MRF700 2-in-1 Driving Assistance Solution

V 1.07

MRF700 2-in-1 Driving Assistance System

Intelligent Driving Technology Provider

MRF700 comes with dual cameras to monitor the road ahead and driver status during driving, and issues warnings in advance to reduce crash accidents.

Warnings data will be uploaded to cloud Wistron management platform automatically for driver risk assessment and dedicate fleet management.

ADAS Camera
with Main Unit

DMS/Fatigue
Camera

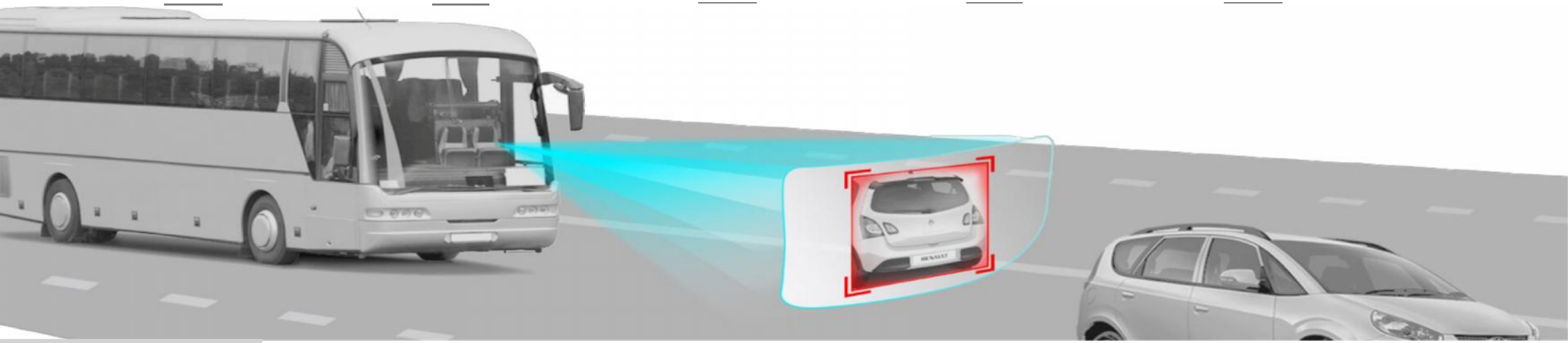
1

System Features

1. ADAS Collision Warning, Reduce Collision Dangers

MRF700 based on leading computer vision technology, is capable of monitoring target objects from the road ahead, such as vehicles, lanes, pedestrians, cyclists, traffic signs, etc. When the system detects potential collision dangers during driving, it will issue warnings to improve the driving safety.

- Forward Collision Warning
- Lane Departure Warning
- Headway Monitoring and Warning
- Pedestrian Collision Warning
- Speed Limit Indication
- Virtual Bumper
- Front Vehicle Departure Warning
- 4G Data Transmission
- Driving Behavior Analysis
- Driving Record



Lane Departure Warning

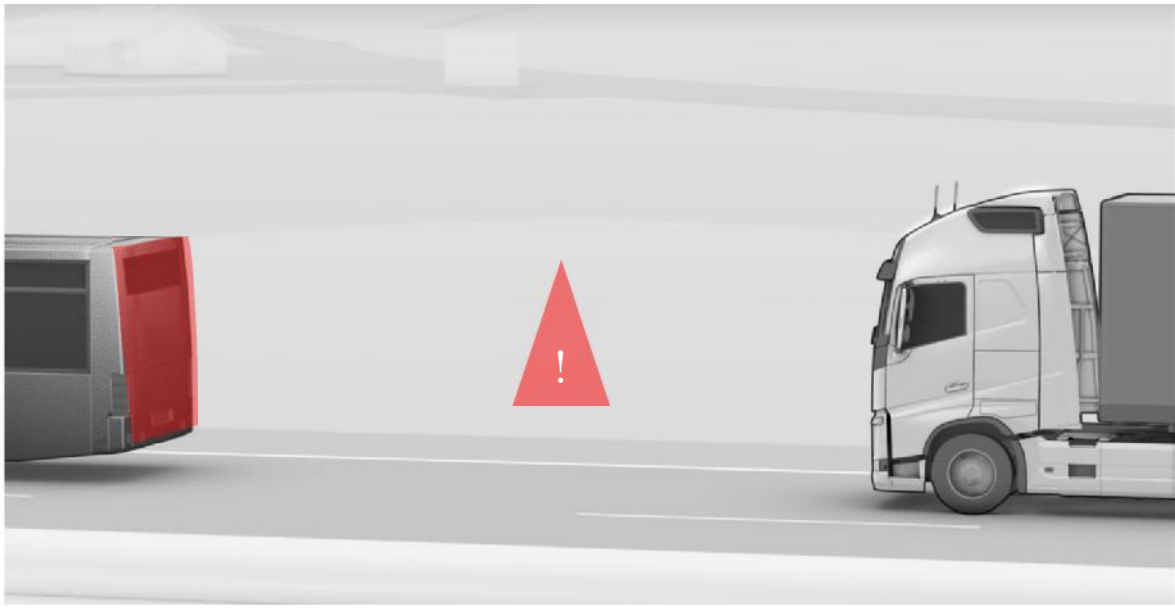
When the vehicle departs from current lane without turn signal on, the system will issue visual and audible warnings indicating that the driver has moved out of current lane.

- The system can distinguish active lane change from unintentional lane departure;
- LDW functions when the vehicle speed is over 30km/h by default;
- Lane icons will appear on the display unit when LDW is triggered;

Forward Collision Warning

When the system detects an immiment collision danger with vehicles ahead (in case of sudden brake or cut in), it will issue visual and audible alerts.

- Audible warnings will be issued up to 2.7 seconds in advance by default;
- Vehicle icons will appear on the display unit when FCW is triggered;



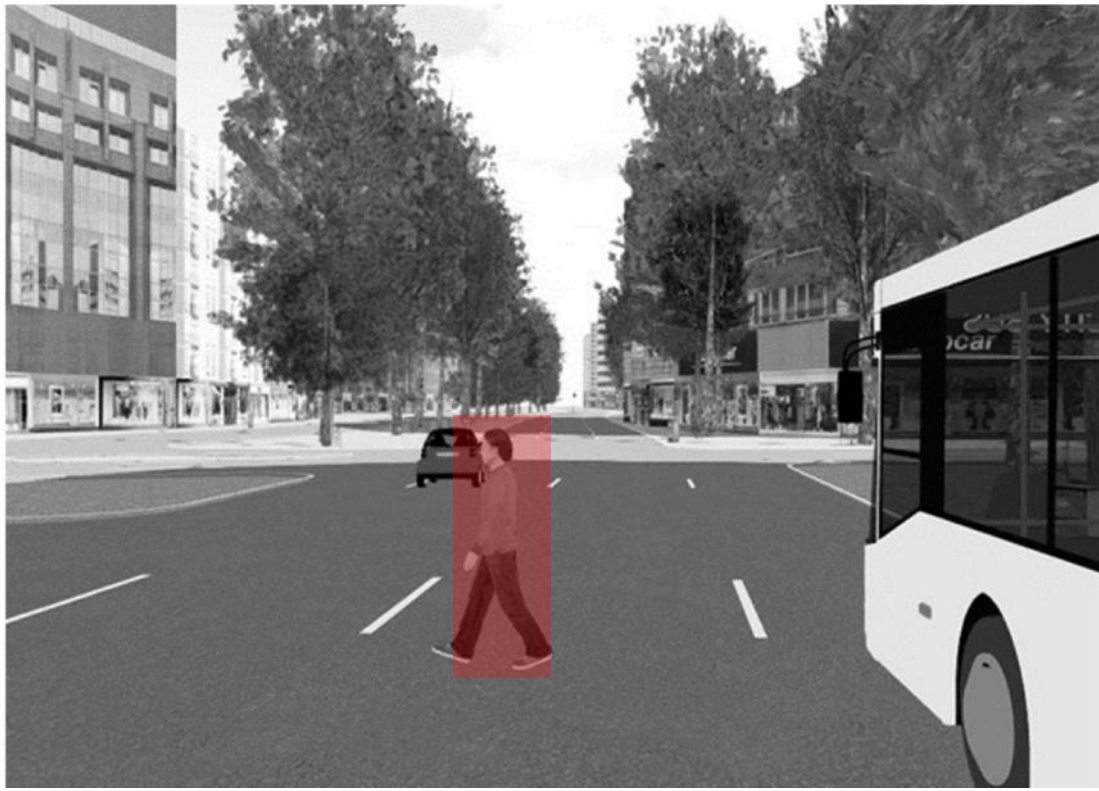
Headway Monitoring and Warning

The system detects vehicles ahead during driving, and when the vehicle fails to keep headway and is too close to vehicles ahead, it will issue visual and audible alert.

- The system can distinguish vehicle ahead in the same lane from vehicles in the oncoming lane.
- HWM functions when the vehicle speed is over 30km/h by default;
- Collision time and vehicle icons will appear on the display unit when HWM is triggered;

Pedestrian Collision Warning

The system detects the pedestrians during driving, and it will issue warnings in advance after detecting potential pedestrian collision dangers.



- PCW functions when the vehicle speed is among 0-60Km/h by default;
- Pedestrian icons will appear on the display unit when PCW is triggered;

Speed Limit Indication

The system supports speed limit indication, and when the vehicle exceeds the road speed limit, it will issue warnings for the nearest speed limit sign.

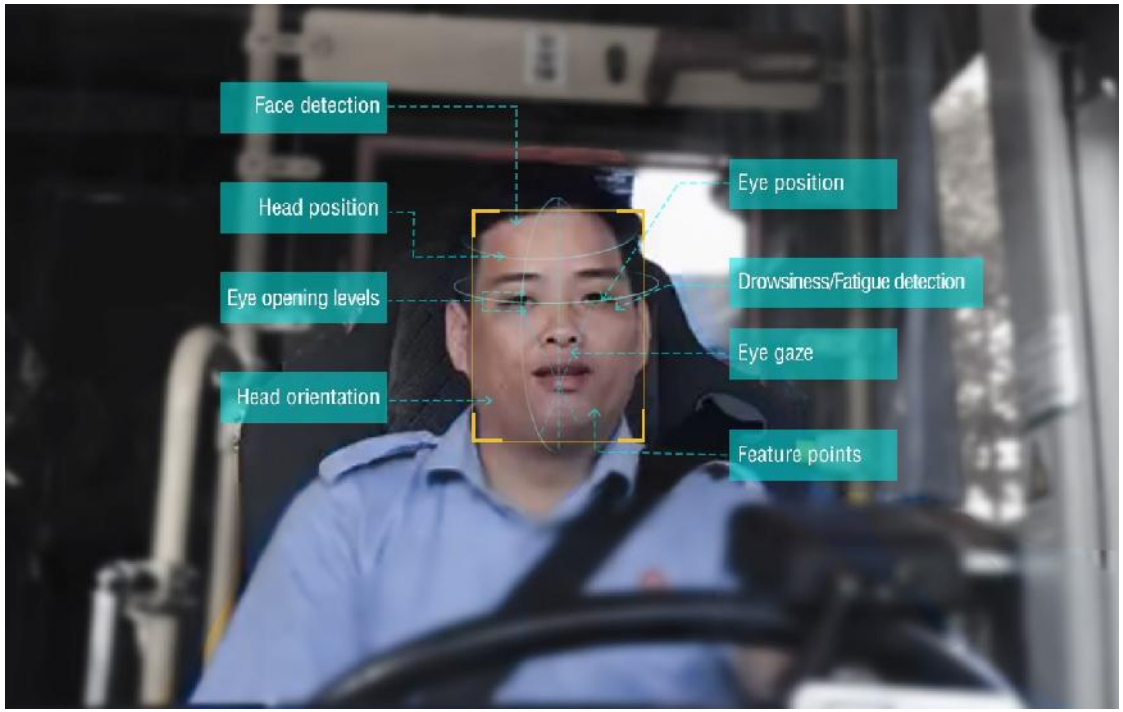
Warning Strategies

Features	Description	Warning Strategies
Lane Departure Warning	Lane change without turn signals	Speed＞50km/h
Headway Monitoring and Warning	Too close to vehicles ahead	Level l: Speed > 30km/h, TTC＜0.8s Level 2: Speed > 30km/h, TTC＜0.4s
Forward Collision Warning	High relative velocity to the vehicle ahead	TTC＜2.7s
Pedestrian Collision Warning	Potential collisions with pedestrians	Speed < 60km/h, TTC＜l.4s
Virtual Bumper	The vehicle unintentionally moves forward when the vehicle ahead stops	Distance: ＜lm
Front Vehicle Departure Warning	The vehicle stands still when the vehicle ahead starts to move forward	Front vehicle departure time : > 3s

* TTC, time to collision, equals to the distance between to vehicles divided by their relative speed.

2. Driver Status Monitoring

MRF700 could detect the drivers' head, face, eyelid movement in real-time, and will issue warnings after detecting distraction or drowsiness during driving. Warning images and videos will be uploaded to cloud management platform for remote supervision and risk assessment.



IR Camera

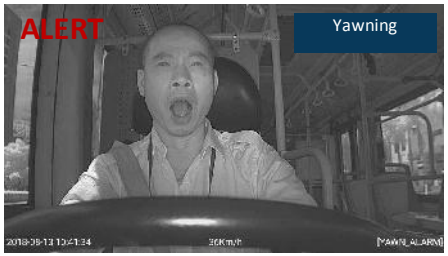
Adaptive to Low-light and Challenging Lighting Conditions

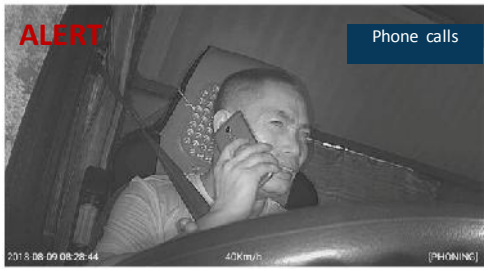
Leading AI Algorithm

Combine deep learning with traditional algorithm to enable highly accurate recognition in complex scenarios

Driver Status Detection

The system can detect various of driver status with drowsiness or distraction such as eye closure, yawning, heading down, eyesight deviation, phone calls and so on. and also can support fatigue status detection in various scenario such as mask, hat, eyeclasses/sunglasses and so on.





Warning Strategies

Intelligent Driving Technology Provider

Features	Description	Warning Strategies
Eye Closure	the driver's eyes are closed	Speed＞ 10km/h
Yawning	the driver is yawning	Speed＞ 10km/h
Head Down	the driver is looking down	Speed＞ 10km/h
Eyesight Deviation	the driver is not looking forward	Speed＞ 10km/h
Phone calls	the driver is talking over the phone	Speed＞ 10km/h
Smoking	the driver is smoking in the vehicle	Speed＞ 10km/h
Empty	the camera didn't detect the driver's face	Speed＞ 10km/h
Shelter	the camera is covered	Speed＞10km/h

3) Cloud Management Platform, Providing Data Basis for Risk Evaluation

Intelligent Driving Technology Provider

Warning information will be uploaded to the cloud management platform in real-time, providing data basis for driving risk evaluation, and delicate fleet management. Wistron cloud management platform can be integrated with third-party fleet management platforms.

Vehicle Safety
Risk Warning
Visualized Vehicle Monitor
Real-time Manual Intervention
Automatic Evidence Collection
Driver Behavior Analysis
Driver Safety Analysis Report

High-efficiency Management
Real-time Task Monitor
BI Analysis & Operations Report
Vehicle/Driver Management

MRF Cloud Management Platform

Third-Party Fleet Management Platforms

Support Integration Via Multiple Protocols

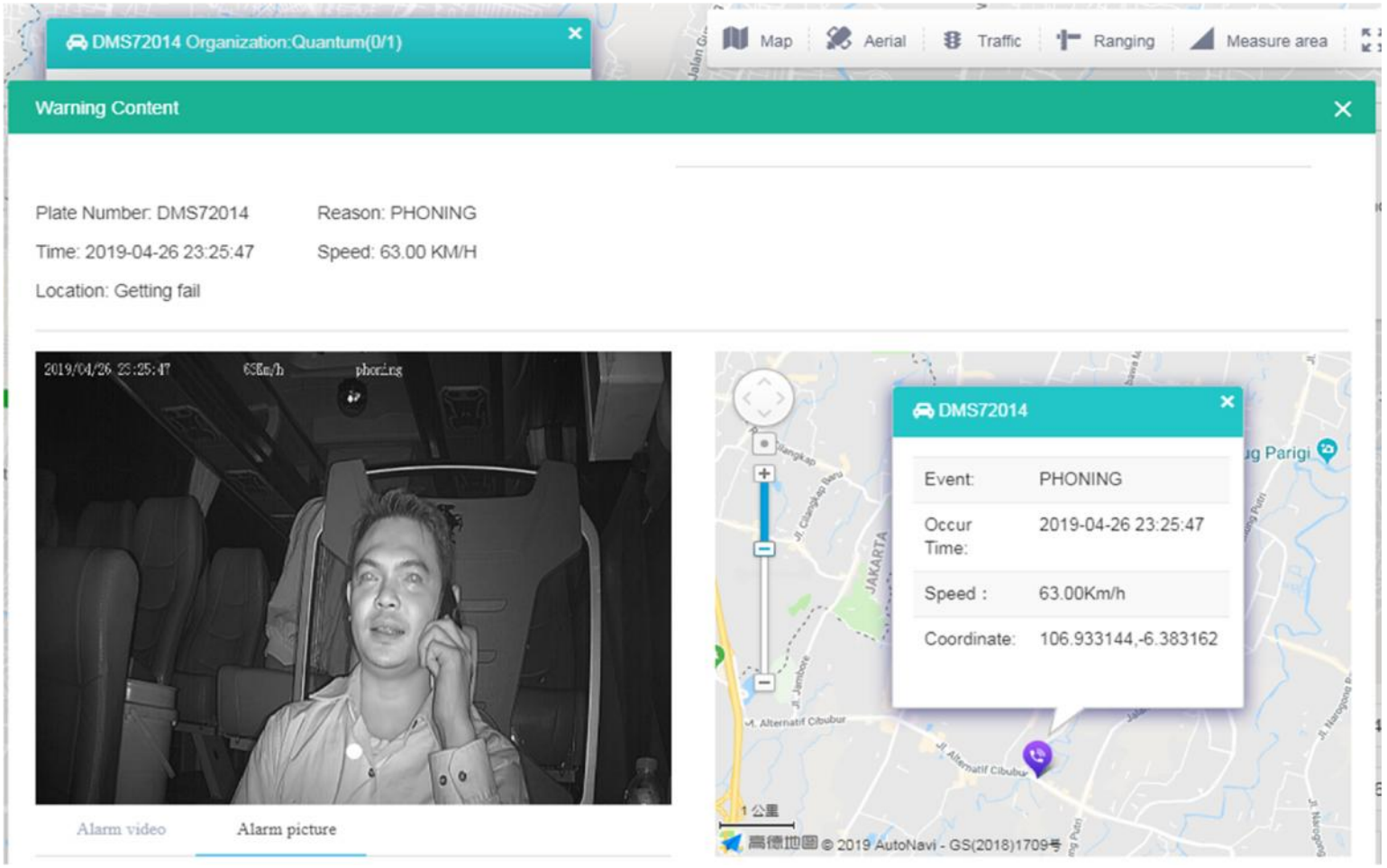
- based on restful API
- based on JTT 809
- based on MQTT of IOT architecture

Support Data Exchange

- Device/Vehicle Data
- Vehicle Track
- Warning

Realtime Vehicle and Driver Monitoring for Driving Safety

- Realtime Risk Warning
- Realtime Monitoring
- Realtime Manual Intervention
- Automatic Evidence Capture



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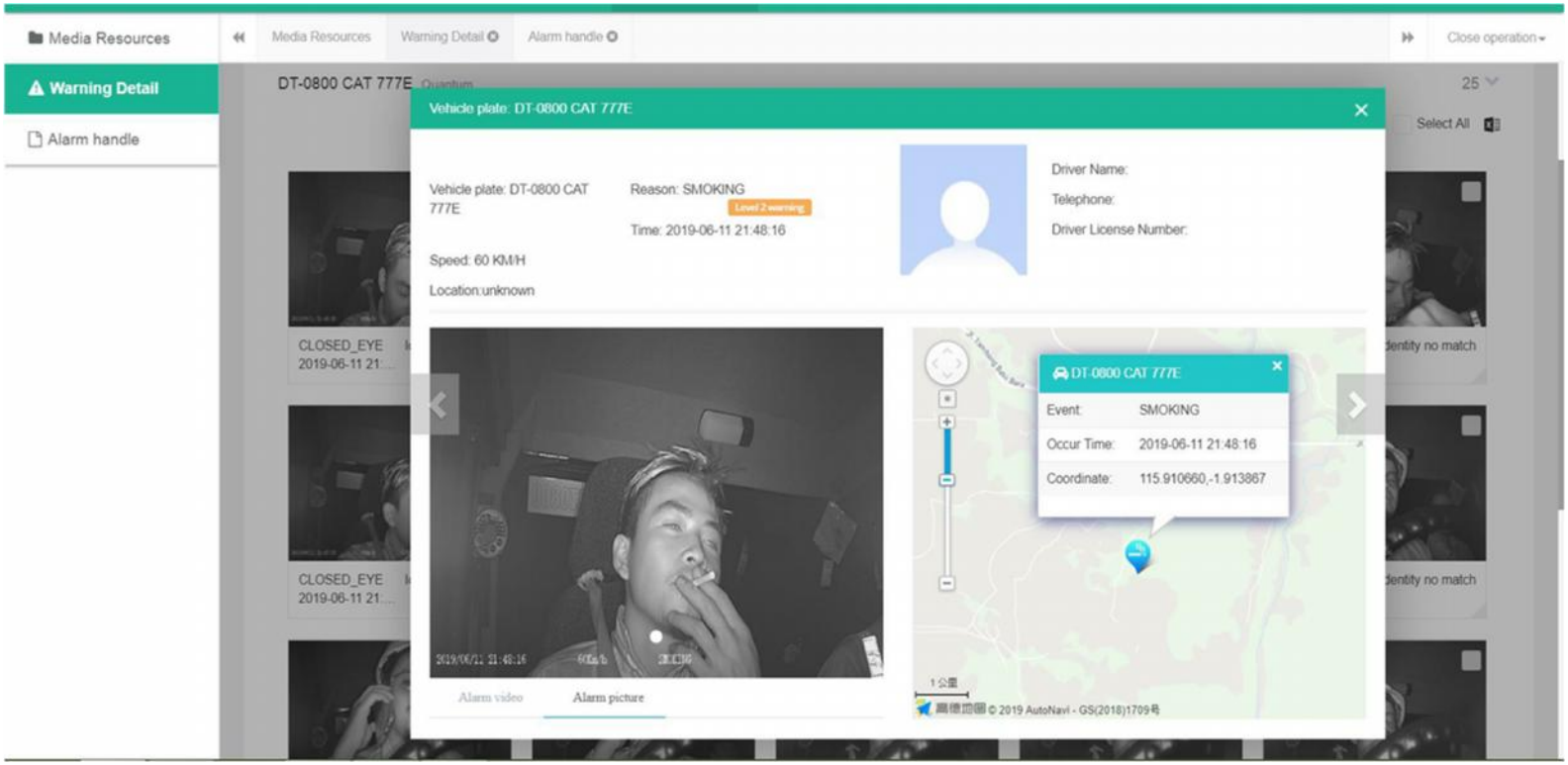

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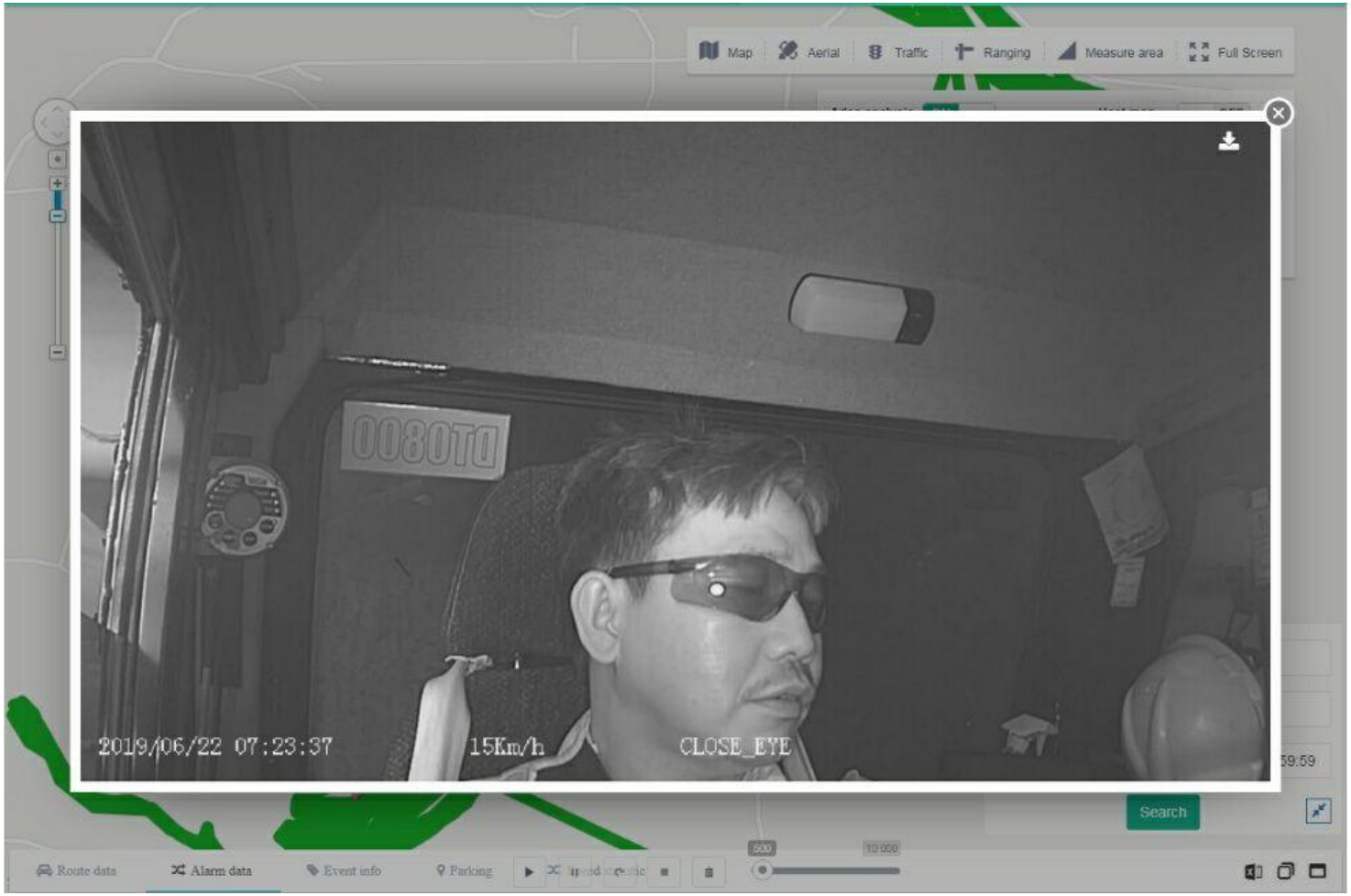

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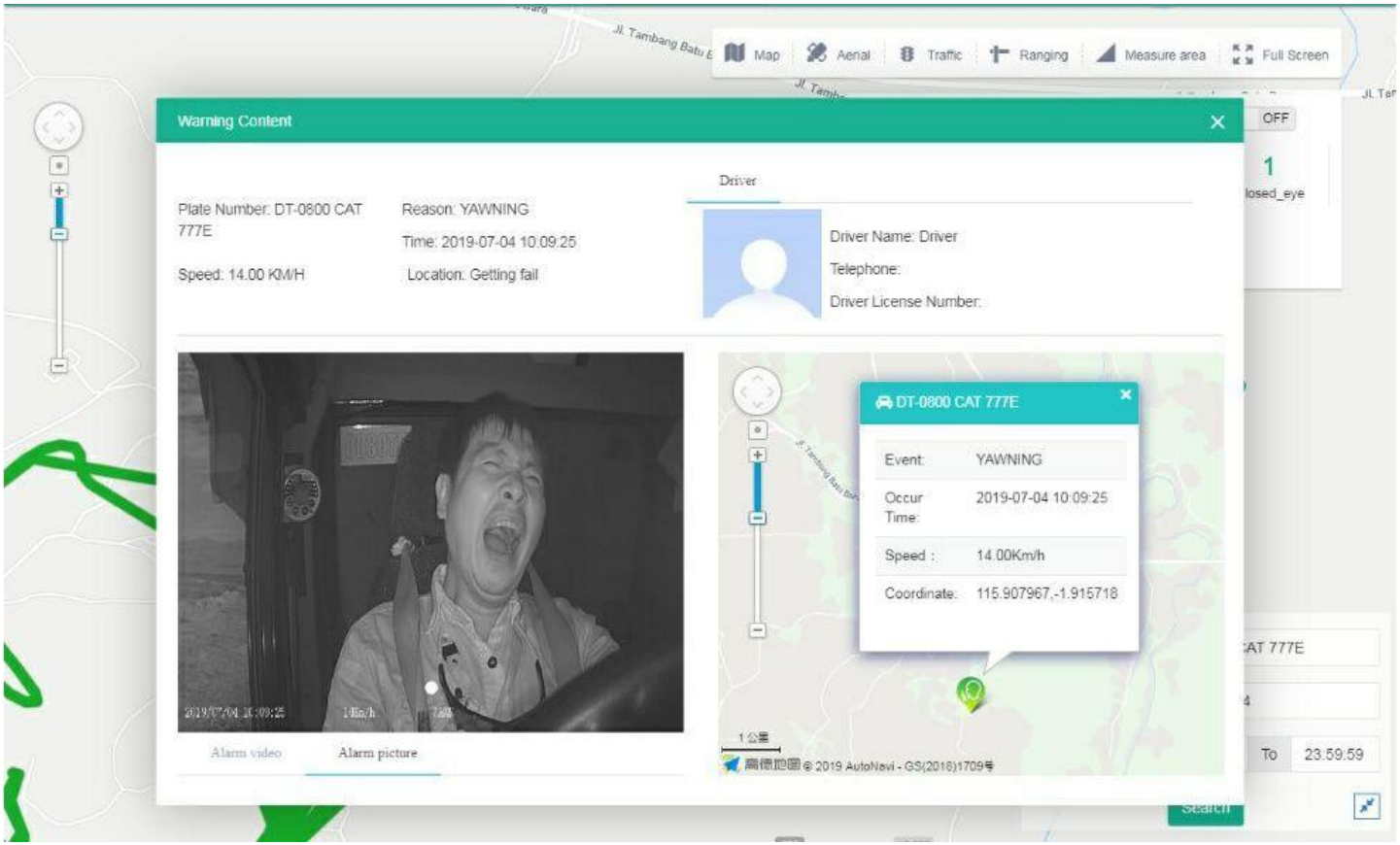

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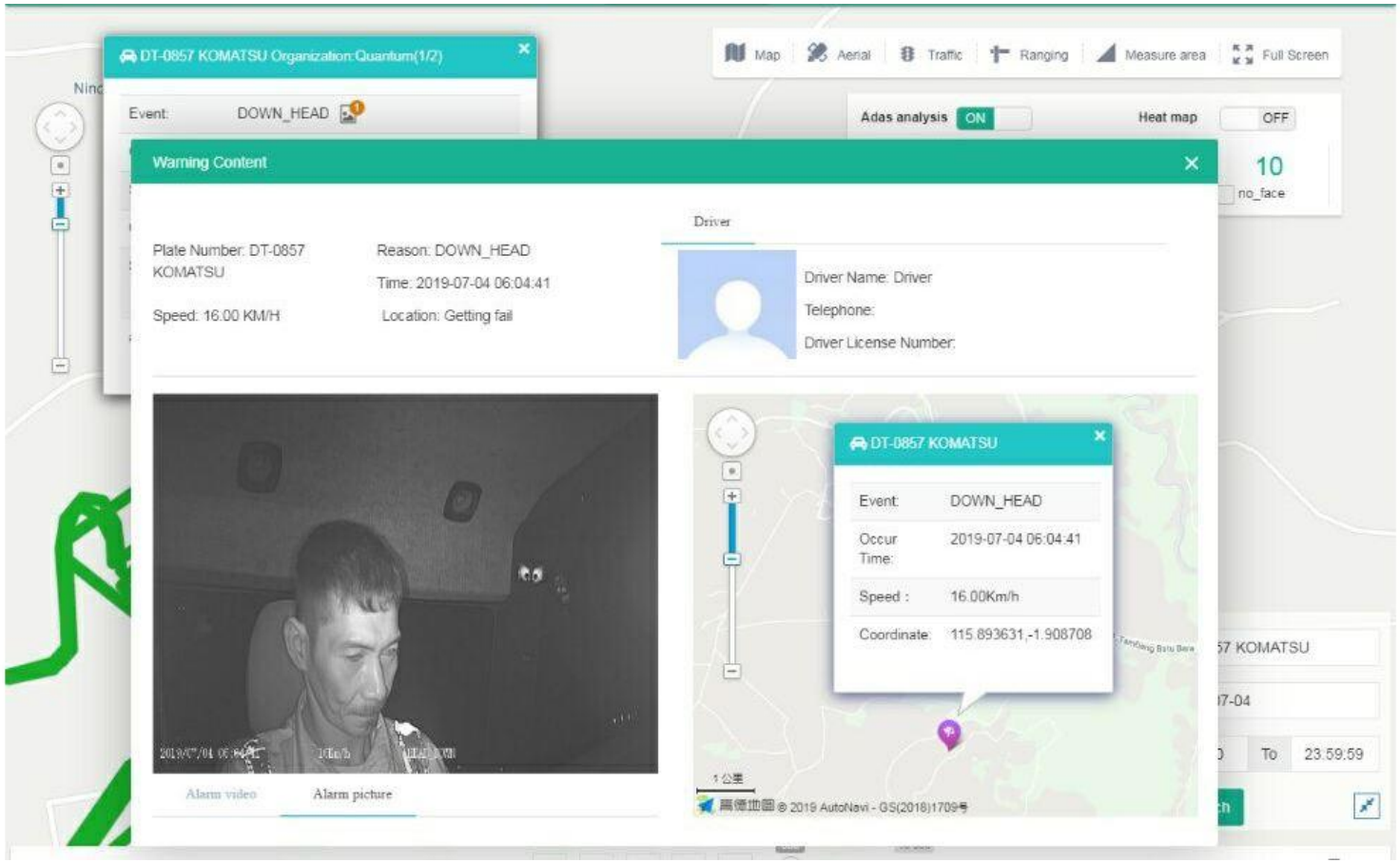

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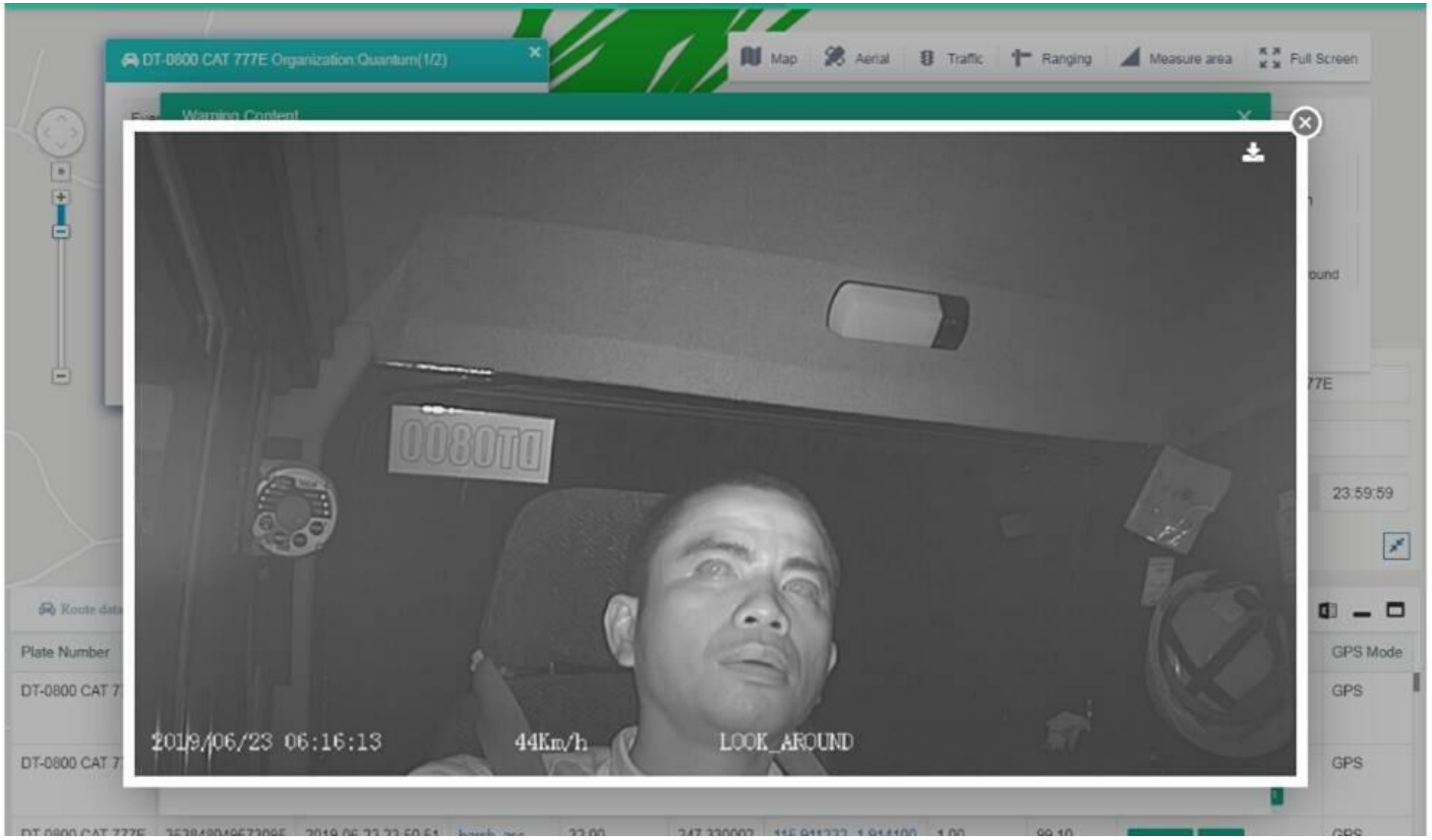
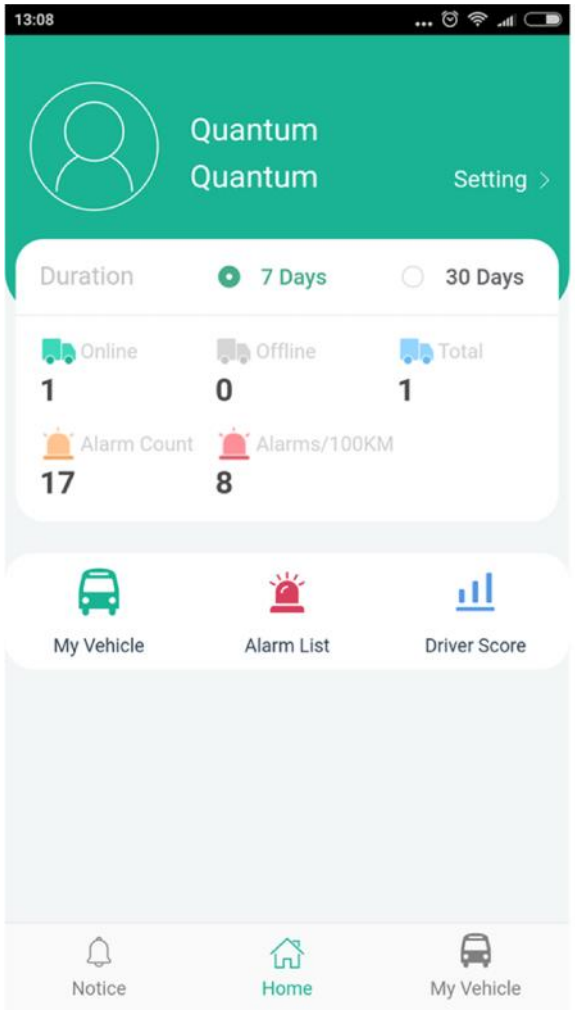
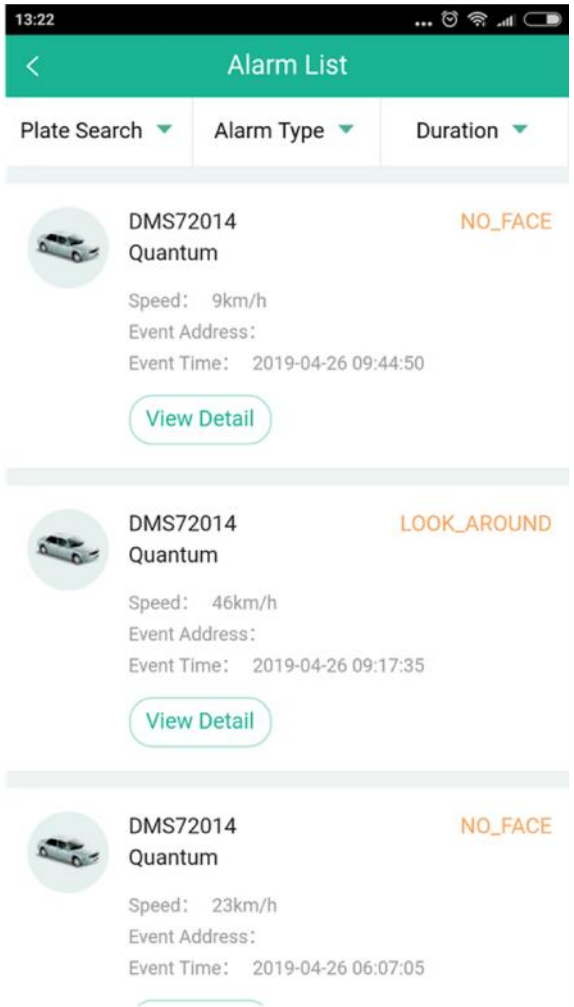


Mobile App Realtime Vehicle and Driver Monitoring for Driving Safety

Intelligent Driving Technology Provider

- Realtime Risk Warning
- Realtime Monitoring
- Realtime Manual Intervention
- Automatic Evidence Capture





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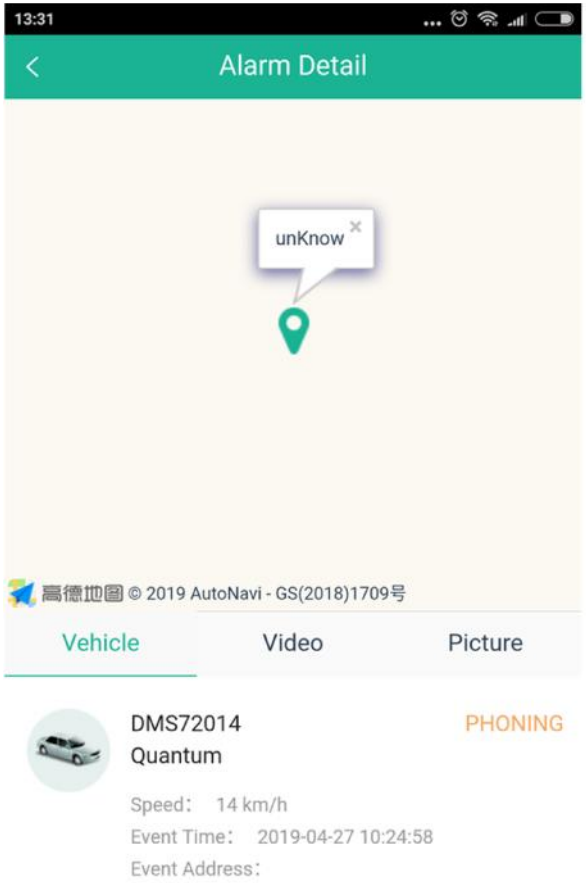

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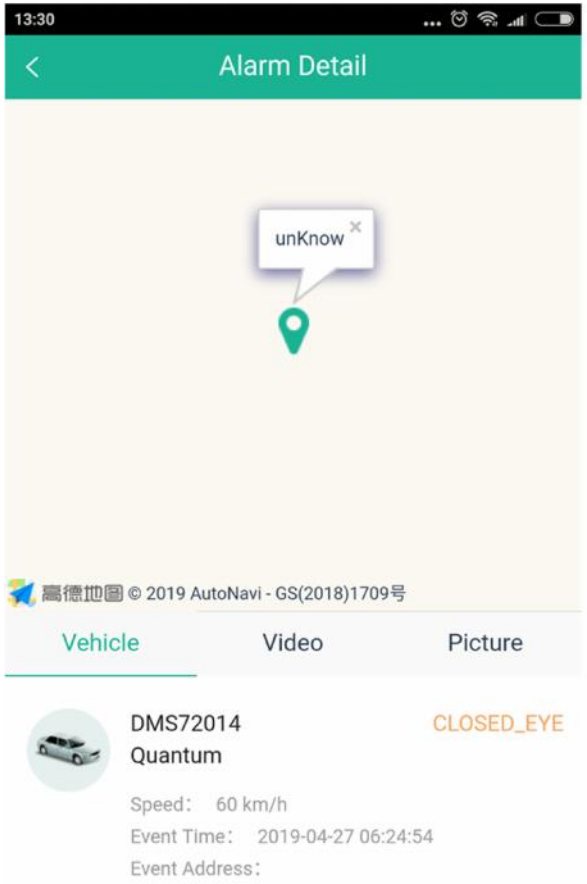
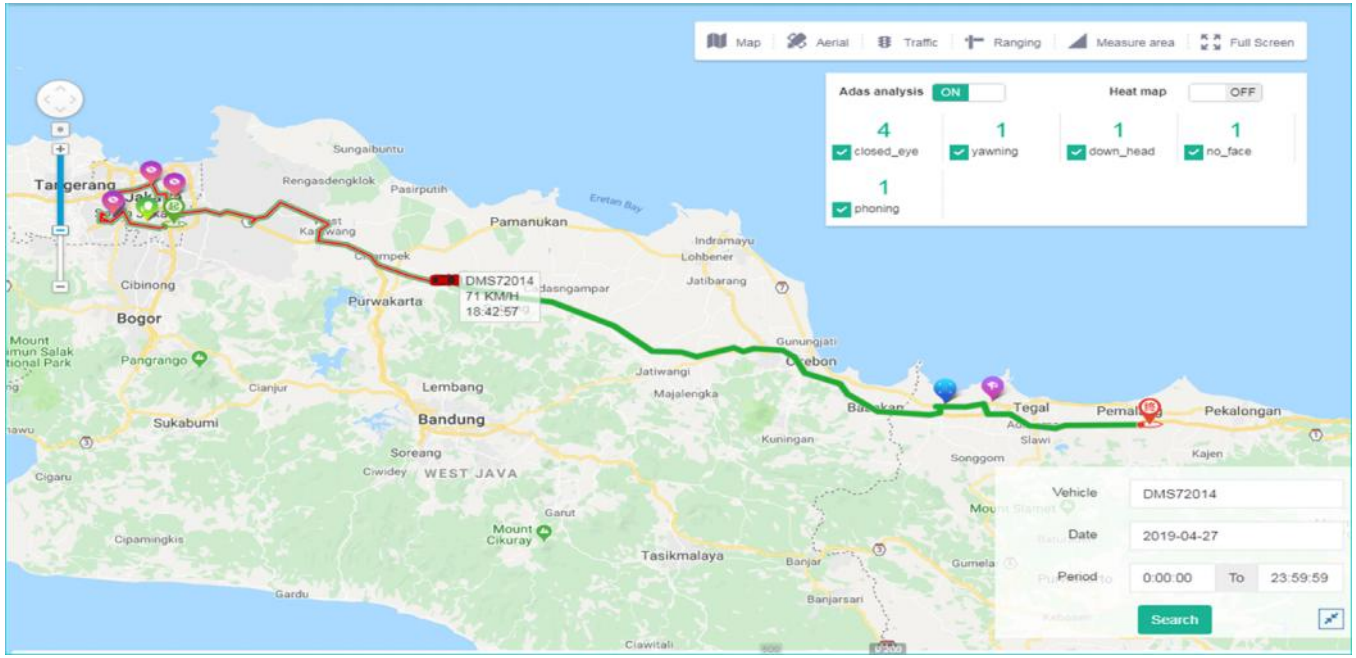


Driving Data Capture for Delicacy Management of Fleets

Data Capture of Abundant Accurate Driving Scenarios

Data Capture of Driver Status

Driving Behavior Analysis and Risk Evaluation



Drowsy Driving	Speed Limit	Single Trip Duration	Behavior Analysis
Distracted Driving	Road Type	Driver Info	Warning Trend
Driver Identification	Single Trip Mileage	Warning Inquiry	Score Trend

Realtime Vehicle ADAS Camera Monitoring for Driving Safety

- Realtime Risk Warning
- Realtime Monitoring
- Realtime Manual Intervention
- Automatic Evidence Capture

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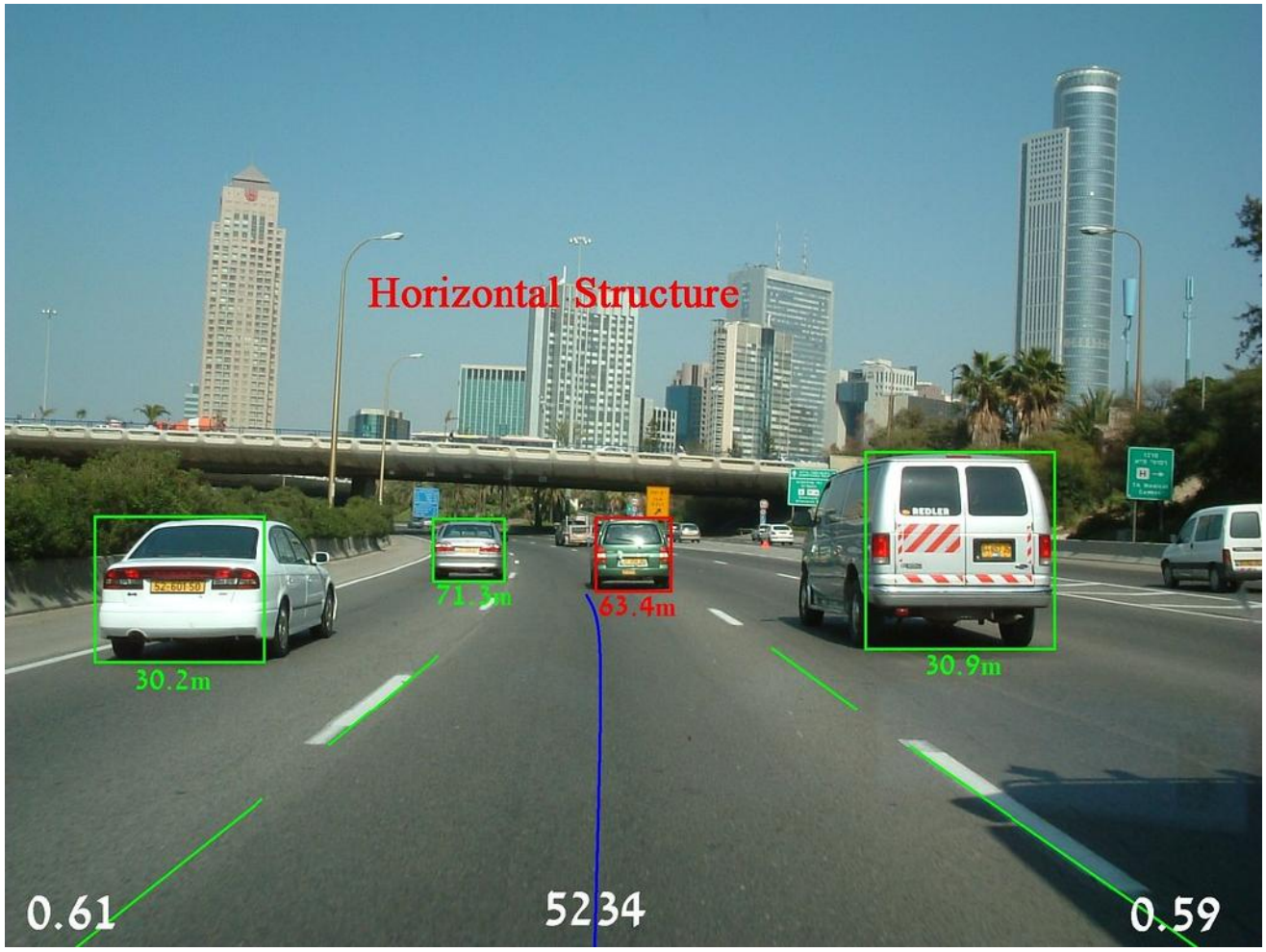

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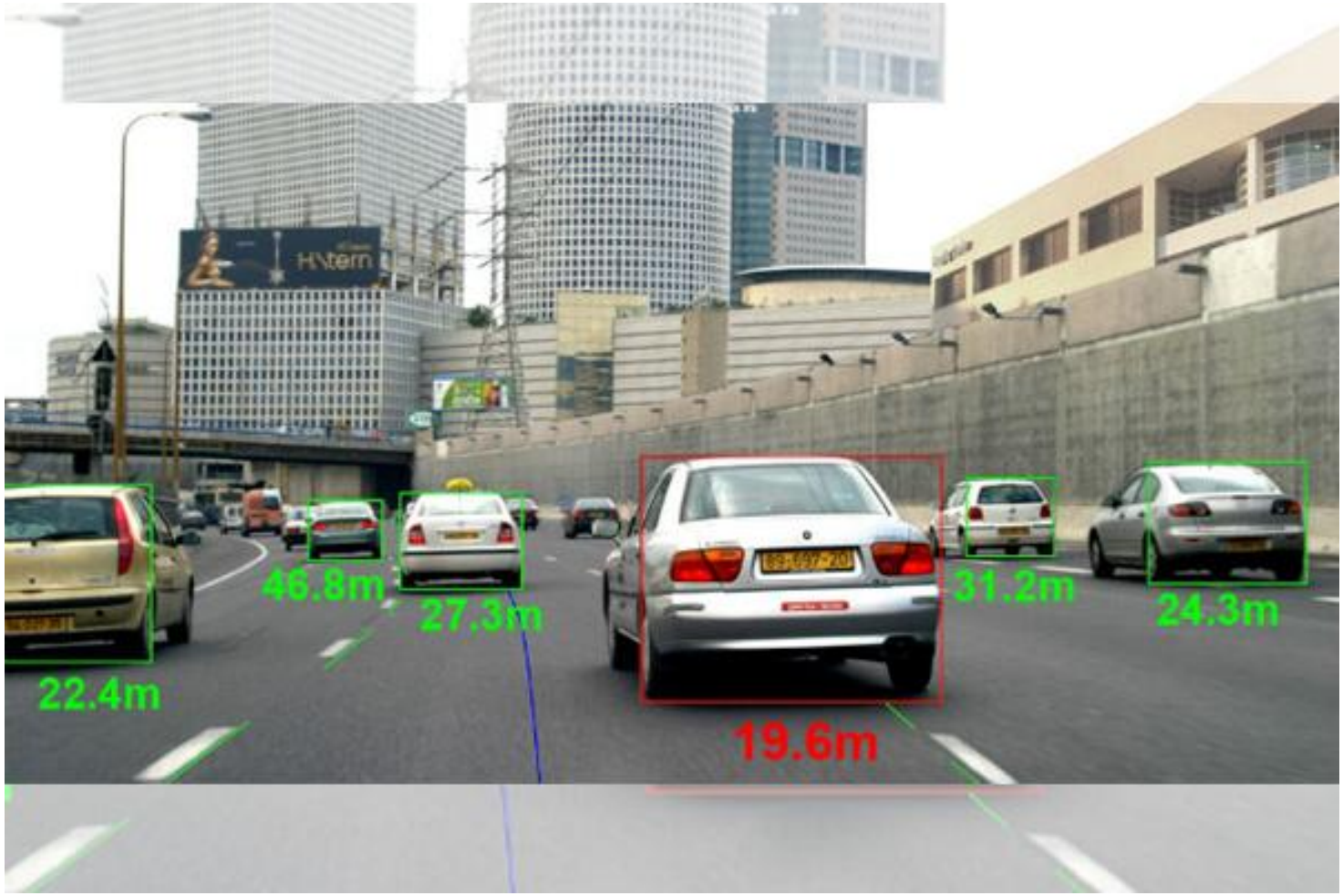


Advantages of Cloud Management Platform

Data Encryption
Data Compression

- Data transmission with two-way authorization, secure protocol encrypted
- Data packet compression, small packet size and less data cost

Support PC/APP
Multi-Platform Operation

- Support PC/ APP operation.

One-Click Installation
Private Deployment

- One-click installation
- Support dynamic capacity expansion

Open Data Platform

- Support standardized data output, and multi-platform data distribution
- Support customized data output, and dynamic data configuration

Single node connects
5000 lines

Maximize Message Concurrency
TPS : 10*5000

Average Message Delay
120ms

2

System Highlights

MRF700 Efficient 2-in-1 Driving Assistance Solution

Intelligent Driving Technology Provider

Algorithm

Hardware

Installation

Cost

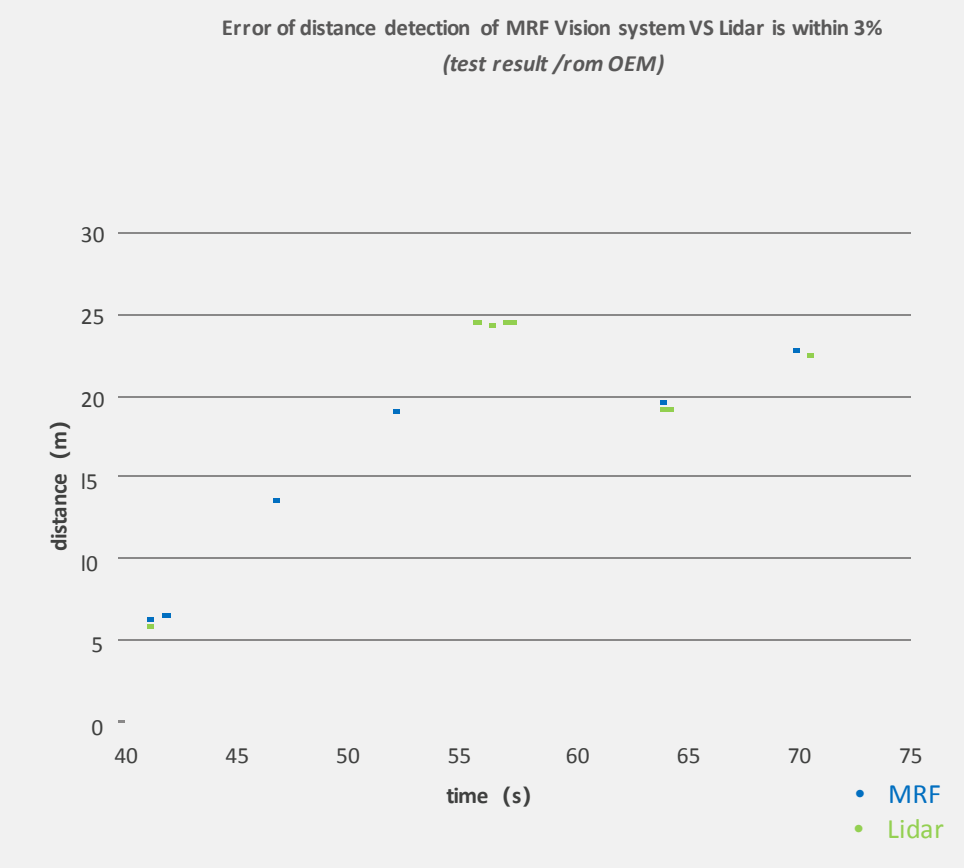
1) Leading AI Algorithm

3% | Error of distance detection of MRF vision system vs Lidar is within 3%

3cm | Lane marking detection precision around 3cm

150m | Minimum curvature radii around 150m

120m | Vehicle detection distance around 120m



2) High Quality Hardware Selection Enables Higher Detection Accuracy

Intelligent Driving Technology Provider

Professional ADAS Camera with HDR

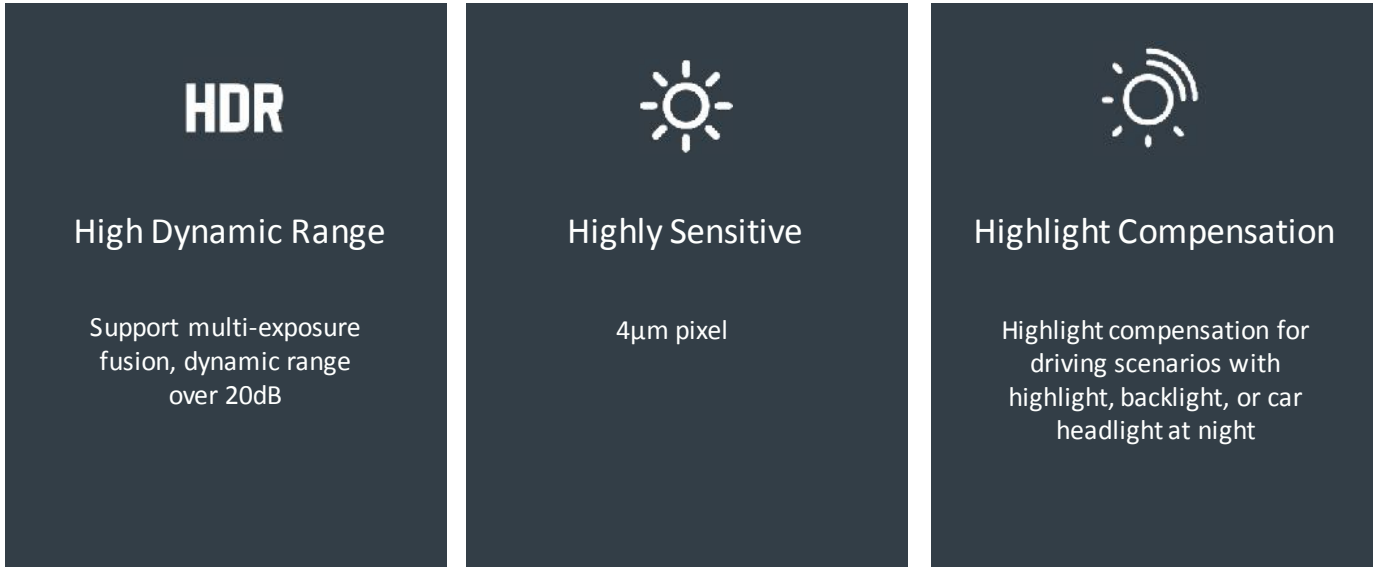
Highly Sensitive & Large DMS Camera

Highly Performance Processing SoC

High Quality Components

Robust ADAS Camera with HDR

The ADAS camera comes with highly sensitive image sensors with HDR, and supports highlight compensation to output high quality image, contributing to the algorithm detection accuracy.



Highly Sensitive DMS Camera for Perfect Image Quality

To improve the image quality, the system uses cameras with large sensors, high sensitivity and high quantum efficiency.

High-End

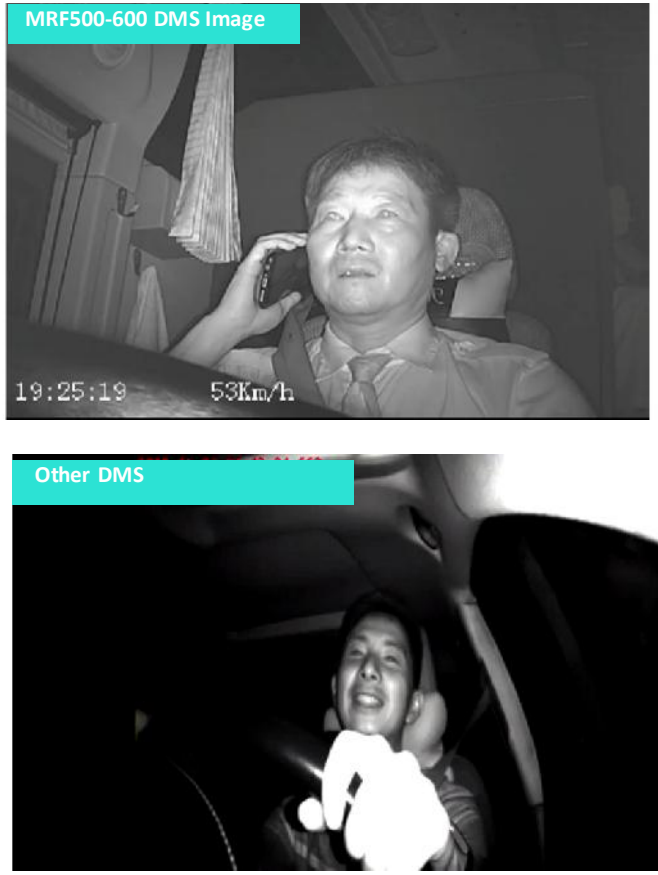
HDR

- 5.5µm, 1/2 inch, high sensitivity
- Support HDR, maximum dynamic range up to 80dB;
- F1.6

Quantum Efficiency

35%

- Normal IR camera QE is around 10%-20% ;
- The larger QE is , the higher the camera sensitive ;



Contrast of DMS Night Image Quality

Flexible Installation, Support Multi-Platform Calibration

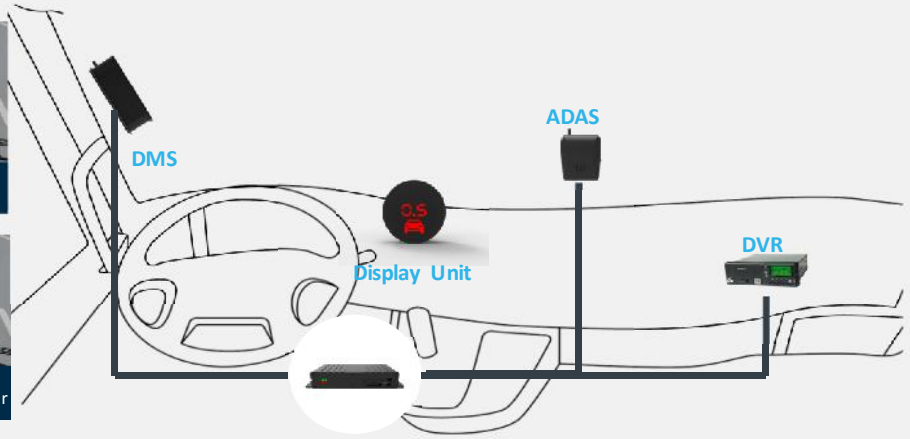
Intelligent Driving Technology Provider

• Flexible Installation

The Main unit can be hidden in the console, and the ADAS camera can be attached to the windshield, and the DMS camera can be attached to the console, or to the windshield near the A-Pillar.

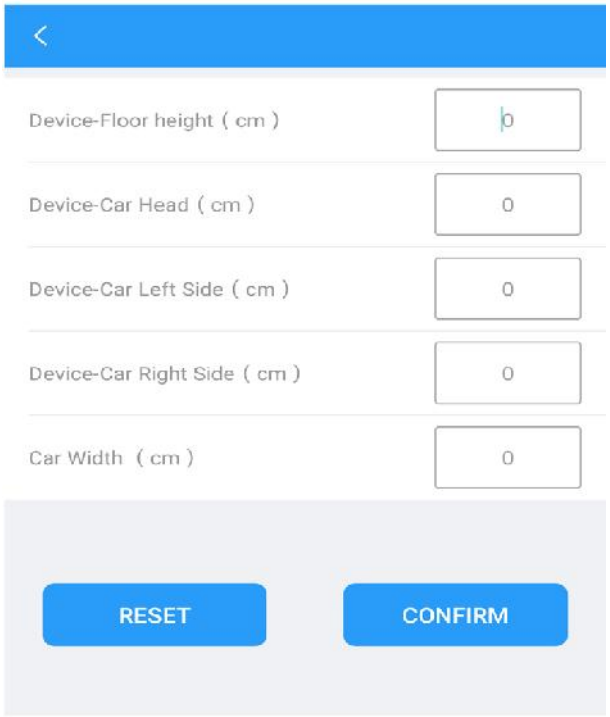
DMS:on the console

DMS:windshield near the A-Pillar



- Connect Vehicle ACC/VCC/GND
- Hidden on the console

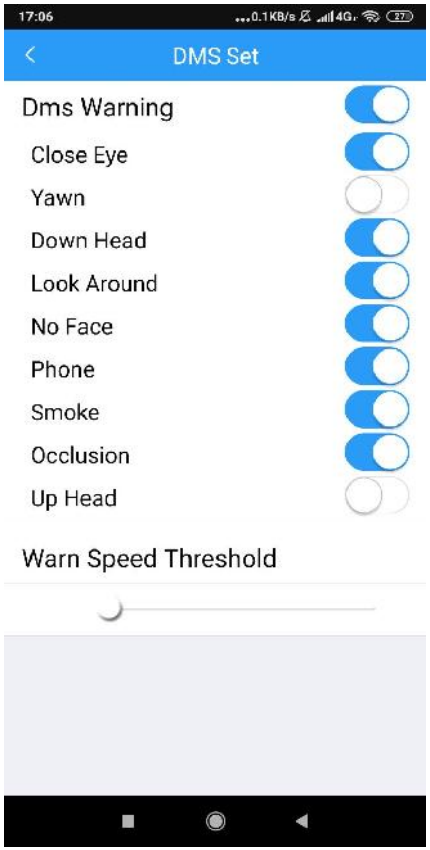
• Support PC/APP Calibration

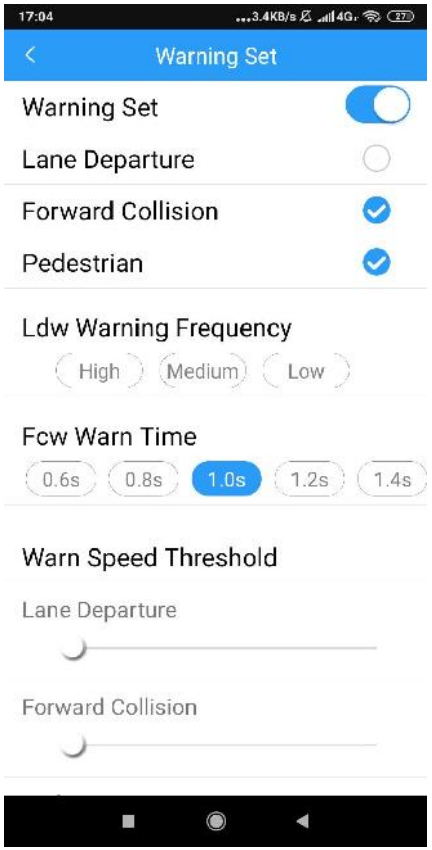


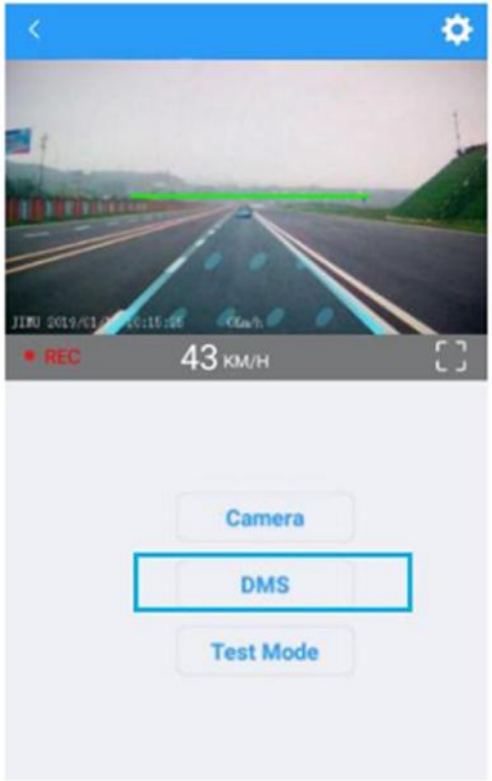
Support Multi-Platform Calibration

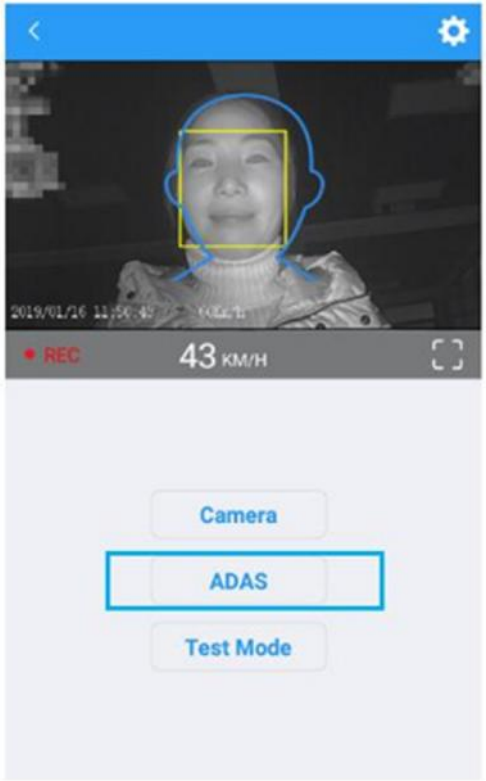
Intelligent Driving Technology Provider

Mobile Android App Calibration





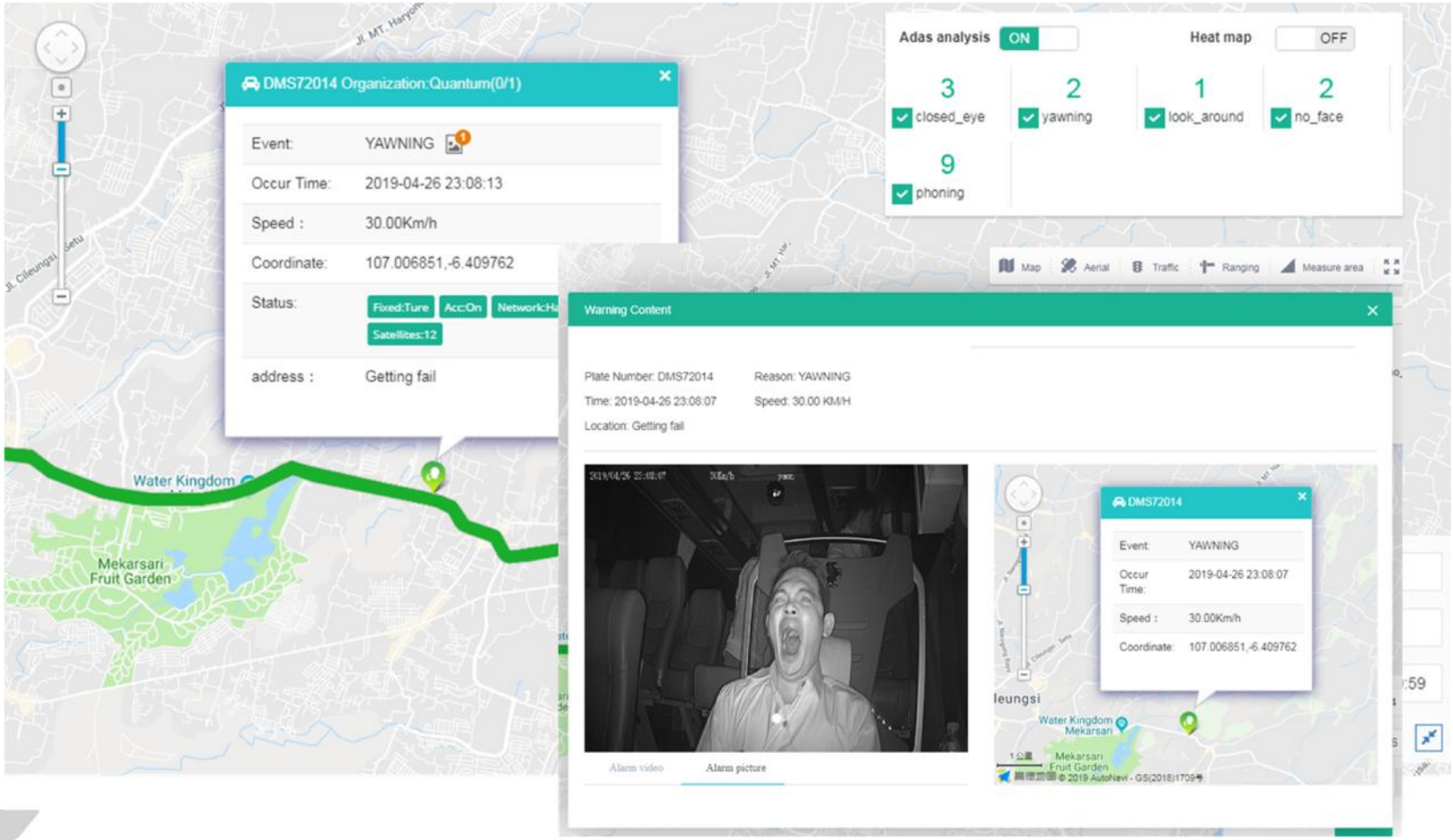




ADAS Setting, DMS Setting, General Setting via WIFI

Support Multi-Platform Calibration

Web Base Application



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Specifications

Features and Specifications of Main Unit

System	Andriod 5.1
Memory	8GB+1GB EMCP
Video	2-CH H.264 720P
Memory Card	Max 128G
Video Input / Output	2-CH 720P AHD video input/output
Internet	1 channel 100MB RJ45
Port	2-CH RS232
CAN	1-CH CAN
USB	1-CH USB
SIM	Support LTE/3G/2G, TDD-LTE/FDD-LTE/WCDMA/ TD-SCDMA/GSM/EDGE

WiFi	Support WiFi/ WiFi AP/ 2.4G 802.1 b/g/n
Audio	Support MIC& PA, singlespeaker
G-sensor	Support G-sensor, supportgyroscope
BT	Support BT 4.0, 2.4G, distance of 10m
GPS	Support GPS, GPS+Beidou
Hardware	Right and left turn signal, speed signal
Voltage	9V~36V
Power Consumption	24V/0.4A
Operation Temperature	-20℃-70℃
Storage Temperature	-30℃-80℃
Dimension	183mm * 102mm * 36mm

External Interface of Main Unit

No.	Interface	Description	Number
1	LED	System status indicator	2
2	LED	Interface status indicator	2
3	SIM Card	Install SIM card	1
4	USB	USB port	1
5	TF Card	Install TF card	1
6	RESET	System reset button	1
7	M16-8-Pin aviation connector	ADAS camera, AHD port	1
8	GX12-6-Pin aviationconnector	Internet access, connect DVR	1

No.	Interface	Description	Number
9	GX12-7-Pin aviation connector	DMS camera, AHD port	1
10	2*5P connector	Standard interface	1
11	2*8P connector	Extension interface	1
12	2*6P connector	Extension interface	1
13	SMA interface	LTE main antennas	1
14	SMA interface	GPS main antennas	1
15	SMA interface	WIFI/BT main antennas	1

Camera Specification

ADAS Camera
Main Unit

DMS Camera

Device	Type	Category	Description
ADAS Camera Main Unit	Size	Size	52mm*62mm*35mm
	Image	Effective Pixel	1280*720
		HDR	Supported
	Camera	Focal Length	8mm
		Field Angle	Horizontal 50°, Vertical 28°
	Video	Video Output	1-CH NTSC：1280*720@30fps
DMS Camera	Size	Size	100mm*64mm*75mm
	Image	Effective Pixel	1280*720
		HDR	Supported
	Camera	Focal Length	6mm
		Field Angle	Horizontal 66°, Vertical 37.3°
	Video	Video Output	1-CH PAL：1280*720@25fps

Parts List

No.	Unit	Configuration	Notes
1	Main Unit ADAS Camera	standard	-
2	ADAS Camera	standard	-
3	DMS Camera	standard	-
4	Standard Power Line	standard	-
5	GPS /WiFi/4G Antenna	standard	-
6	TF Card	optional	-
7	SIM Card	optional	-
8	Extra camera	optional	Normal camera
9	Optional Cable	optional	a serial port, a CAN

4

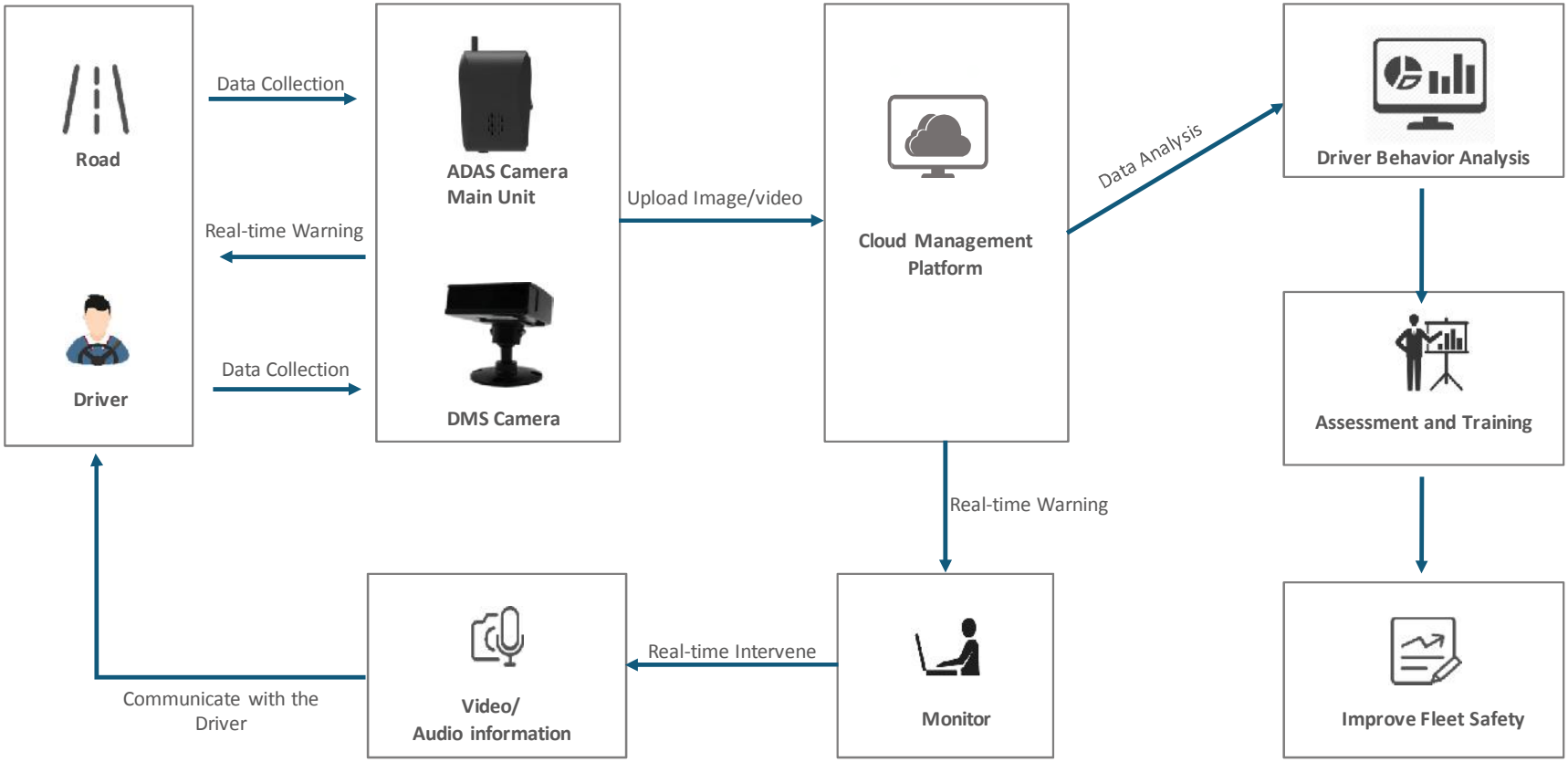
Extension Features

Multiple Extensions to Meet Different Requirements

Intelligent Driving Technology Provider

GPS or OBD	G-Mouse	Differential Positioning	DR Navigation
Get the speed of vehicles	Get the position of vehicles	Get the position of vehicles	Get the speed of vehicles without breaking the vehicle circuits

Application Framework



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