HESHAM INDUSTRIAL SOLUTIONS

BUS SEAT BELT REMINDER SYSTEM:

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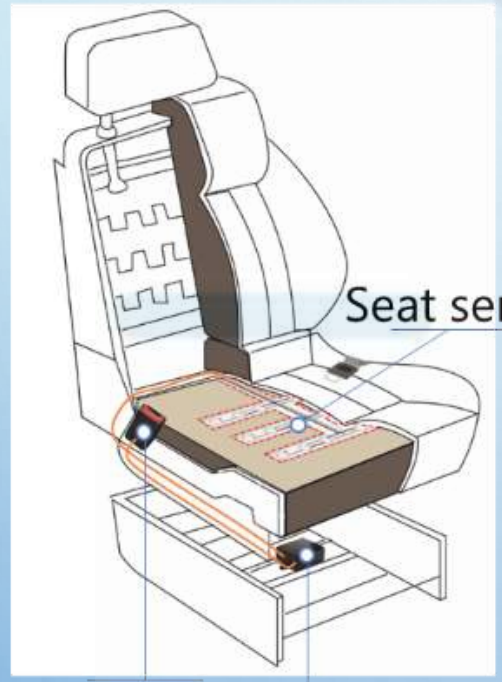
01. Background and Demand

The seat belt is often referred to as the "life belt," serving as the most fundamental and critical occupant protection device during car accidents. Statistics show that wearing a seat belt can reduce the mortality rate by 57% in frontal collisions, 44% in side impacts, and 80% in rollover accidents. Many countries have made it mandatory for drivers and passengers to wear seat belts, imposing fines for non-compliance. The purpose of the seat belt detection system is to utilize IoT technology for effective seat belt management, reminding passengers to wear seat belts and reducing secondary injuries caused by accidents.

02. System Topology Introduction

Network screen solution:



Seat sensor

Seat belt buckle

Safe reminder system

Car Power （12V/24V）

4G

Sub-1G

Audio line

Car audio

Detection terminal

(single seat、double seat)

Reminder terminal

Network screen solution:

1. Seat cushion sensor and seat belt socket

The seat cushion sensor detects whether someone is sitting in the seat, the seat belt socket detects whether the passenger's seat belt is fastened, and the detection result is output to the detection terminal.

2. Terminal detection

The detection terminal packages the detection results of the seat cushion sensor and seat belt socket, and sends them to the safety reminder host through wireless signals at regular intervals. One detection terminal can detect the status information of one or two seats.

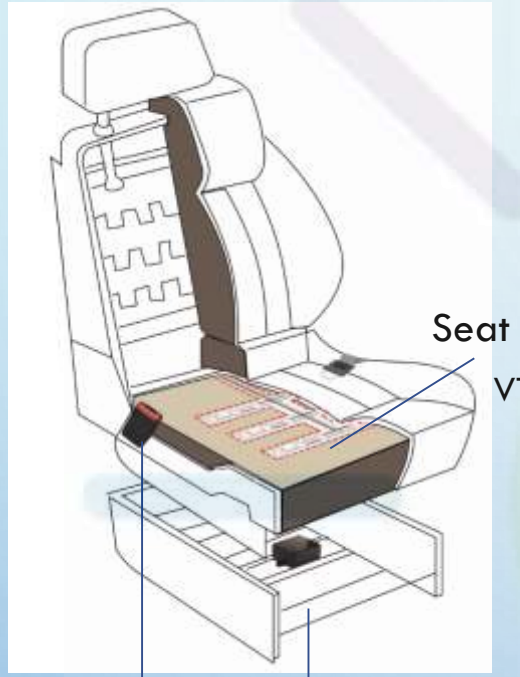
3. Seat belt host

The seat belt host receives signals from the detection terminal, displays th results on the screen, and outputs audio signals to drive the car speaker through the car amplifier, reminding passengers who have not fastened their seat belts to do so. The data is uploaded to the backend system through the 4G network.

4. Backend system and mini program

Administrators can remotely view the seat and seat belt fastening status of vehicles in the backend system, perform location queries, and remotely manage devices.

Local screen solution:

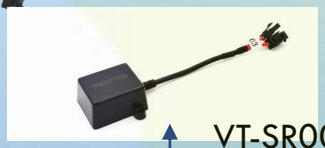


Seat sensor
VT-SR004

Seat belt buckle
VT-SR001

Car power supply
(12V/24V)

Sub-1G



VT-SR003
VT-SR002

Detecting terminals
(Single seat, double seat, triple seat)

audio cable

VT-SR710

Reminder terminal
(Bus, school bus, commercial vehicle, taxi, RV, ambulance)

Car horn

Local screen solution:

1. Seat cushion sensor and seat belt socket

The seat cushion sensor detects whether someone is sitting in the seat, the seat belt socket detects whether the passenger's seat belt is fastened, and the detection result is output to the detection terminal.

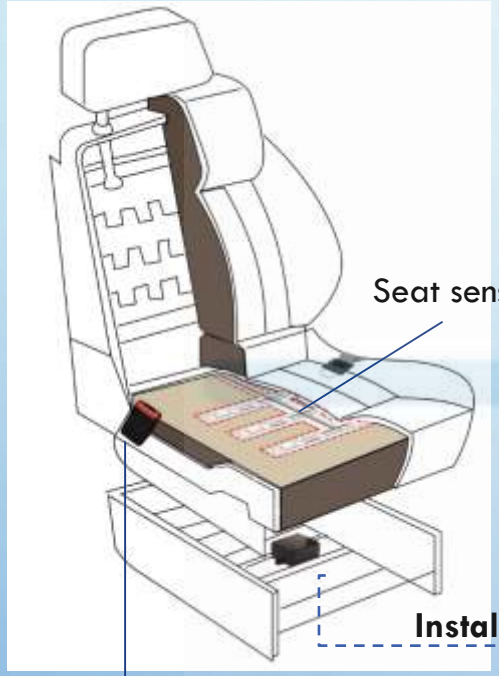
2. Terminal detection

The detection terminal packages the detection results of the seat cushion sensor and seat belt socket, and sends them to the safety reminder host through wireless signals at regular intervals. One detection terminal can detect the status information of one or two seats.

3. Seat belt host

The seat belt host receives signals from the detection terminal, displays the results on the screen, and outputs audio signals to drive the car horn through the car amplifier, reminding passengers who have not fastened their seat belts to do so.

Seat belt alarm scheme:



Seat sensor

VT-SR004

Installation position

Seat belt buckle

VT-SR001

Car power supply
(12V/24V)

Seat belt alarm

(Single seat, double seat, triple seat)

VT-SA002-OT

Seat sensor

VT-SR004

Seat belt buckle

VT-SR001

Seat belt alarm scheme:

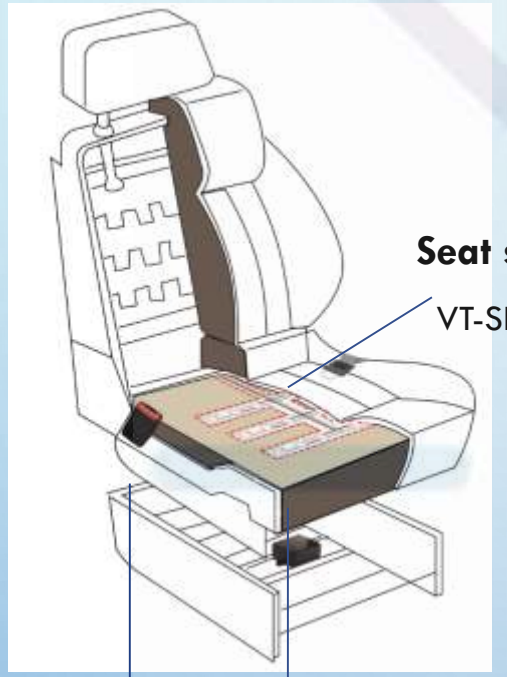
1. Seat cushion sensor and seat belt socket

The seat cushion sensor detects whether someone is sitting in the seat, the seat belt socket detects whether the passenger's seat belt is fastened, and the detection result is output to the detection terminal.

2. Seat belt alarm

Seat belt alarm (battery+dual seat) is mainly used for detecting and alerting when a car seat belt is not fastened. When a passenger is detected sitting and not fastened, it will provide voice and visual reminders. One seat belt alarm can manage two seats.

IOT BOX Solution:



Seat sensor

VT-SR004

Seat belt buckle

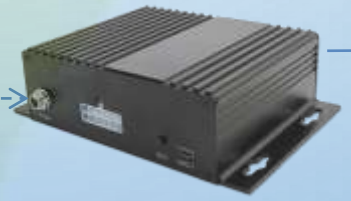
VT-SR001

Detection terminal

VT-SR003 VT-SR002

Wireless Sub-1G

Power（12V/24V）



IOT BOX

VT-SR013

RS485

4G

Seat belt reminder system

Terminal of customer

SPEAKER CABLE

Car horn

The products we offer

IOT BOX Solution:

1. Seat cushion sensor and seat belt socket

The seat cushion sensor detects whether someone is sitting in the seat, the seat belt socket detects whether the passenger's seat belt is fastened, and the detection result is output to the detection terminal.

2. Terminal detection

The detection terminal packages the detection results of the seat cushion sensor and seat belt socket, and sends them to the safety reminder host through wireless signals at regular intervals. One detection terminal can detect the status information of one or two seats.

3. IoT Box

The IoT box is responsible for receiving wireless signals from detection terminals, intelligently determining which seat's passenger is not wearing a seat belt, and outputting audio signals to the car speaker to broadcast voice reminders for passengers who are not wearing a seat belt to do so. Finally, the relevant data is sent to third-party devices via RS485

03. Equipment

Reminder terminal:

Power parameters	
Power supply method	DC 12V or 24V
RF parameters	
Communication bands	Sub-1G
Communication distance	60 meters (open conditions).
Physical parameters	
Networking method	2G/3G/4G Global Connect (excluding Japan and North America)
Locate method	GPS/BD, Internal Antenna
Screen size	7 inch IPS TFT screen, resolution 1024*600
Power supply interface	DB9 or DC 5.5mm×2.5mm
Audio interface	DB9
Reminder method	Voice output (excluding power amplifier)
Apparent dimension	175mm×129mm×37mm
Amplifier power	2 channels*5W
Fixed method	Bracket installation, fixed with screws
Networking method	4G Global Connect (excluding Japan and North America)
Locate method	GPS/BD, Internal Antenna
Environment parameters	
Operating temperature	-20℃~70℃

The seat belt host is installed at the front of the car and is responsible for receiving signals from the detection terminal, displaying the results on the screen, and outputting audio signals to drive the car speaker through the car amplifier, reminding passengers who have not fastened their seat belts to do so. The data is uploaded to the backend system through the 4G network.

VT-SR710

Reminder terminal

Detection terminal (single seat):

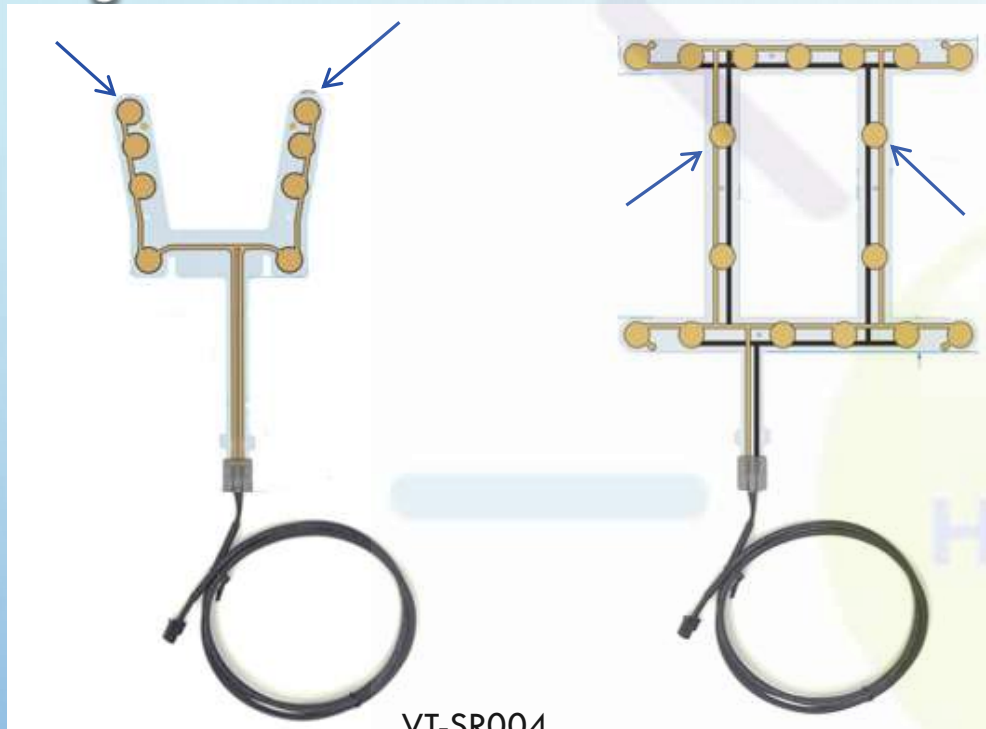
VT-SR002

Detection terminal (single seat)

Responsible for collecting the status of seat cushion sensors and seat belt buckle sensors, and regularly sending wireless signals to the seat belt host for centralized processing. One seat detection terminal (single seat) can only manage the seating and seat belt buckle situation of one seat.

Radio-frequency parameters	
Communication frequency	Sub-1G
Communication distance	60 meters (open conditions)
Physical parameters	
Power supply method	Lithium sub battery (non replaceable)
Battery life	About 5 years
Housing material	ABS material
Wire harness interface	Connected to socket: 43020 (2 × 2P, female shell male pin), connected to seat cushion: 43020 (2 × 1P, female shell male needle)
Wire harness length	80mm
Apparent dimension	41.9mm×47.0mm×21.0mm
Installation method	Installation of tie straps
Environmental parameter	
Operation temperature	-20℃~70℃

Seat sensor:



VT-SR004

Remarks: Double contact: Two columns must be pressed to at least one contact point each in order to sense heavy objects, making it more accurate to determine whether a passenger is sitting on them

Physical parameters	
Trigger method	There are two types of triggering: single contact and double contact
Product material	PET material
Interface model	43025 (2*1P, male and female pins)
Lead length	1200mm
Apparent dimension	108.26 × 123.0mm (left image), 180.0 × 210.0mm (right image)
Installation method	Adhesive (comes with 3M adhesive)

Seat cushion sensor, installed inside the seat cover, is used to detect whether the passenger is seated, and the detection result is output to the seat detection terminal through a level signal. There are two types of seat cushion sensors: dual contact (left image) and single contact (right image). Single contact sensors are more sensitive and prone to false alarms. Dual contact sensors greatly reduce the occurrence of accidental triggering of items.

Seat belt buckle:

The seat belt socket is equipped with an electronic detection device that can detect in real time whether the seat belt is fastened, and the detection terminal will submit the buckle status to the seat belt host.

VT-SR001

Physical parameters	
Detection method	Snap-on contact
Product color	black
Interface model	43025 (2*2P, male and female pins).
Lead length	1200mm
Exterior dimensions	Total length 270mm (without harness)
Installation method	Screw fixing, hole diameter 12mm

IOT BOX:

The IoT box is responsible for receiving wireless signals from detection terminals, intelligently determining which seat's passenger is not wearing a seat belt, and outputting audio signals to the car speaker to broadcast voice reminders for passengers who are not wearing a seat belt to do so. Finally, the relevant data is sent to third-party devices via RS485

Power parameters	
Power supply method	DC 12V or 24V power supply
Peak power	18W
RF parameters	
Communication bands	Sub-1G
Communication distance	50 meters (open conditions)
Antenna type	External antenna
Networking method	2G/3G/4G Global ccnnect (excludlng Japan and North Amerlca)
SIM card	customers can install it themselves
Locate method	GPS/BD, Internal Antenna
Physical parameters	
Status display	LED light status display
Power amplifier	The power amplifier function is built-in and can directly drive the car horn
Communication interface	RS485
External dimensions	147.0mm×103.0mm×41.2mm
Shell color	Black
Shell material	Aluminum alloy
Installation method	Screw fixation or 3M adhesive fixation
Environmental parameters	
Working temperature	-20℃ ~ 70℃

VT-SR013

Seat belt alarm:

Seat belt alarm (battery+dual seat) is mainly used for detecting and alerting when a car seat belt is not fastened. When a passenger is detected sitting and not fastened, it will provide voice and visual reminders. One seat belt alarm can manage two seats.

The seat belt alarm (battery+double seat) is powered by Nanfu No. 5 battery, easy to install, and the shell material is made of flame-retardant material. It has a delicate appearance and a patented design. The reminder voice can be customized and is suitable for seat belt reminders on buses, school buses, and vehicles with 9 seats or less.

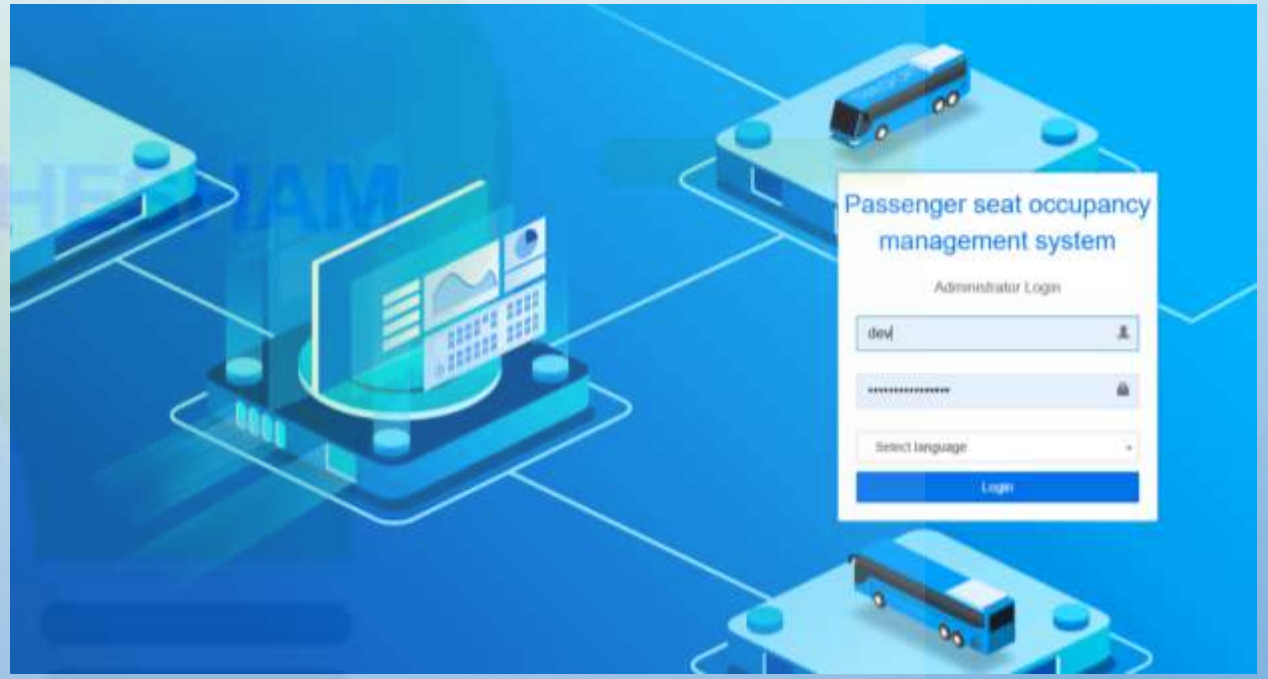
Power supply parameters	
Supply voltage	DC12V/24V
Power supply current	broadcasting sound < 300mA, sleep < 5mA
Physical parameters	
Default voice type	Chinese and English
Maximum volume	About 100 decibels near the 1cm position of the speaker
Broadcasting method	When the seat belt is not fastened, a reminder voice will be periodically broadcasted 4 times before entering standby mode, with a 10 second interval between broadcasts
Visual reminder	When the seat belt is not fastened, the LED light will flash synchronously to remind the speaker
Supports seat management	2 seats
Interface model	Connect seat belt socket and seat cushion terminal: 5557 (1 * 2P)
product weighs	65g
Product color	Black
Exterior dimensions	Shell body dimensions: Length 109.0 x Width 48.0 x Height 21.0mm
Shell material	ABS flame retardant material
Installation method	zip tie binding or double-sided tape pasting
Environmental parameters	
Working temperature	-20℃ ~ 70℃

VT-SA002-OT

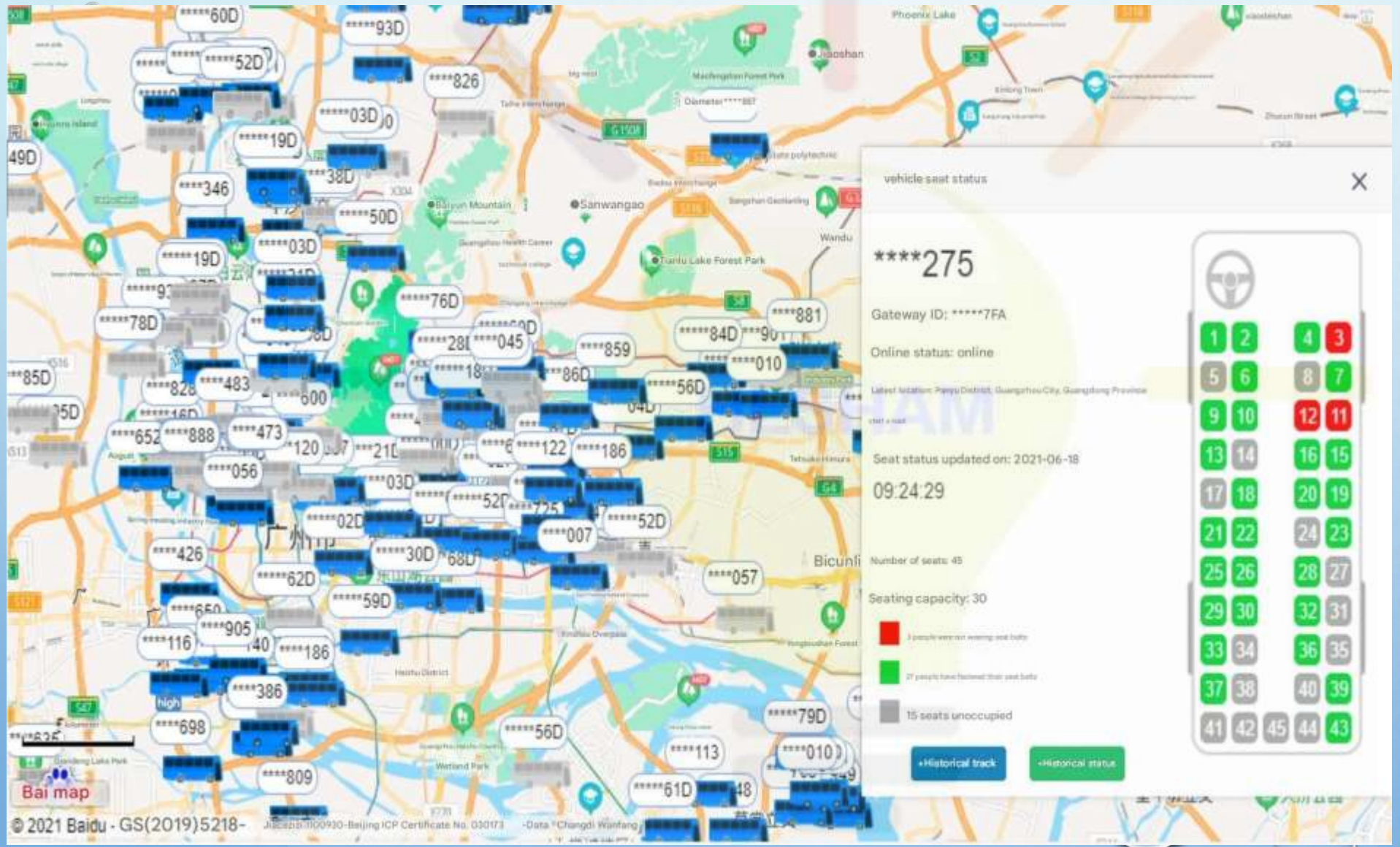
04. Introduction to Software System Functions

Login interface:

The system administrator logs in by entering an account and password to remind the system to view data. People without permission cannot view the data, which better ensures information confidentiality.



Monitoring center:



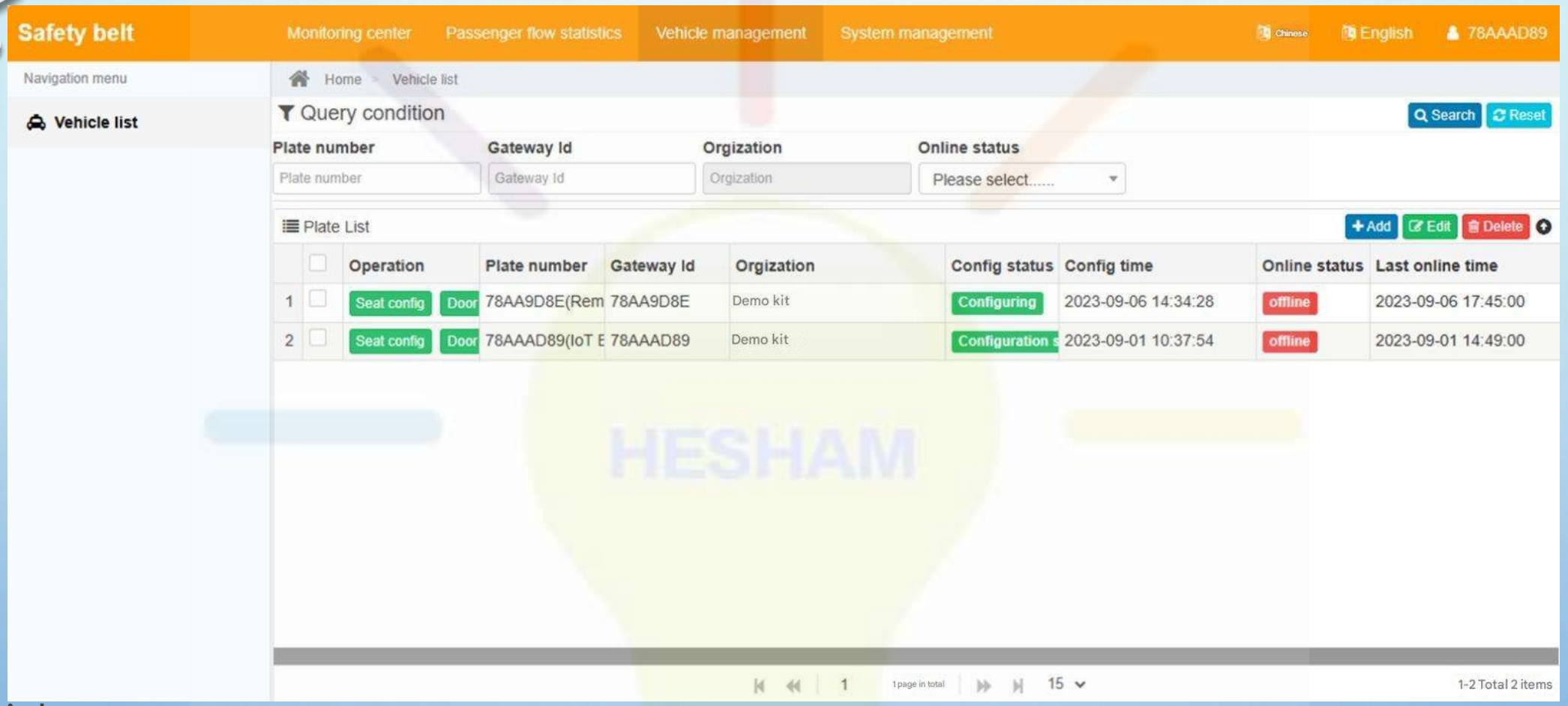
Monitoring center

The monitoring center can remotely monitor the tie up situation, passenger flow statistics, and data storage of operating vehicles through current vehicle information and corresponding seat schedules, achieving remote monitoring and management of operating vehicles

Visual interface:

The visual data interface can be used to set up account management, vehicle management, etc. Account management allows for setting account permissions, making it convenient for individuals with different permissions to manage vehicles within their organization. Vehicle management can input new vehicle information for configuration, classification, statistics, etc.

Vehicle management:



Vehicle management

The vehicle management interface can manage all vehicles belonging to the organization and add vehicle information; Vehicle seat numbers can be flexibly configured according to the seating arrangement of each vehicle.

05. Application Cases


Coach

School bus


Sightseeing vehicle

Taxi


Minibus

Ambulance

Product Applicable Scenarios

Coach:

The successfully installed models of the product include Yutong Bus, Ankai Bus, Fukuda Ouhui, Haige Bus, Jinlu Bus, Jinlong Automobile, Zhongtong Bus, Yaxing Bus, Dongfeng Liuqi and other major brands of cars, while meeting the needs of seat belt reminders for commercial vehicles, student school buses, and taxis. Currently, nearly 2000 vehicles have been installed and put online, with over 50000 seats managed online.

Guangzhou Automobile Group mainly uses our products for employee commuting cars, tourist charter cars, and large business vehicles. Currently, a total of 306 vehicles have installed seat belt intelligent reminder systems

GAC Group

Coach:

After the comprehensive installation of intelligent seat belt monitoring system in the long-distance bus fleet, the device has achieved significant results in improving the buckle rate of seat belts and effectively preventing passengers from self unfastening during long-distance travel, effectively ensuring passenger safety

Guangzhou Changyun Group has installed an intelligent reminder system for passenger car seat belts on a total of 500 vehicles

Coach:

Guangzhou Bus Group Co., Ltd. is a large state-owned transportation enterprise with diversified development, mainly engaged in urban public transportation and road passenger transportation, directly under the Guangzhou Municipal Transportation Commission. It is a national first-class road passenger transportation enterprise and one of the top 500 enterprises in Guangdong Province. A total of 276 operating buses are equipped with intelligent seat belt warning systems.

Coach:

Bus seat belt products have been successfully piloted in 19 countries, including Mongolia, South Korea, Indonesia, Malaysia, Russia, France, Germany, Spain, Switzerland, Saudi Arabia, South Africa, Kenya, Ethiopia, Ghana, Angola, Peru, Chile, Mexico, and Australia, totaling 1000

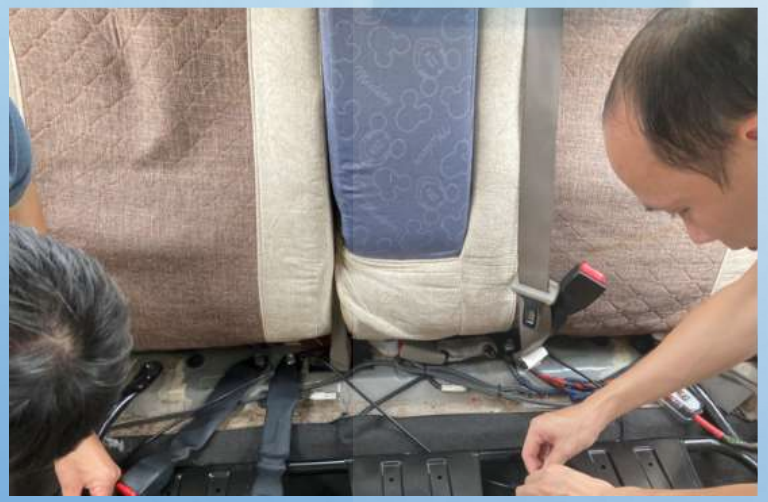
School bus:

Anhui Jianghuai Automobile

Installation of school bus seat belts

To effectively ensure the safety of students' transportation to and from school and prevent traffic accidents, the school bus seat belt reminder product comprehensively assists in campus safety construction, reminding every child to fasten their seat belt and develop good habits. The product has been installed on over 110 school buses.

TAXI:



Taxi installation

Taxis and ride hailing services are people's first choice for transportation, and countries around the world have clear requirements for passengers to fasten their seat belts when boarding. At present, the intelligent reminder system for seat belts has been successfully piloted in taxis, helping enterprises improve safety standards.

Ambulance vehicle:

Installation of ambulance vehicle

The seat belt reminder system has been successfully applied in ambulances, helping drivers remind passengers on board, comply with traffic rules during emergency rescue, ensure their own safety, and provide safety protection for those in need.

Mini bus:

This project focuses on the characteristics of rural passenger vehicle types and conducts in-depth inspections of the actual situation of vehicles in various regions. Most of them are 7/9-seater passenger vehicles and some small passenger vehicles, with vehicle locations scattered in various counties and districts. Vehicles that have successfully installed seat belt reminder devices have resumed normal operation

HESHAM

Forklift:

When the driver gets on the forklift, the seat belt detection alarm emits a voice message, prompting the driver to fasten the seat belt until the driver has fastened the seat belt, and the voice alarm stops, effectively improving the driver's safety assistance device when driving the vehicle. At present, the number of forklifts undergoing safety belt renovation in the project is 900, and the voice content can be customized

Cinema seat detection:

Through IoT technology, the number of people sitting in cinemas can be intelligently recognized and counted, helping managers use big data analysis to make scientific and effective arrangements and decisions.。

HESHAM INDUSTRIAL SOLUTIONS, 112 BRIJ INDUSTRIES,NR BUNDY INDIA, GIDC MAKARPURA,VADODARA, GUJARAT-390010, INDIA,GST: 24AZCPM3892K1Z1
Our Website: www.heshamsolutions.com , www.heshamsolutions.in
Mob: 7228866734, contact@heshamsolutions.com, heshamsolutions@gmail.com