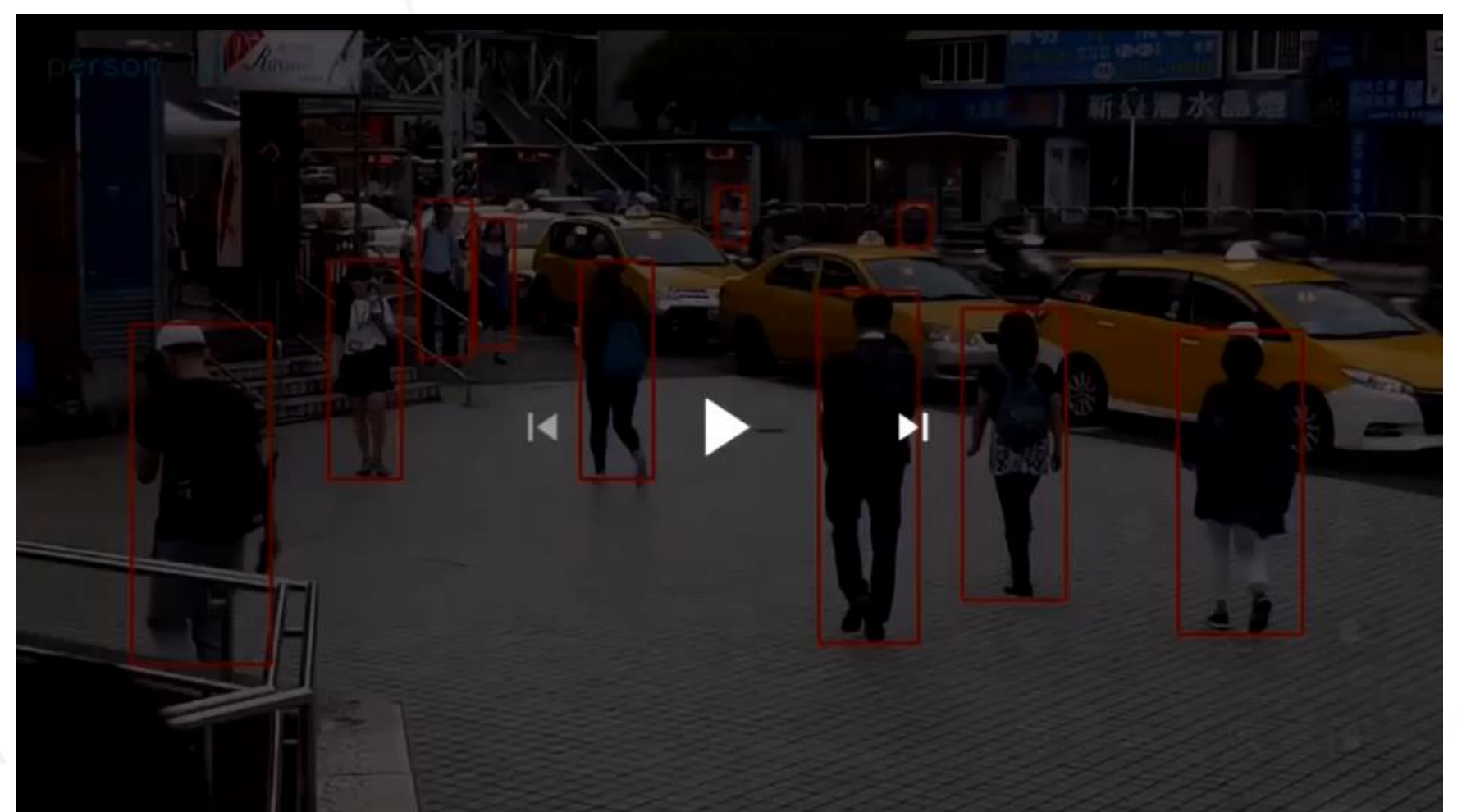Behavior Detection

AI For RGB Lens Performance Demo

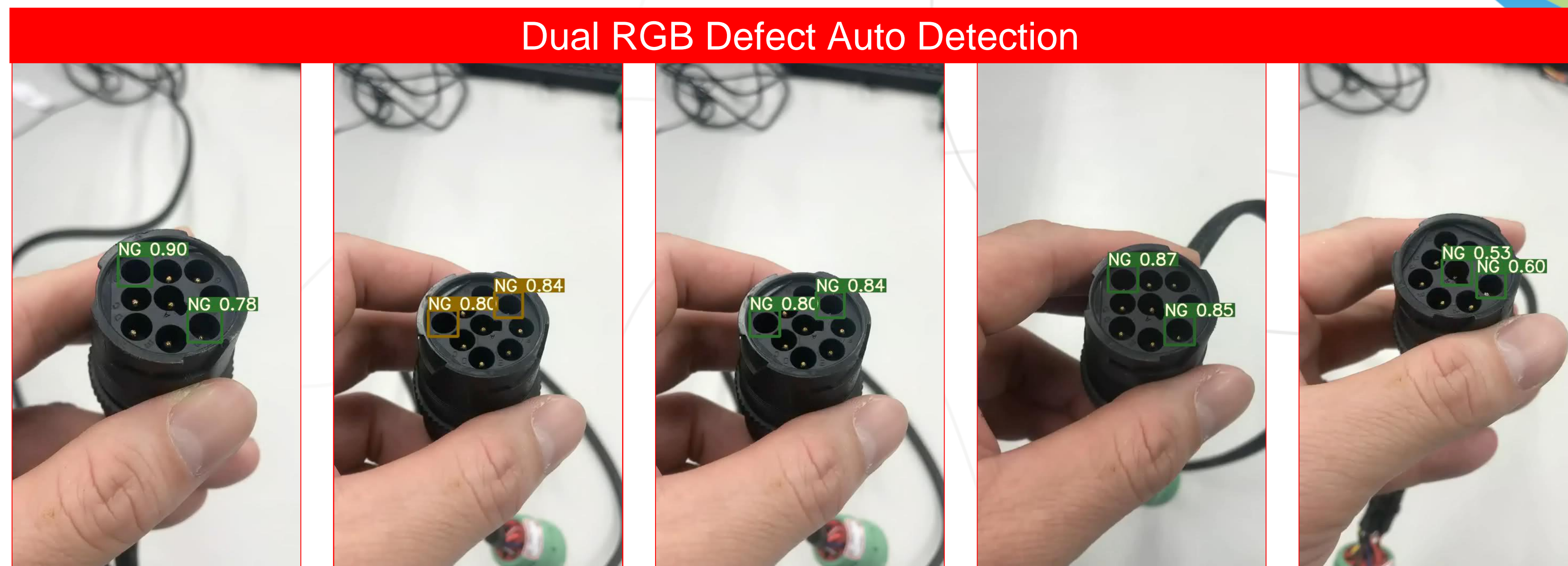Driver Drowsiness Detection

Human Detection with car motion
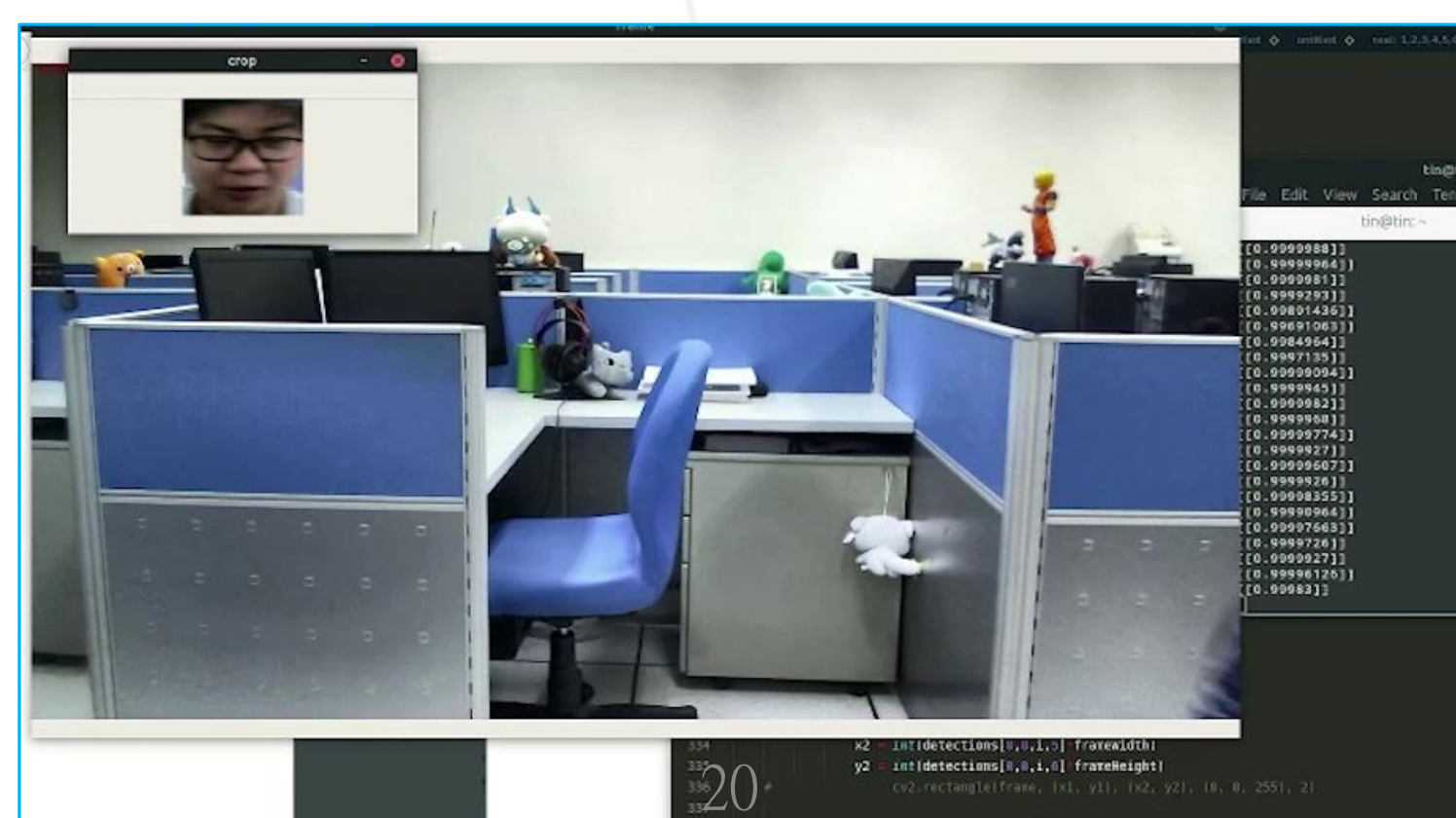
Object Detection & Identification

Predestrian Detection

AI For RGB Lens Performance Demo

Good

Dual RGB Defect Auto Detection

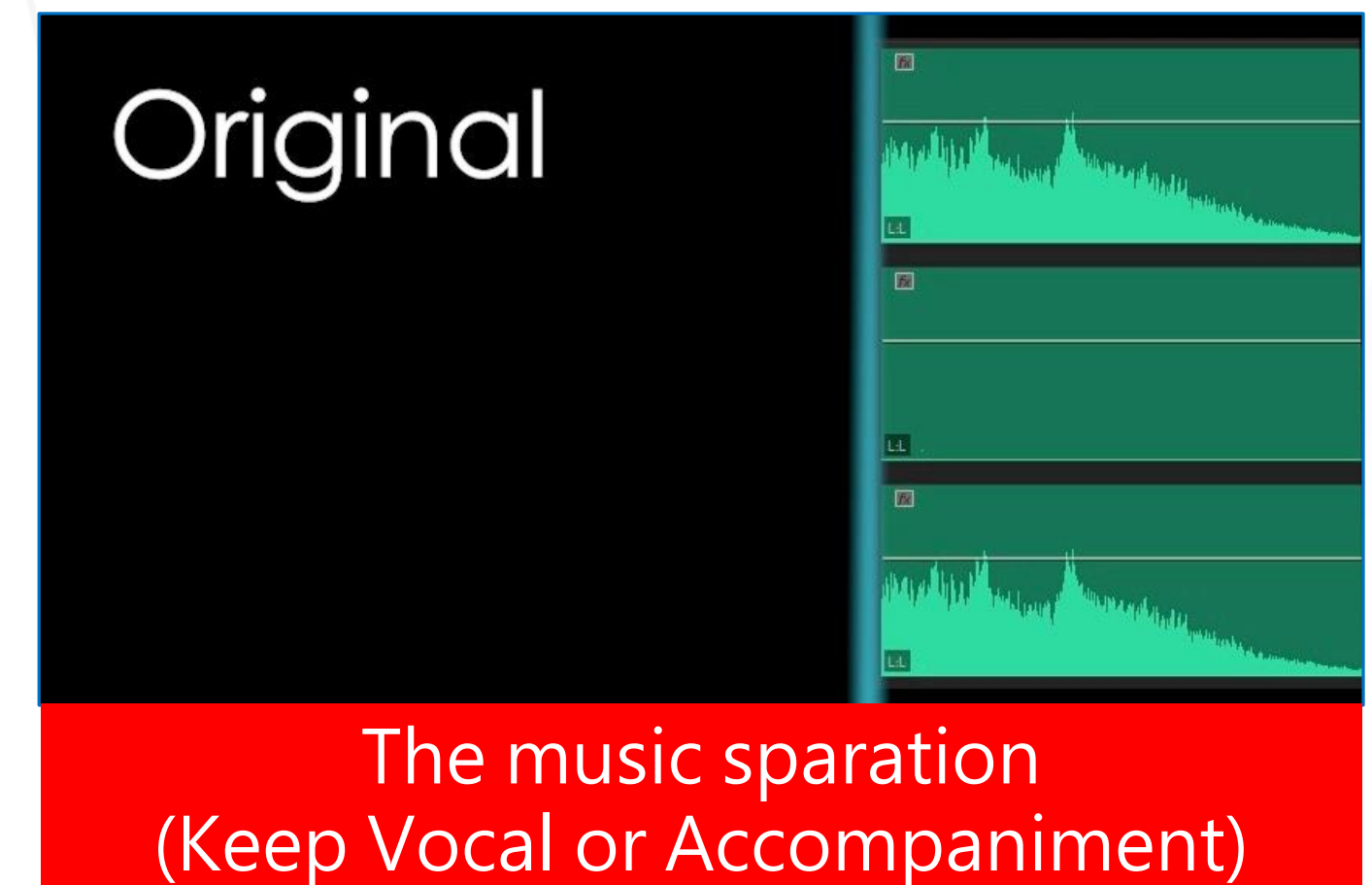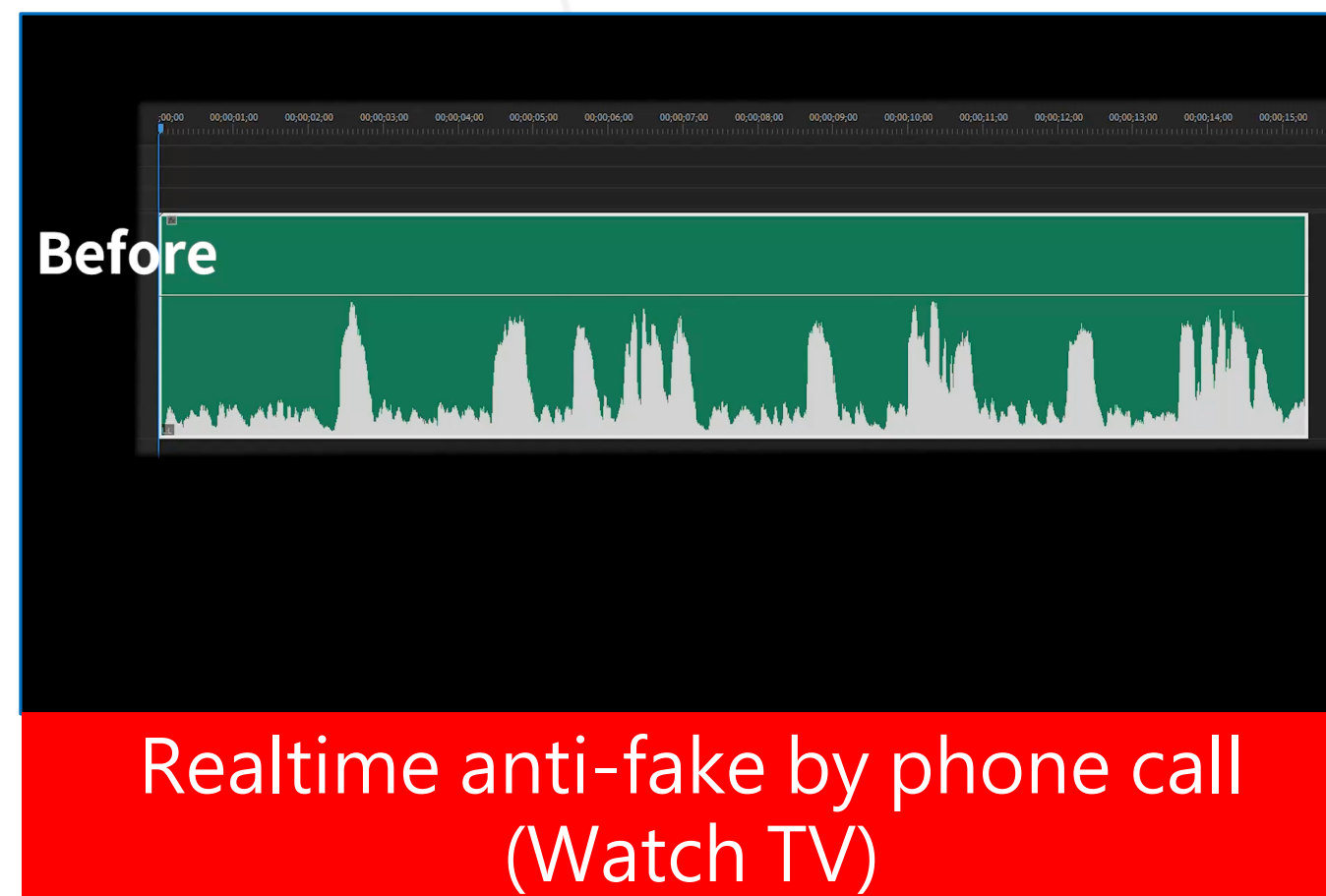Age/Gender/Emotion Detection
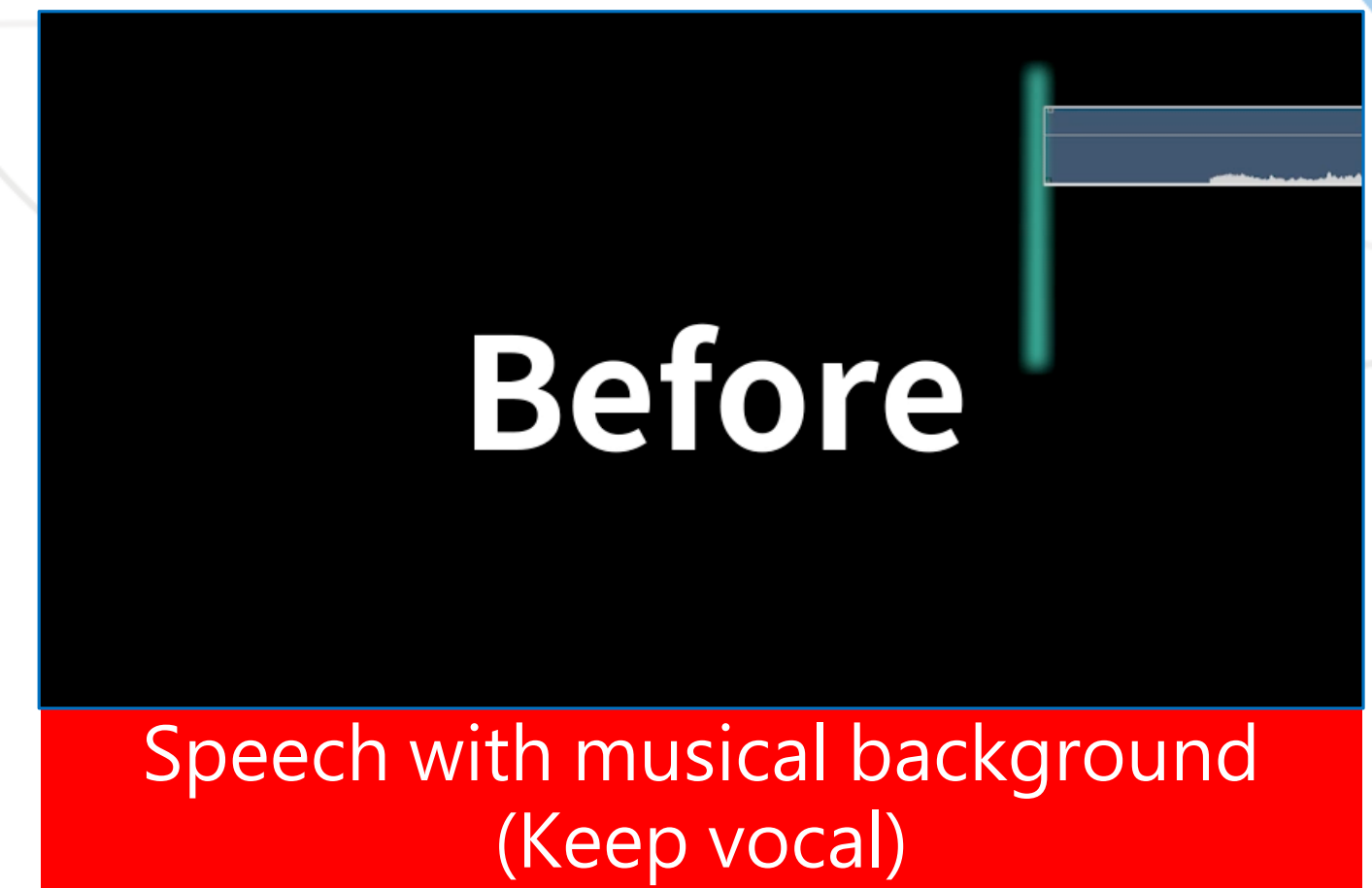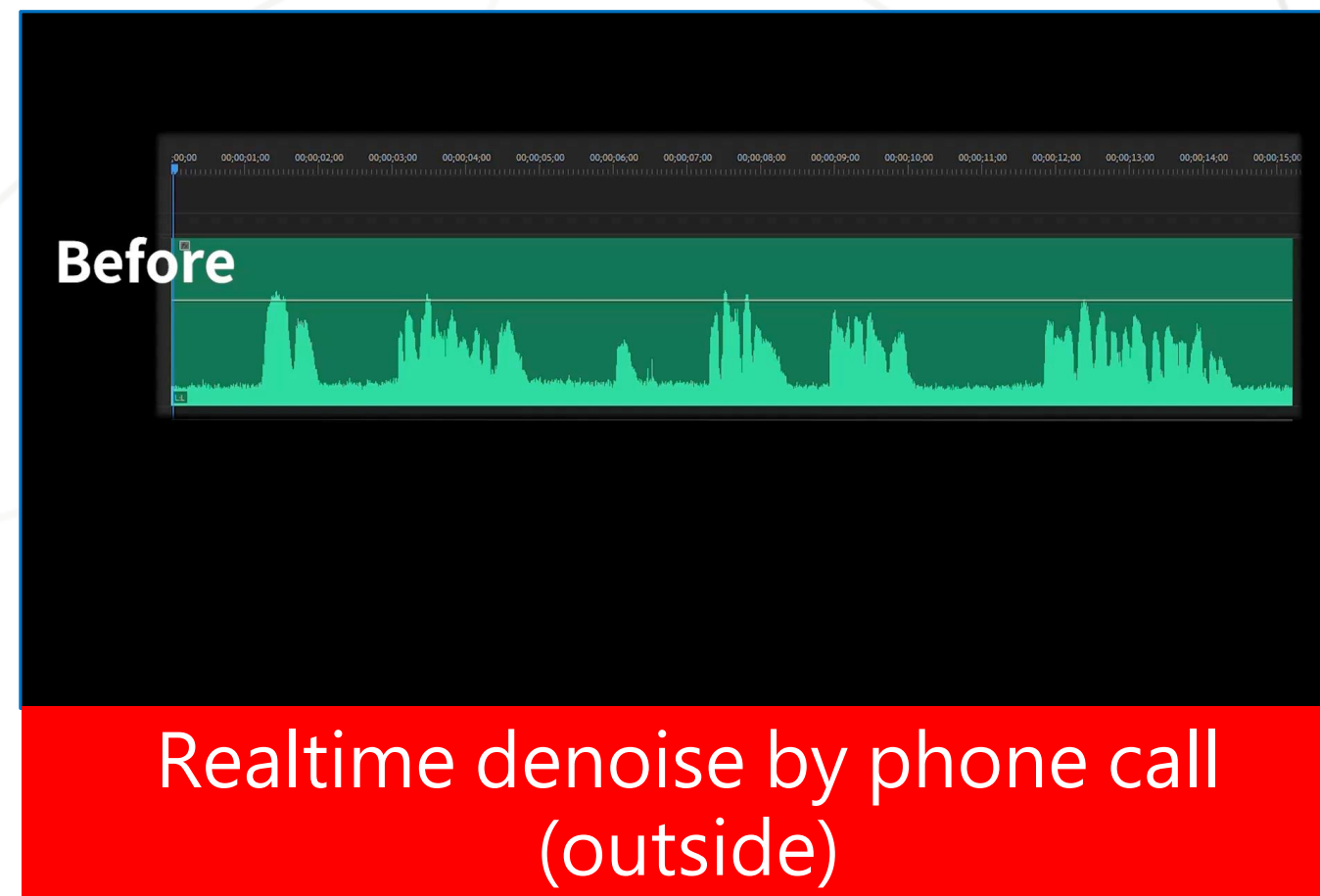
Face & Anti-Fake Recognition

Multi-mode Gesture Detection

AI for Realtime denoise and feature separation demo
Diff. environment phone call denoise / music separation to vocal and accompaniment

◆ It can be adjusted manually/automatically in…

 - Echo

 - Equalizer

 - Volume

◆ Algorithm can be build in SoC.

◆ Denoise can identify the source of the sound, and

anti-fake in advance.

◆ music separation can

 - automatically adjust the pitch.

 - Singing score.

 - etc.

Before

Realtime denoise by phone call
(outside)

Before

Speech with musical background
(Keep vocal)

Before

Realtime anti-fake by phone call
(Watch TV)

Original

The music sparation
(Keep Vocal or Accompaniment)

AI for Health care and advanced sound processing demo

Cough and Hard Breath detection / Sound emotion and Speaker recognition / ASR and auto-translation / D.O.A

- ◆ Algorithm can be build in SoC.

- ◆ It can automatically detect the frequency and classification of cough and Hard Breath.

- ◆ 5 sound emotion can be identification.

- ◆ Recognize 6 different sounds, baby/fire alarm/sickroom alarm/knock/dog/broken glass.

- ◆ TaiYu also can be recognized.

- ◆ Speaker recognition / ASR / Auto-translation

Cough Detection

Hard Breath Detection

Taiwan Mandarin

ASR for Mandarin & TaiYu

Sound emotion identification

Speaker recognition
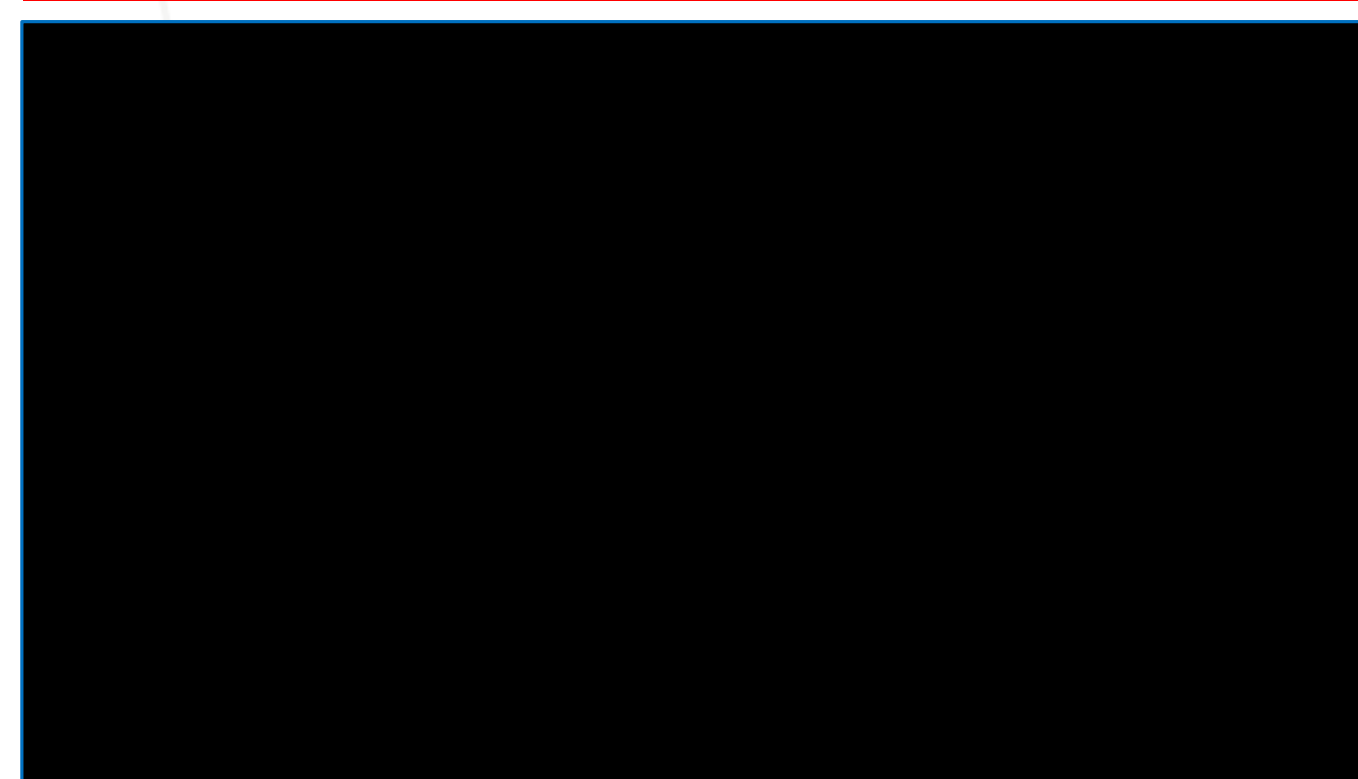
ASR/Auto-translation

Thank You