Introduction to the Functions of the Intelligent Vehicle Terminal – TBOX Product

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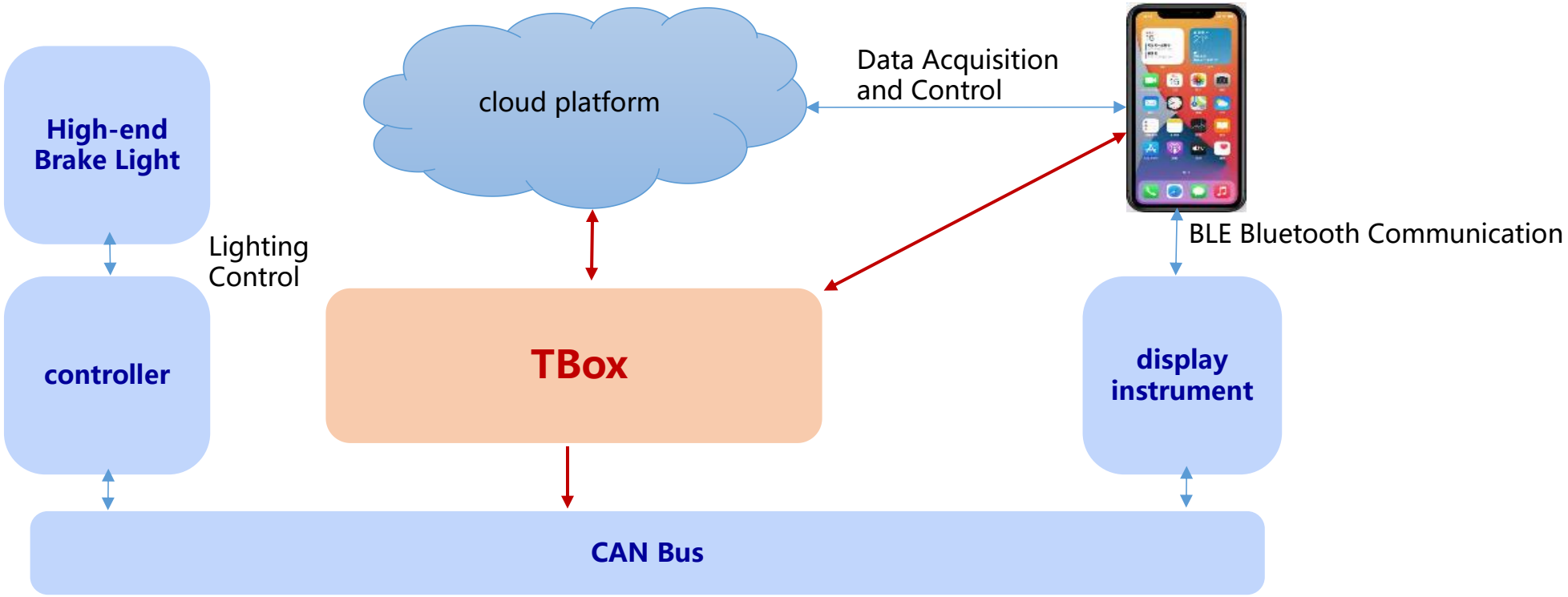
Intelligent Vehicle Infotainment Platform-TBOX

1. As the central gateway in vehicle intelligence, TBOX operates independently from the entire vehicle and is not a functional safety component. When it's not standard equipment, it does not affect the riding and use of the vehicle.
2. All vehicle data is collected, analyzed, and uploaded to the cloud platform through the TBOX, providing a basis for big data analysis and optimization decisions.
3. Multiple positioning supports GPS, LBS, and WiFi assisted positioning, ensuring intelligent safety and worry-free anti-theft.
4. BLE Bluetooth enables seamless smart entry. The vehicle automatically unlocks when the owner approaches, which is convenient and quick. It supports four-master four-slave mode and can connect to more smart devices.
5. The 6-axis G-sensor can detect riding posture, and in case of abnormal riding situations, it can activate SOS emergency rescue services.



Intelligent Vehicle Infotainment Platform-TBOX

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TBOX Product Specifications	
Power	25-75V
Size	150x45x33mm
Mobile Communication	Qualcomm 4G Cat.1
Status lamp	Red, Green, Blue LED Indicator Lights
Bluetooth	BLE 5.0, supports four-master four-slave mode
Seamless Entry	Supports Bluetooth Seamless Smart Entry
location	GPS、LBS、WiFi
Positioning Accuracy	Dynamic 5 meters, Static 10 meters
G-sensor	Six-axis Acceleration
Startup Time	Hot start 10S, Cold start 60S
battery	1250mAh
Protection Level	IPX6
Horn	8Ω 1.5W

Intelligent Vehicle Infotainment Platform-TBOX
Industrial Design and Installation Location

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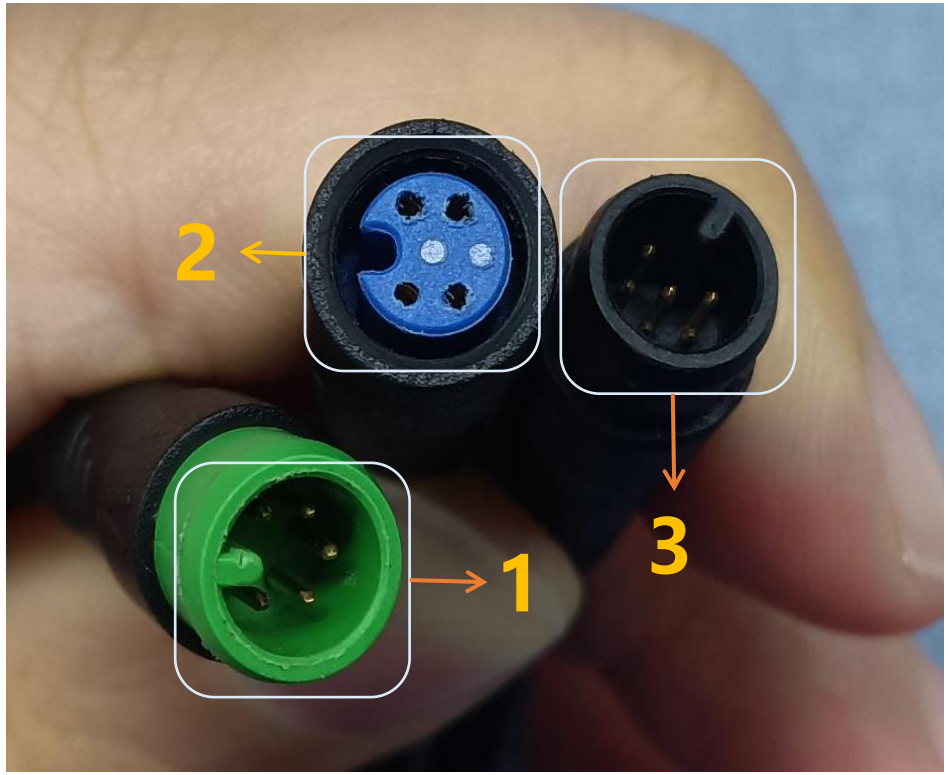
front

Installation Location for Road Bikes

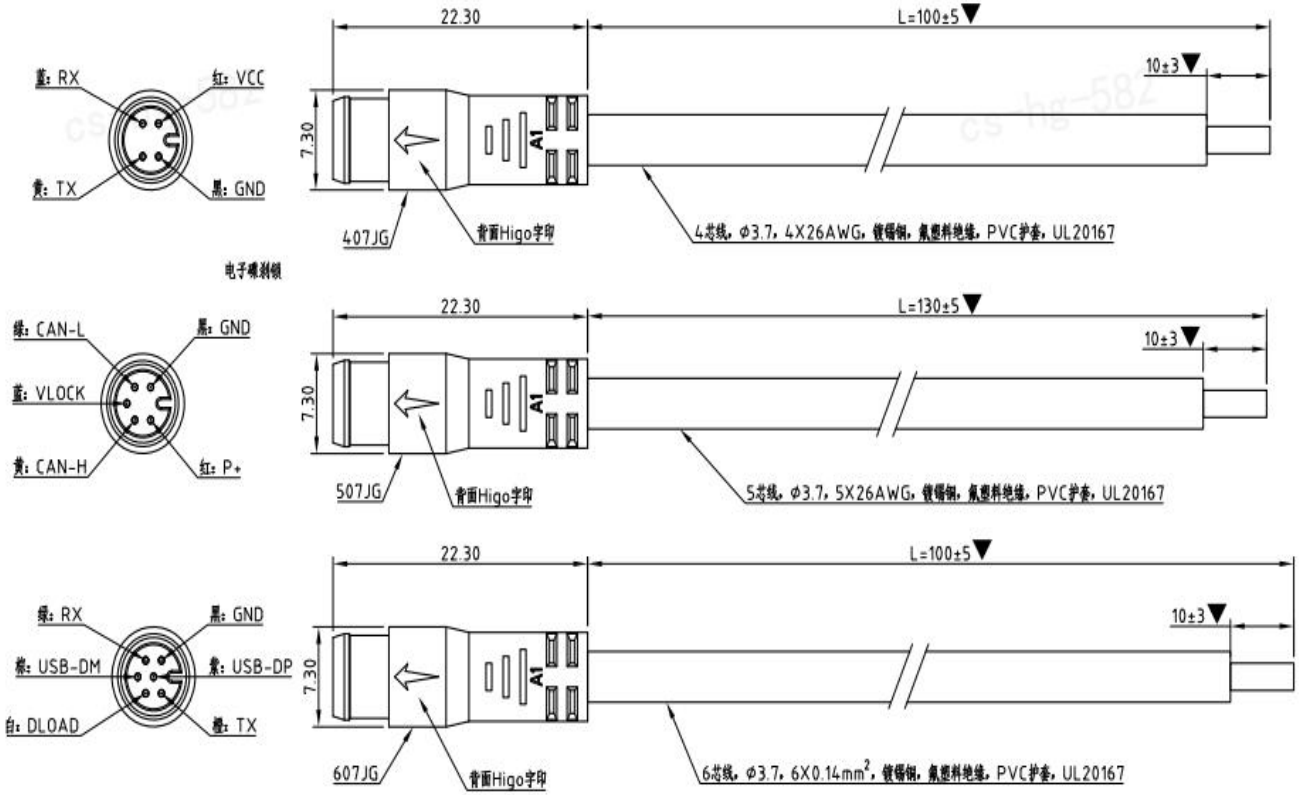
back

Installation Location for Mountain Bikes

Intelligent Vehicle Infotainment Platform-
TBOX-Wire Harness Interface

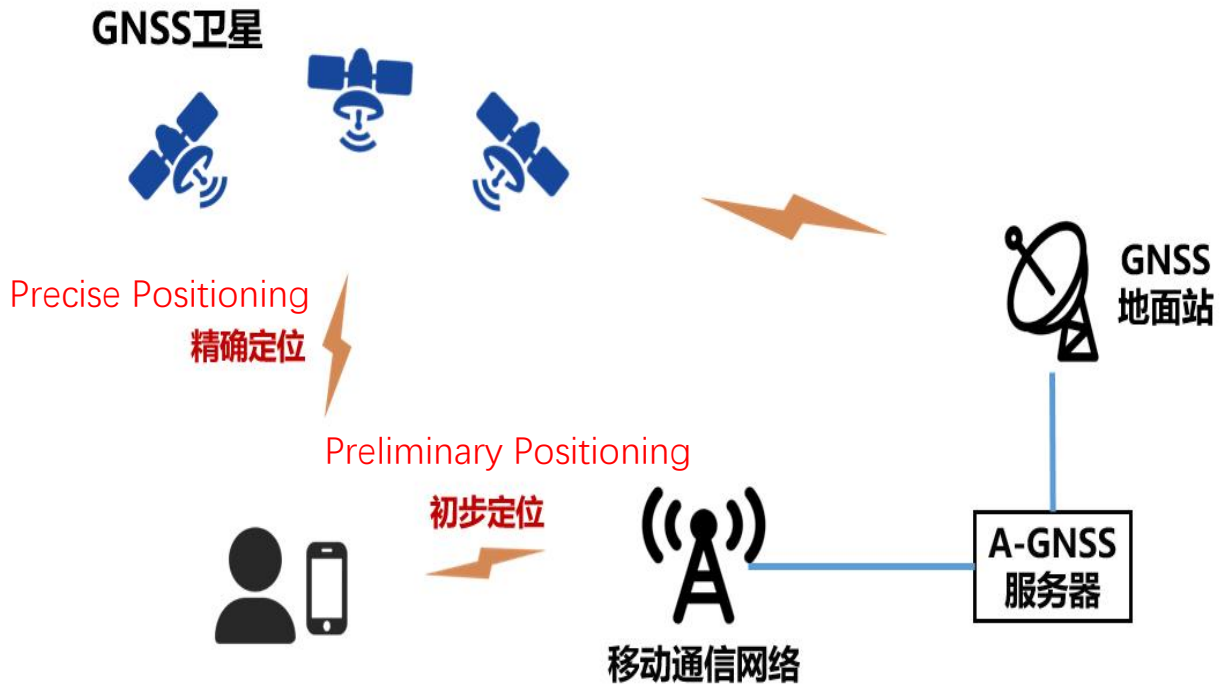


1. Whole vehicle CAN interface
2. Functional serial port
3. Reserved debugging interface



Intelligent Vehicle Infotainment Platform-
TBOX-GNSS location

GNSS（Global Navigation Satellite System）,is a space-based radio navigation positioning system that can provide users with all-weather 3D coordinates, velocity, and time information at any location on the surface of the Earth or near-Earth space. It includes one or more satellite constellations and the enhancement systems needed to support specific tasks.



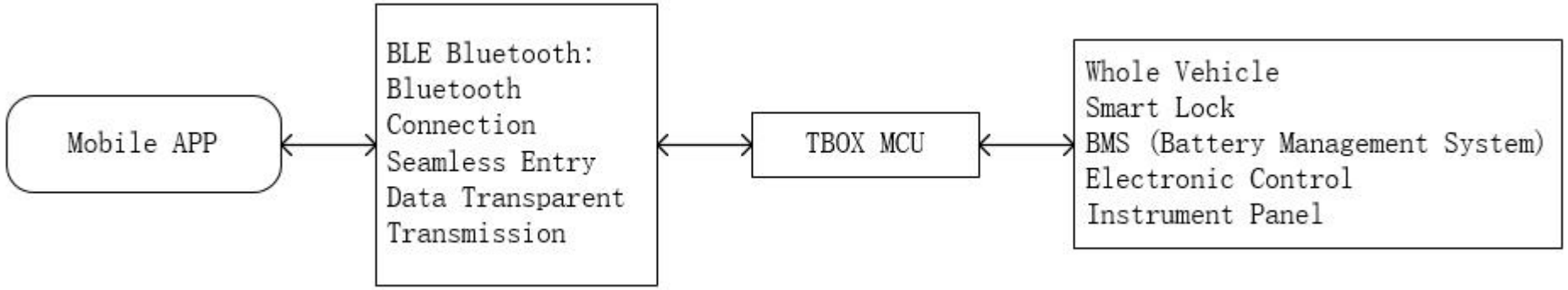
TBOX positioning supports:

1. GPS positioning: Cold start 1 minute, hot start 10S
2. WIFI positioning: Backend data analysis for indoor positioning
3. LBS positioning: Base station positioning

Intelligent Vehicle Infotainment Platform-
TBOX-Bluetooth seamless unlocking

Bluetooth technology is a short-range wireless communication technology. The TBox uses the TelinkBle Bluetooth 8258 chip with the BLE5.0 protocol. The 8258 supports a four-master and four-slave mode. In the first phase of development, the 8258 is set as the slave mode and the mobile phone as the master mode. This allows for seamless unlocking when the Bluetooth device is in close proximity.

The overall block diagram of the system is shown as follows:



The mobile phone support includes:

1. iOS series: All models after iPhone 11.

2. Android series: Samsung, MI, OPPO, VIVO, Honor, etc. (Android 10 and above, specific models are being refined).

Intelligent Vehicle Infotainment Platform-
TBOX-Pilot lamp

The TBOX comes with a three-color indicator light that corresponds to different states when working as follows:

Light color	Function	Off	Quick Flash	Slow Flash	Always On
red light	Vehicle communication	The main power is disconnected.	The main power supply is present, the main power is turned off, and communication with all nodes on the bus has failed.	The main power is on, but communication with all nodes has failed.	The main power is on and there is communication with some nodes.
green light	4G network	No SIM card.	In the process of network registration.	Connecting to the server, logging in.	Online status.
blue lamp	GPS	GNSS is in the off state.	Not activated.	Locating.	Location successfully determined.

Fast flashing: The LED is on for 100 milliseconds, and off for 900 milliseconds.
Slow flashing: The LED is on for 1 second, and off for 3 seconds.

Intelligent Vehicle Infotainment Platform-TBOX-Gsensor

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A six-axis sensor typically refers to a combination of a three-axis accelerometer and a three-axis gyroscope. The three-axis accelerometer is used to detect lateral acceleration, while the three-axis gyroscope is used to detect angle rotation and balance.

The TBox is equipped with a built-in 6-axis gyroscope sensor to establish a riding posture model. It is used to detect alarms for vibrations when the vehicle is stationary, tilt alarms during riding, and rollover alarms. When such alarms occur, an alarm sound is triggered, and alarm information is uploaded to the network at the same time. The rollover alarm triggers the SOS rescue module in the APP.

Vibration and disturbance alarms are triggered by the backend TSP to push messages, reminding the internal messages in the APP to pay attention to abnormal alarms and ensure safety.

serial number	Functional item	TBOX state
1	Vibration alarm	The device is in an activated state, and the entire vehicle is powered down in a low power consumption state.
2	Abnormal movement alarm.	The device is in an activated state, and the entire vehicle is powered down in a low power consumption state.
3	Tilt alarm.	The device is in an activated state, the entire vehicle is powered on, and communication is normal: the red, green, and blue lights are functioning properly.
4	Rolling alarm.	The device is in an activated state, the entire vehicle is powered on, and communication is normal: the red, green, and blue lights are functioning properly.

Intelligent Vehicle Infotainment Platform-
TBOX-Voice Broadcasting（1）

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Serial number	Sound name	type	Trigger condition	frequency	Sound effect 1 (female voice)	Sound effect 2 (male voice)	Custom 3	APP settings	Human voice broadcast content.
1	Power on	Event type	Announcement when the power button is pressed or when the APP is started.	Single broadcast.	Human voice.	Human voice.	The voice can be customized.	Single sound switch, one-key shutdown.	Power on.
2	Power Off	Event type	Announcement when the power button is pressed or when the APP is shut down, or during automatic shutdown.	Single broadcast.	Human voice.	Human voice.	The voice can be customized.		Power off.
3	Car finding	Event type	Announcement when the APP triggers the car-finding function.	Broadcast continuously three times.	Human voice.	Human voice.	The voice can be customized.		I'm here.
4	Alarm sound	Trigger type	Alarm sound prompt when there is vibration or abnormal riding.	Single broadcast, lasting 5 seconds. If the abnormal movement continues, it will be broadcast in a loop.	Chord warning sound.	Chord warning sound.	The voice can be customized.		/
5	Low power	Trigger type	The battery capacity is low, please charge it in time.	Single broadcast.	Human voice.	Human voice.	/		My battery is low.
6	Trouble code	Trigger type	Prompt when there is a fault code in the battery or electronic control.	Single broadcast.	Human voice.	Human voice.	/		Device error, please contact your Vanpowers support.
7	Gear change	Trigger type	Prompt sound when switching to ECO Sport BOOST OFF gear.	Single broadcast.	Human voice.	Human voice.	/		ECO Mode/ Sport Mode/ Boost Mode/ Assist off
8	Overspeed safety Tips	Trigger type	Prompt sound when exceeding the motor cut-off speed.	Single broadcast.	Human voice.	Human voice.	/		Top speed limit, please be careful.
9	Vehicle binding	Trigger type	TBOX binding successful.	Single broadcast.	Human voice.	Human voice.	/		TBox binding successful
10	Car charger	Trigger type	Prompt sound when charging connection is successful.	Single broadcast.	Human voice.	Human voice.	The voice can be customized.		Charger connected.

Intelligent Vehicle Infotainment Platform-
TBOX-Voice Broadcasting（2）

Serial number	Sound name	type	Trigger condition	frequency	Sound effect 1 (female voice)	Sound effect 2 (male voice)	Custom 3	APP settings	Human voice broadcast content.
11	Secondary battery access	Trigger type	Prompt sound when the auxiliary battery is successfully connected to the vehicle.	Single broadcast.	Human voice.	Human voice.	/		Extended battery connected.
12	Access electronic fence	Trigger type	The user rides from outside the fence into the range of the electronic fence.	Single broadcast.	Human voice.	Human voice.	/		We are back in the riding area.
13	Drive out of the electronic fence	Trigger type	The user rides from within the fence range out to outside the fence.	Single broadcast.	Human voice.	Human voice.	/		We are outside the riding area.

Intelligent Vehicle Infotainment Platform-TBOX-APP

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1. "APP Page Icons"
2. "Binding Activation and Unbinding"
3. "Bluetooth Unlock"
4. "Voice and Settings"
5. "Anti-theft Positioning and Car Searching"
6. "Vibration Alarm and SOS"
7. "Electronic Fence"
8. "Vehicle Riding Trajectory"

Intelligent Vehicle Infotainment Platform-
TBOX-Installation Process

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TBOX installation steps:

1. Prepare the TBOX for installation.	2. Connect the TBOX plug (green).	3. Place the device in the installation position.	4. Lock the screws at the left and right corners.	5. Install the cover plate.	6. Installation is complete.

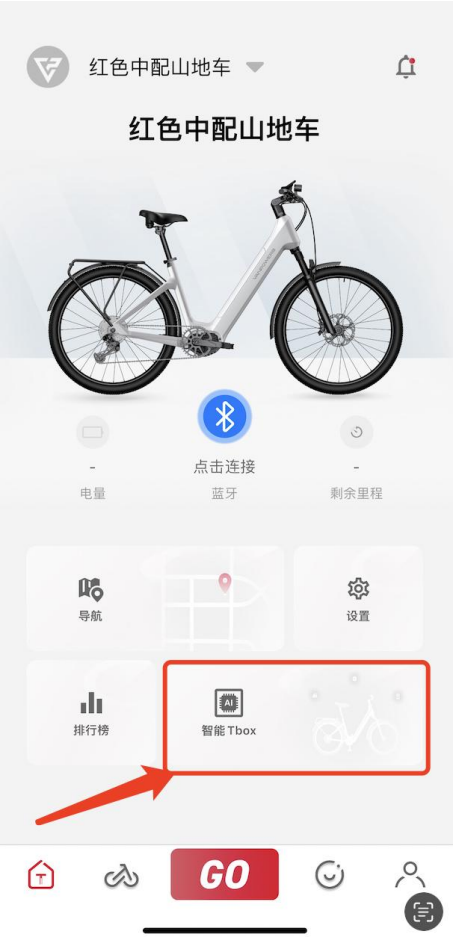
Intelligent Vehicle Infotainment Platform-
TBOX-APP interface

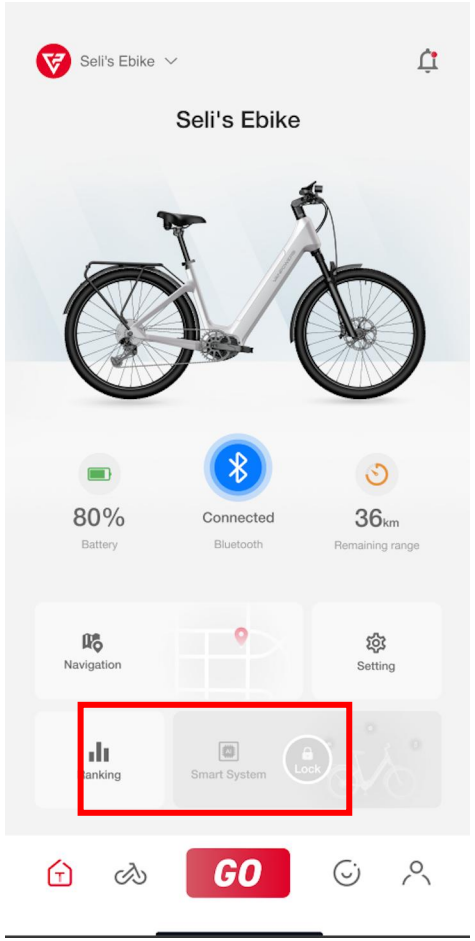
1、APP download address：

IOS：https://www.pgyer.com/2Vk3

Android：https://www.pgyer.com/5gjmWG

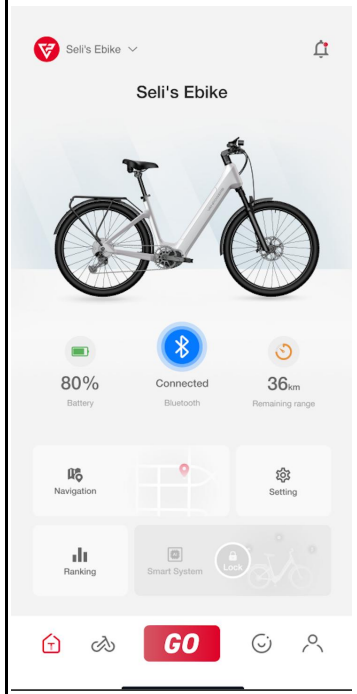
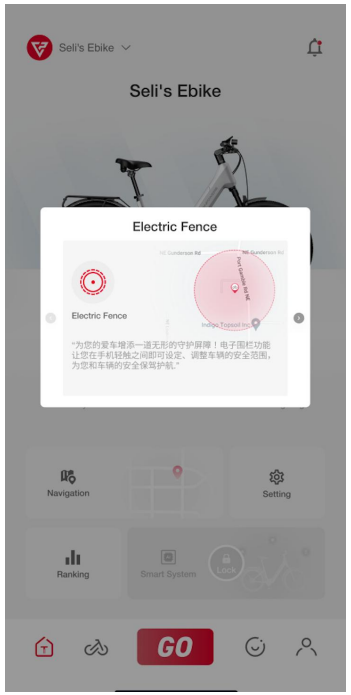
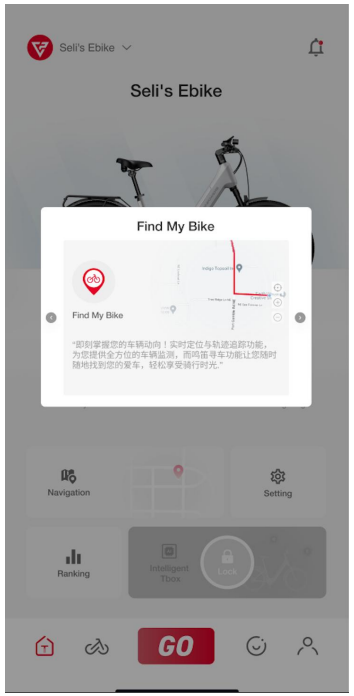
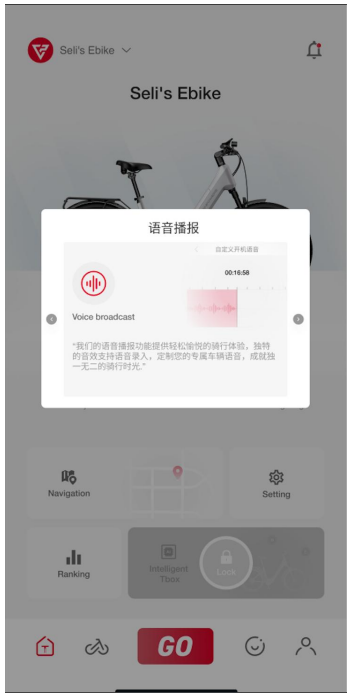
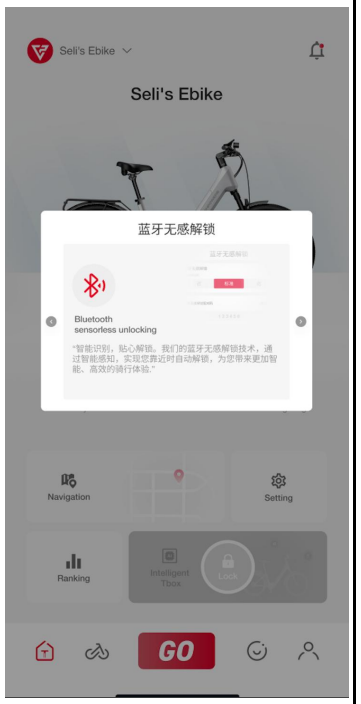
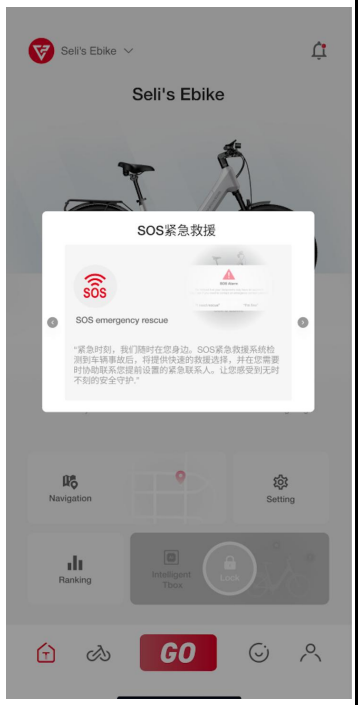
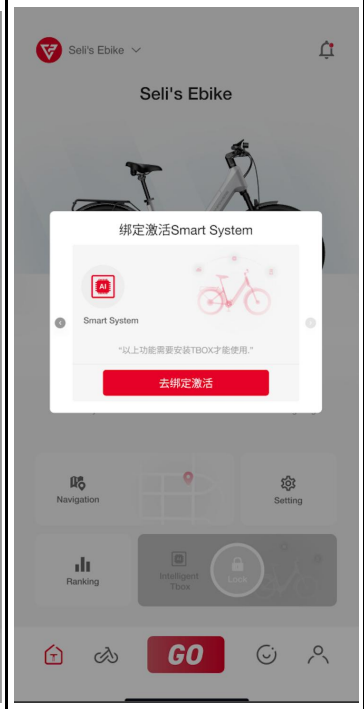
2.TBox feature entry：





Intelligent Vehicle Infotainment Platform-
TBOX-APP interface

2、TBox broadcast.
When the TBOX is not purchased, the entry interface is grayed out. Clicking on it will bring up a carousel page, promoting the main functions of the TBOX.

	Electronic fence.	Find car	Voice broadcast	Bluetooth seamless unlocking	SOS emergency rescue	Activate binding
						

Intelligent Vehicle Infotainment Platform-
TBOX-APP interface

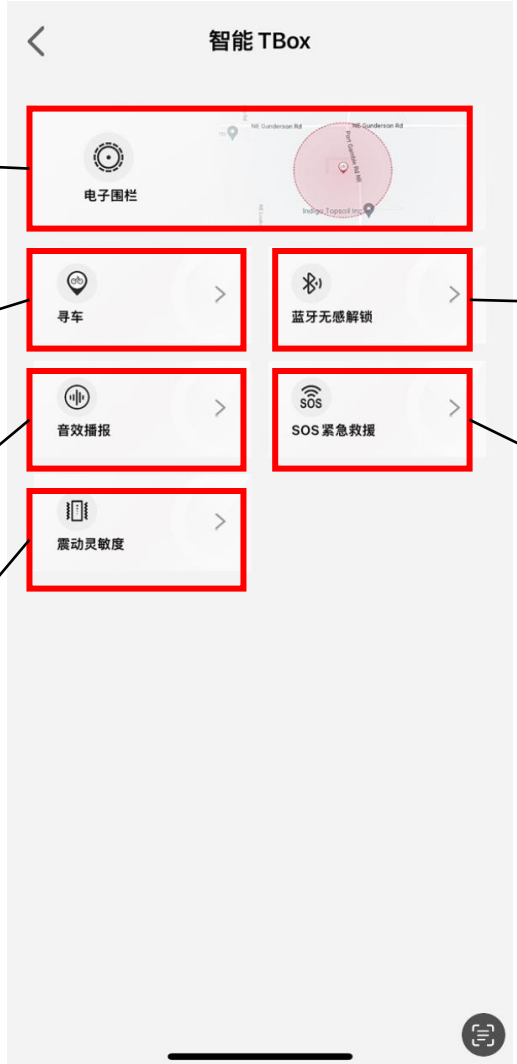
3、TBox function module.

“Electronic fence.”
Allows users to set virtual boundaries on geographic locations. Once the vehicle crosses or enters this range, it will trigger an alarm or notification.

“Find car”
Real-time vehicle positioning and tracking, view the most recent driving trajectory and honk to find the car.

“Voice broadcast”
Two sets of system voice prompts, supporting custom recording of some sound effects.

“Vibration sensitivity”
Adjust the sensitivity level of the vehicle triggering the alarm.



“Bluetooth seamless unlocking”
Implement Bluetooth proximity unlocking, supporting adjustment of three unlocking distances: far, medium, and near.

“SOS emergency rescue”
When a crisis is detected, it will notify the emergency contact.

Intelligent Vehicle Infotainment Platform-
TBOX-Binding Activation and Unbinding（1）

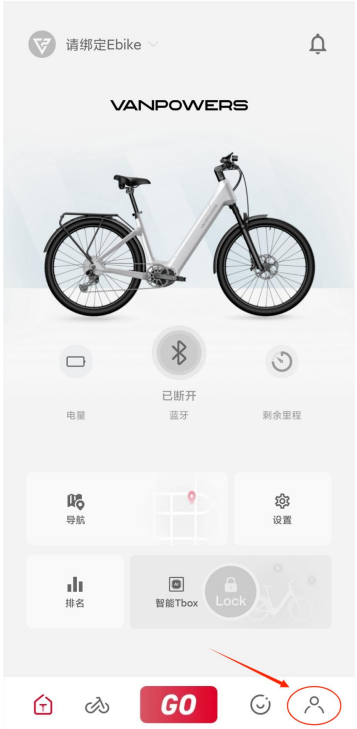
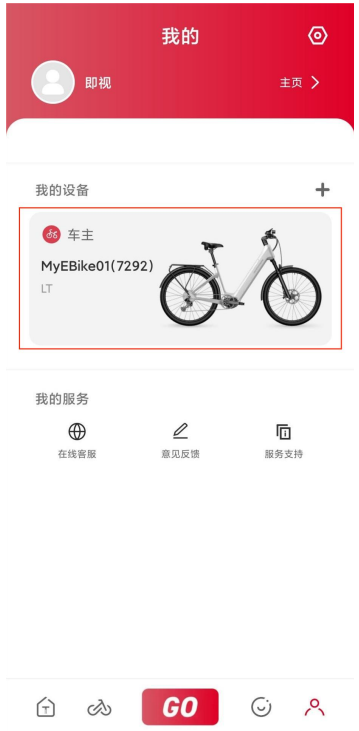
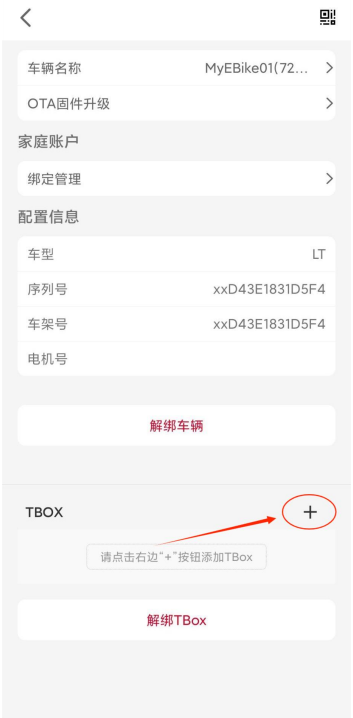
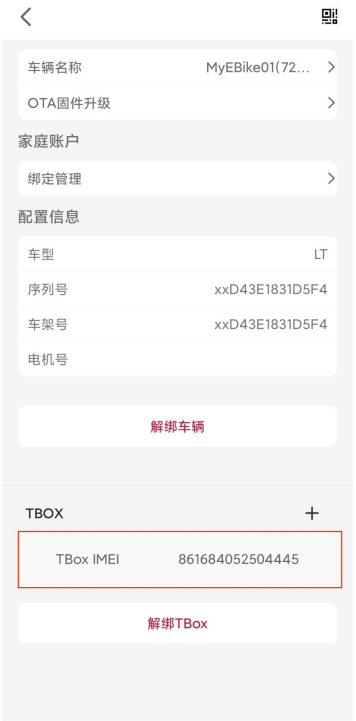
1、TBox binding and activation.

1.1 Precautions before binding.:

The vehicle binding must be completed before the TBOX binding can be performed, and the same TBOX can only be bound to one vehicle;

The TBOX is located inside the upper tube of the EBike. After opening the upper tube cover structure, you can observe the TBOX body. The binding barcode is located on the upper part of the TBOX packaging.

1.2 APP TBOX binding process.

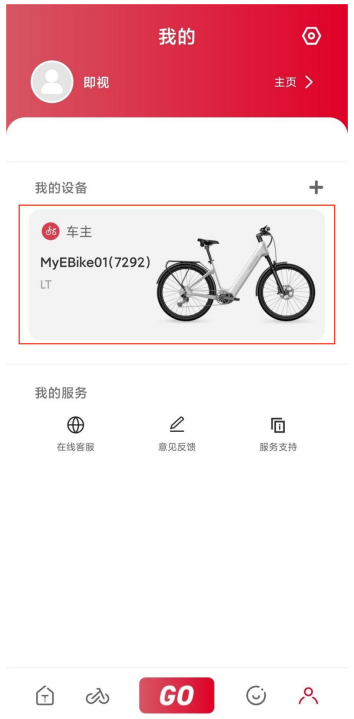
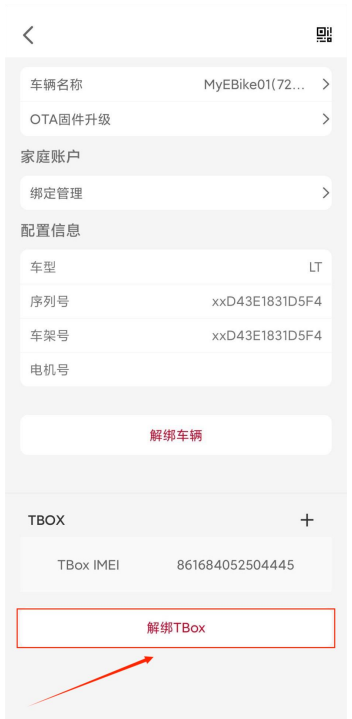
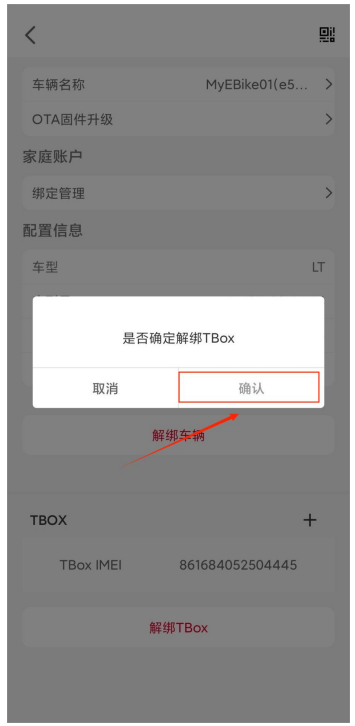
1. Click "My" on the main interface	2. Click on the device tag	3. Click on the "+" option to bind the TBOX	4. Scan the TBOX IMEI barcode	5. Confirm (IMEI number is auto-filled)	6. Binding is successful (TBOX tag appears)
					

Intelligent Vehicle Infotainment Platform-
TBOX-Binding Activation and Unbinding（2）

The process of scanning the barcode to bind the TBOX does not require the TBOX to be powered. The TBOX will exit sleep mode and trigger the language indicating successful binding, but the status indicator light will not be displayed during this process.

During binding, the APP will query the current TBOX IMEI number in the backend database. If it exists and has not been bound, the target TBOX will be bound to the whole vehicle corresponding to the device tag selected on the current "My Device" interface of the APP.

2、Unbinding of the TBox.

1. Click on the device tag in "My"	2. Click on "Unbind TBox"	3. Click on "Confirm"
		

Note:
If the vehicle binding is directly unbound without unbinding the vehicle and the TBOX, although the vehicle has been unbound from the user, the TBOX is still in a mutually bound relationship with the vehicle in the database. At this time, the TBOX cannot be bound to other vehicles.

When a vehicle that has not unbound from the TBOX binds with a user again, it will default to binding the TBOX at the same time, and the user does not need to bind the TBOX again.

Intelligent Vehicle Infotainment Platform-
TBOX-Bluetooth seamless unlocking

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Bluetooth Senseless Unlock General Switch.

There are three types of unlocking sensing distances: "Near, Standard, Far".

The distance sensing interval is (1m, 3m).

The Bluetooth senseless unlock pairing code can be hidden.

Intelligent Vehicle Infotainment Platform-
TBOX-Voice broadcast（1）

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1、Sound Effect General Interface.

Sound Effect General Switch: When turned off, all sounds from the TBox will be turned off.

There are three sound effect modes.

"Sound Effect 1" and "Sound Effect 2" are global effects, one is a male voice, the other is a female voice - the chosen one will be applied to all sound effects.

Custom sound effects can be individually set for a total of 12 sound effects.

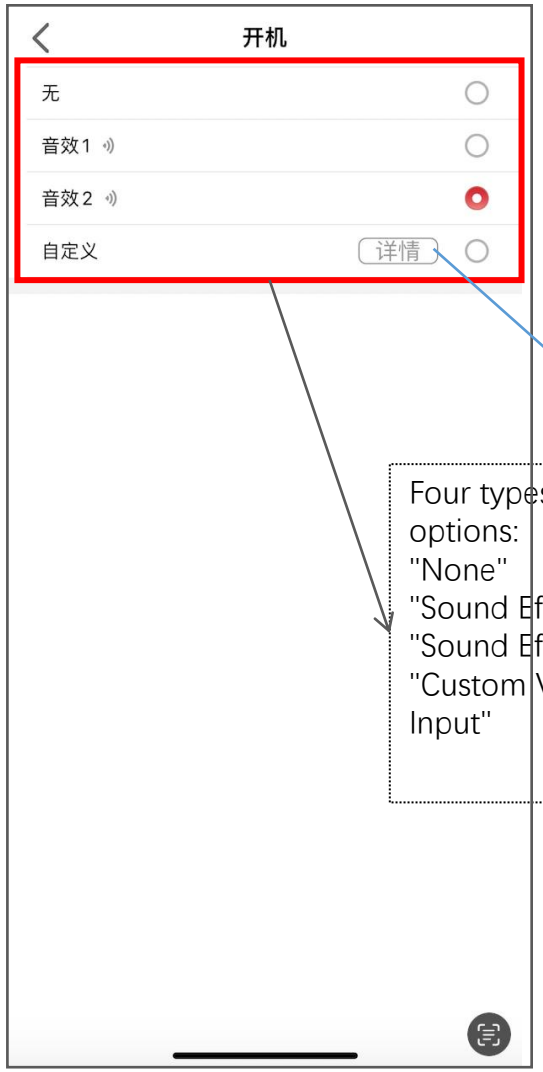
2、Custom Sound Effect Detail Page.

Custom sound effects are divided into two categories:
The first five types support voice input settings.

The last six types do not support voice input settings, and can only choose Sound Effect 1, Sound Effect 2, or turn off.

Intelligent Vehicle Infotainment Platform-
TBOX-Voice broadcast（2）

3、Sound effects that support voice input
- Taking startup as an example.



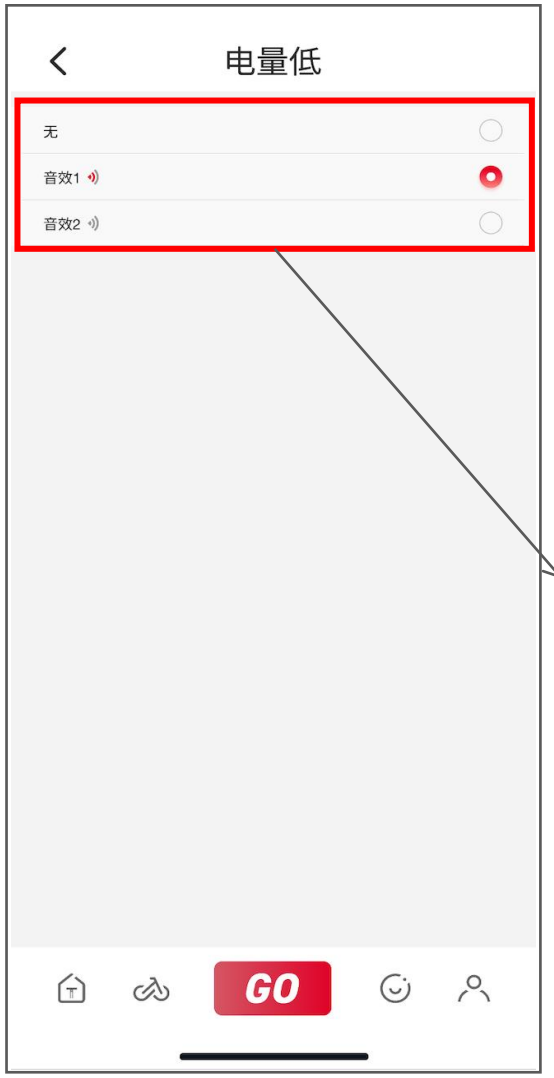
Four types of options:
"None"
"Sound Effect 1"
"Sound Effect 2"
"Custom Voice Input"

Custom Voice Input Page.

Supports functions such as recording audio, modifying audio names, setting as voice, deleting, playing, etc.

Only one voice can be saved.

4、Sound effects that do not support voice input
- Taking low battery as an example.



Supports selection of:
"Sound Effect 1"
"Sound Effect 2"
"None"

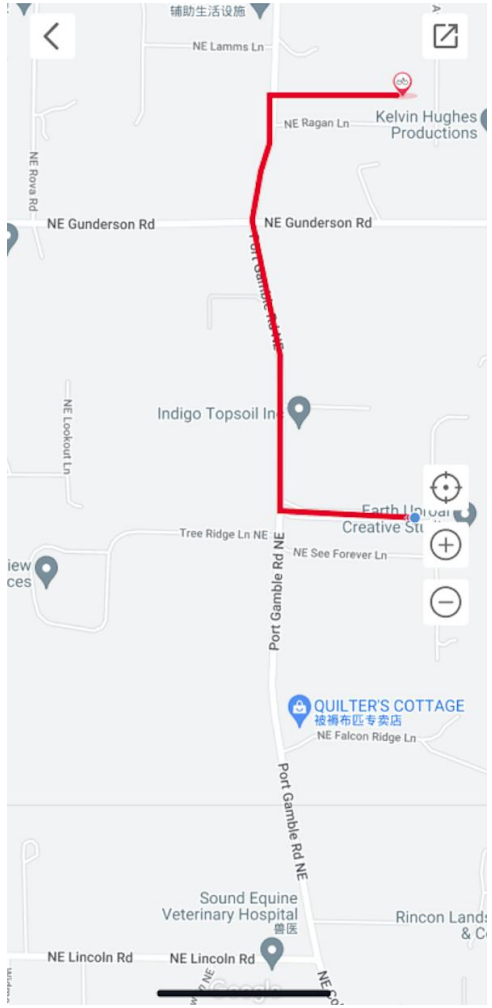
Intelligent Vehicle Infotainment Platform-TBOX-Anti-theft Positioning and Car Searching（1）

一、The car finding page under normal conditions.

1、Car Finding Page.

- The map shows the real-time location of the vehicle and projects an electronic fence on the map.
- Displays the current vehicle location.
- You can view the riding trajectory of the last 24 hours.
- You can find the car by honking.

2、Trajectory Page.



Displays the riding path of the last 24 hours.

Intelligent Vehicle Infotainment Platform-TBOX-Anti-theft Positioning and Car Searching（2）

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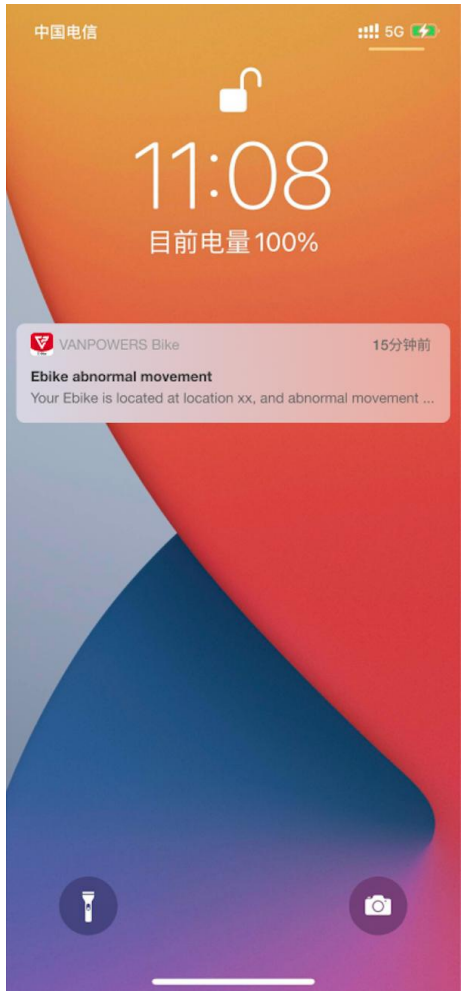
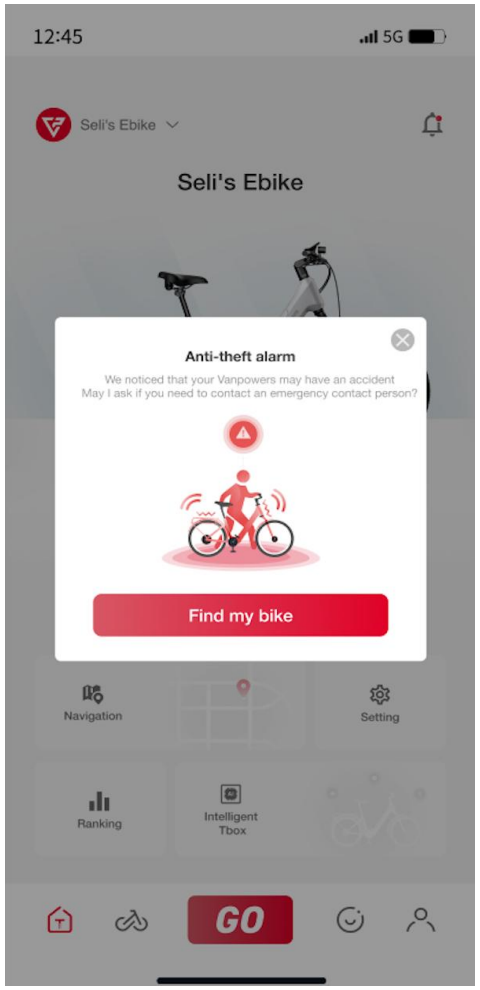
二、The car finding page under alarm status.

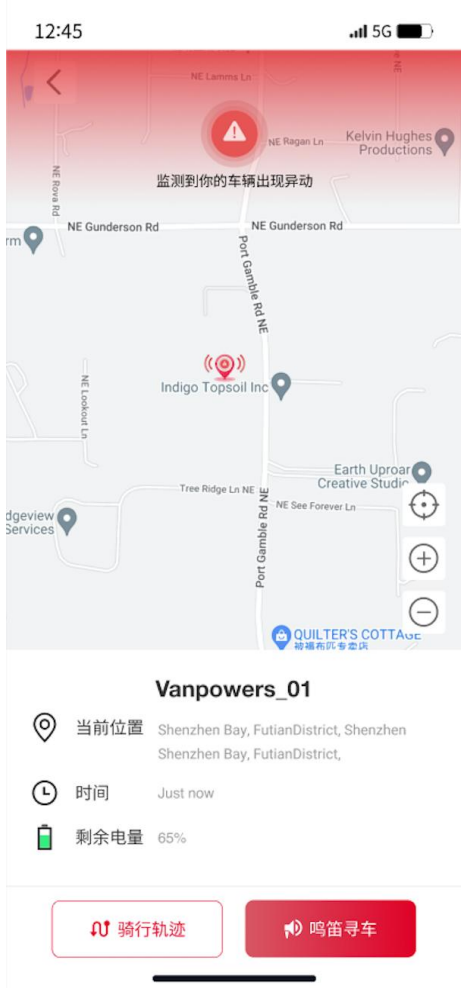
1、APP pushes alarm



2、Home page alarm

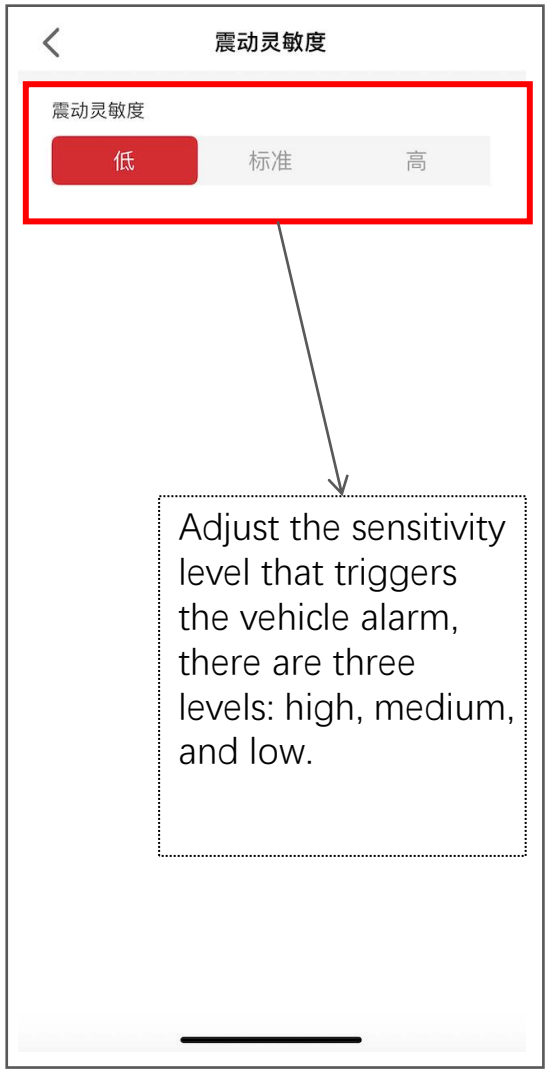


3、Car Finding Page - Alarm Status.



Intelligent Vehicle Infotainment Platform-
TBOX-Vibration Alarm and SOS（1）

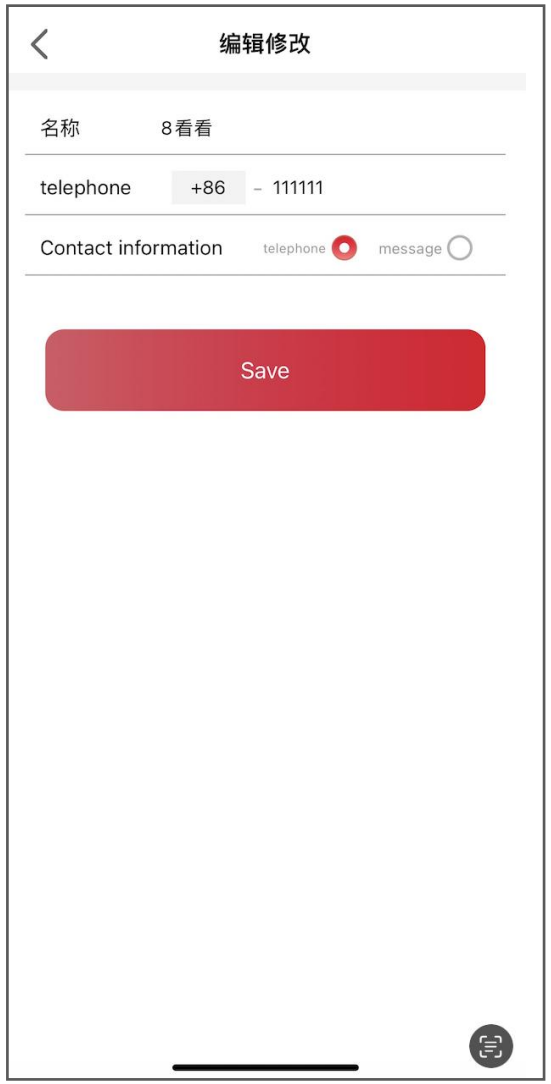
一、Vibration Alarm Sensitivity Setting.



Adjust the sensitivity level that triggers the vehicle alarm, there are three levels: high, medium, and low.

二、Setting of SOS emergency contacts.

The master switch for the SOS rescue process.

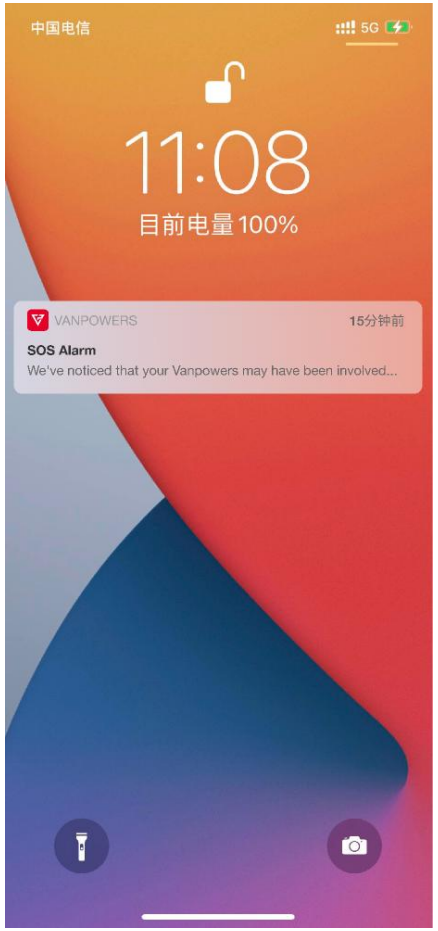
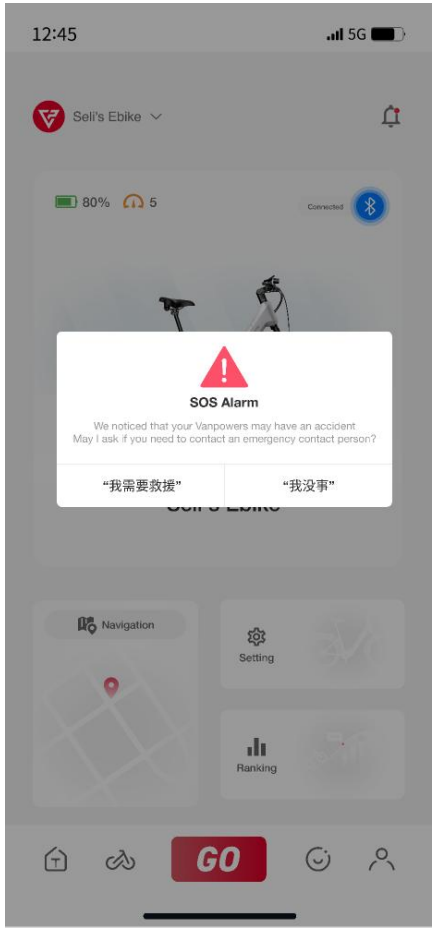
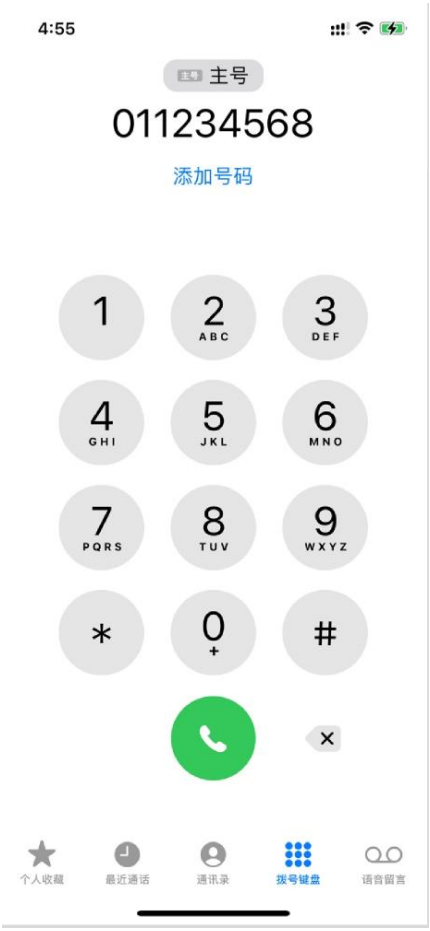
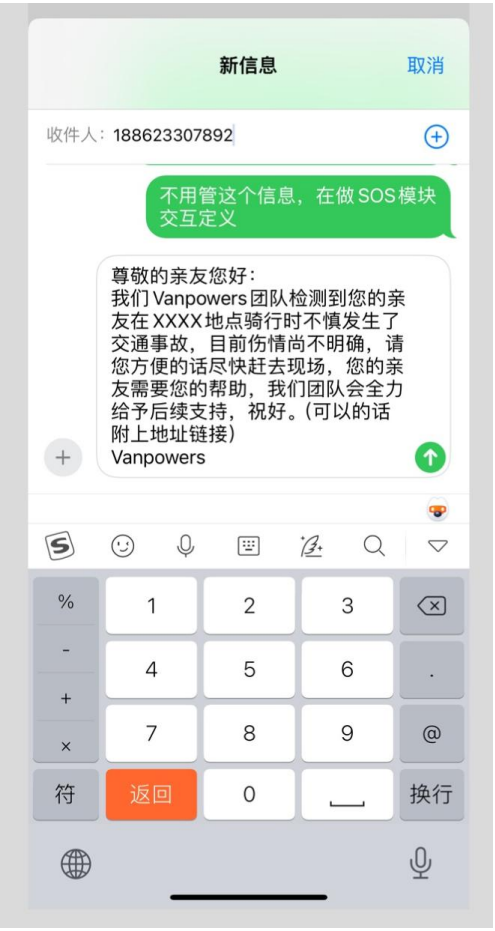


Emergency contact settings:
Up to three emergency contacts can be set.
Only one contact can be selected at a time.
Supports adding, editing, and deleting contact information.

Intelligent Vehicle Infotainment Platform-
TBOX-Vibration Alarm and SOS（2）

赛维时代 SAILVAN TIMES

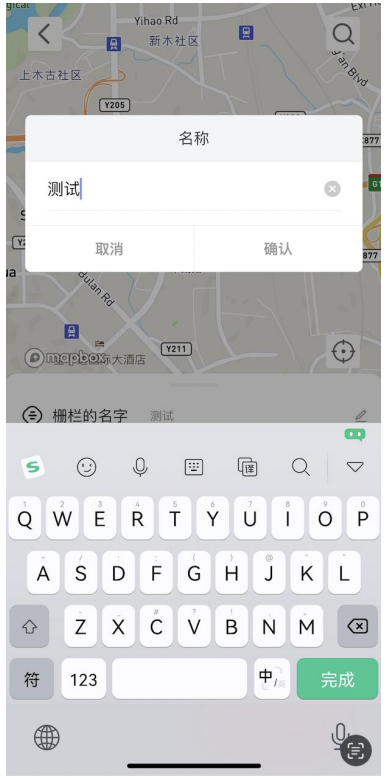
三、SOS Emergency Rescue Process.

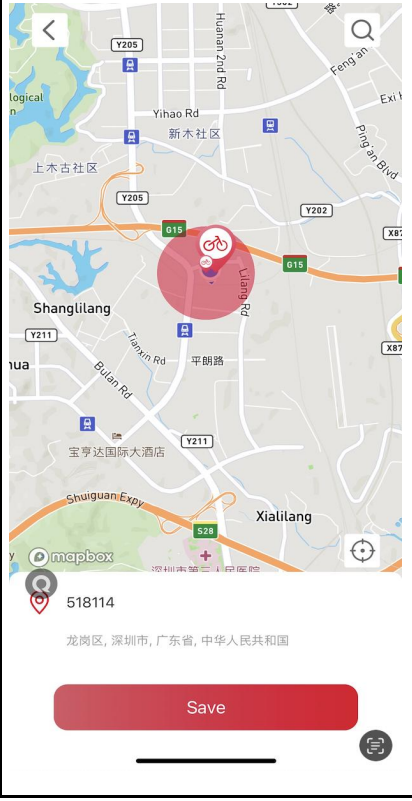
1. When an accident is detected, an SOS rescue notification will be pushed.	v2. After entering the homepage, there is an option of whether rescue is needed. If "I'm fine" is selected, the rescue process ends. If "I need rescue" is selected, the preset emergency contact will be contacted.	3. If the preset contact method is to make a phone call, after selecting "I need rescue", it will jump to the page for making a call.	4. If the preset contact method is to send a text message, after selecting "I need rescue", it will jump to the page for sending a text message.
			

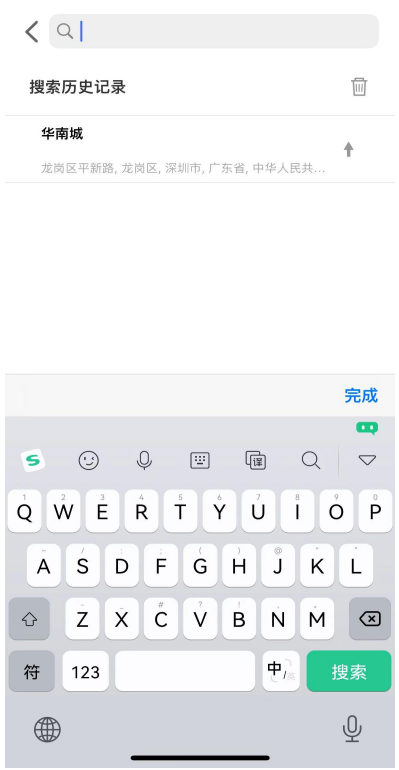
Intelligent Vehicle Infotainment Platform-
TBOX-Electronic Fence

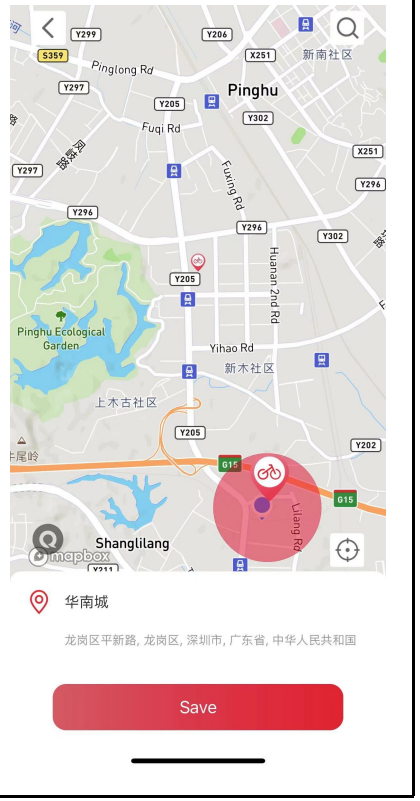
赛维时代 SAILVAN TIMES

1. Electronic fence overview page, where you can choose to add a fence (up to three), close or open a fence, and enter the fence details page.	2. Fence details page, which contains the basic information of the fence and displays an overview on the map, where specific parameters can be modified.	3. The name of the fence can be modified.	4. The center point of the fence can be modified, supporting modification by dragging the map and searching for an address. Clicking save will modify the center position of the fence and display it on the map.



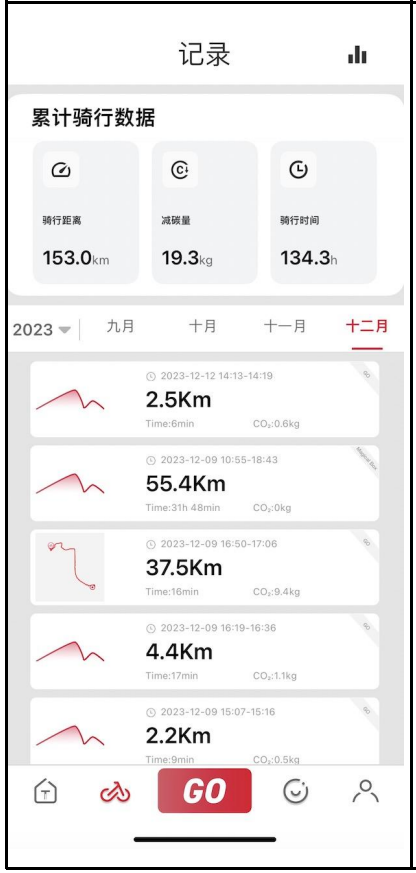
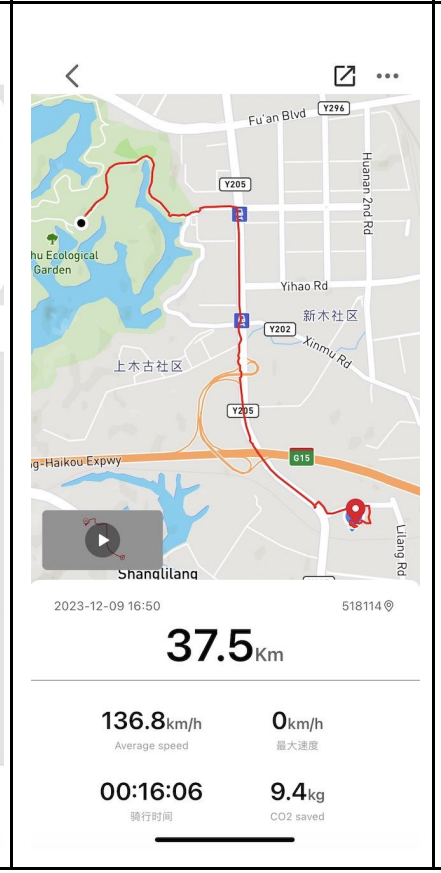
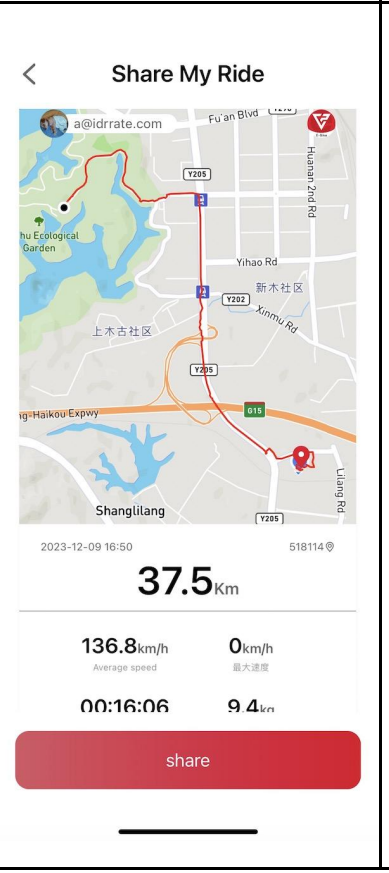
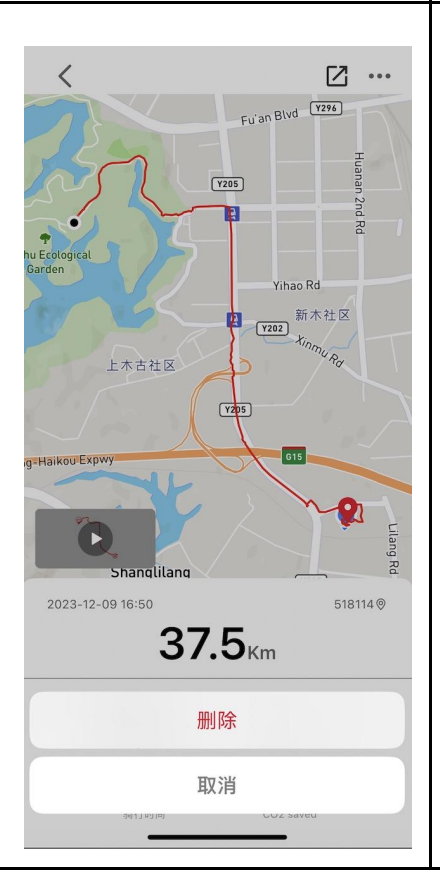
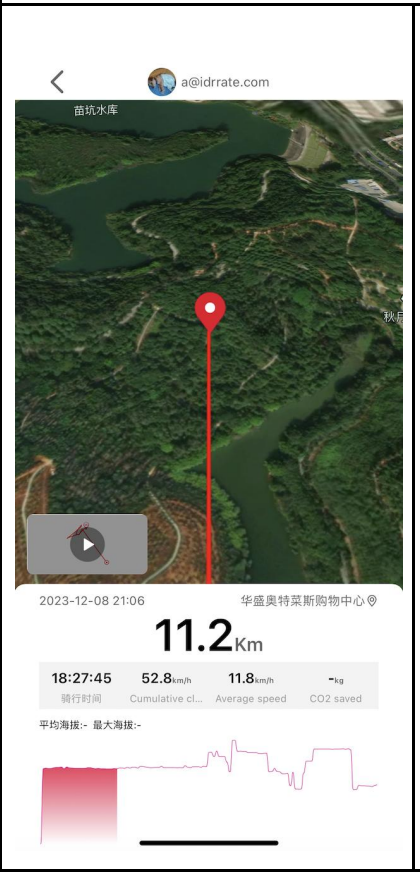
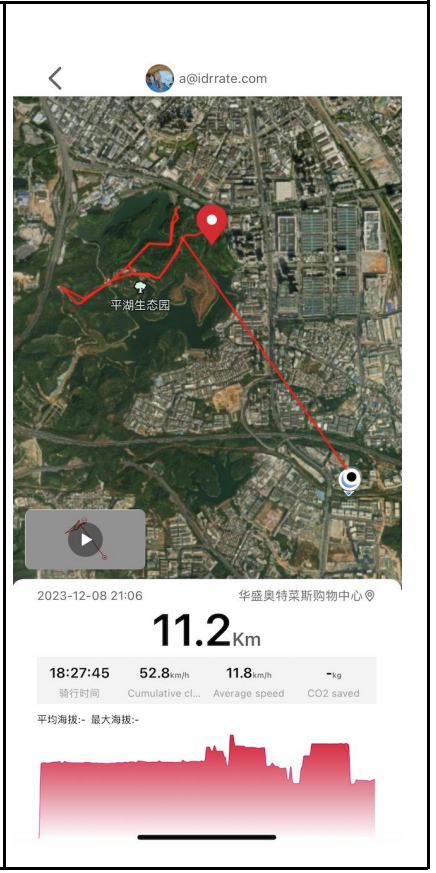






Intelligent Vehicle Infotainment Platform-
TBOX-Vehicle Driving Trajectory

赛维时代 SAILVAN TIMES

1. Overview page of the trajectory, including riding data accumulated by the TBox end, thumbnails of each trajectory, etc.	2. Detailed page of each riding trajectory. It contains basic riding data and an entry to the trajectory animation.	3. Riding trajectory sharing page, where you can share this trajectory.	4. Riding trajectory deletion page.	5. Animation display of the trajectory, including basic riding data and altitude display. 6. Overall thumbnail display after the end of the trajectory animation.	
					

Intelligent Vehicle Infotainment Platform-TBOX
Data Collection, Providing Basis for Optimization

赛维时代 SAILVAN TIMES

序号	数据类型	数据项
1	Device Information	time
		Model number
		Software version number
		ICCID
		IMEI
		Bluetooth Mac
		Bluetooth SN
		GPS signal strength
		Mobile signal strength
		Terminal state
2	Satellite Positioning	Number of GPS satellites
		GPS status
		Anchor point 1 longitude
		Anchor point 1 latitude
3	Base Station Data	ID
		MCC
		Base Station1:MNC
		Base Station1:LAC
		Base Station1:CELL-ID
		Base Station1(RSSI)
4	WiFi_Mac	WiFi1:BSSID
		WiFi1:level
		WiFi1:SSID
5	Battery Data	Main battery SN
		Main battery SOC
		Main battery SOH
		Number of main battery charging cycles
		Remaining time when the main battery is charged
		Remaining capacity of the main battery
		Main battery full capacity
		Total voltage of main battery
		Total current of the main battery
		Each cell battery voltage
		Battery fault code
		Charging current
		Discharge current
		Cell temperature
6	Vehicle Condition	Endurance Mileage
		Single Trip Mileage
		Total Mileage
		Riding Status
		Electric Door Lock Status
		Charger Connection Status
		Charger Connection Status
		Single Ride Duration
		Total Riding Time
7	Electric control	Vehicle Speed
		Vehicle Speed
		Motor Status
		Motor Alarm
		Riding Cadence
		Torque Output Voltage
		Average Speed
		Maximum Speed
		Motor Input Power
		Motor Speed
		Motor Temperature
		Bus Voltage
		Bus Current
		Historical Error Information
		Power-off Brake Status
		Scheme Type
		Hardware Version Number
		Software FLASH Version Number
		Boot Program Version Number
		Controller Working Status
		Controller Mode
		Buzzer
		Controller SN
		Tail Light Status
		Electric Door (Handlebar Angle)
8	Trigger Alarm	Vibration Alarm
		Power-off Alarm
		Tilt Alarm
		Roll-over Alarm
		Destruction Alarm
		Electronic Fence Alarm
9	Terminal Fault Alarm	Gsensor Status
		GPS Status
		CAN Communication Status
		Mobile Communication Status
		Altimeter
		Watchdog Status
10	Vehicle Fault	Fault Quantity
		Fault Code
11	Altimeter	Altitude
		Air Pressure
12	G-sensor	Raw Data
13	Riding Posture	Right Handlebar Pressure Value
		Left Handlebar Pressure Value
		Saddle Pressure Value
14	Health Monitoring	Heart Rate
		Blood Pressure
		Blood Oxygen Saturation

Intelligent Vehicle Infotainment Platform-
TBOX Backend Display

http://ebike-ops-test.sailvan.net/grafana/d/da3a5985-1f00-4bb9-a2e6-ffaf970489fe/iot%E7%8A%B6%E6%80%81%E6%95%B0%E6%8D%AE?orgId=1&var-sn=T182SWADBD112000011&from=1702185095043&to=1702213211328

Intelligent Vehicle Infotainment Platform-Standard Vehicle Configuration" vs "Vehicle + Optional Tbox

赛维时代 SAILVAN TIMES

Serial number	Class item	Standard Vehicle Configuration Tbox	Vehicle without TBOX
1	Bluetooth Seamless Entry	support	Do Not Support
2	Highlight Brake Lights	support	Do Not Support
3	Anti-theft Positioning	support	Do Not Support
4	Whole Vehicle Data Collection	Complete Whole Vehicle Data Collection	Limited Data Collection in APP Scenario
5	Audio, Light, and Electrical Alarm	support	Do Not Support
6	SOS Emergency Rescue	support	Do Not Support
7	User Riding Posture	support	Do Not Support
8	Whole Vehicle OTA	Achieve Whole Vehicle OTA	Limited Data Collection in APP Scenario
9	Assisted Riding	Display, Battery, Electronic Control Motor Usage	Display, Battery, Electronic Control Motor Usage

FCC Warning

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Any Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

-Reorient or relocate the receiving antenna.

-Increase the separation between the equipment and receiver.

-Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

-Consult the dealer or an experienced radio/TV technician for help.

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction.

Specific Absorption Rate (SAR) information:
This Intelligent Terminal meets the government's requirements for exposure to radio waves. The guidelines are based on standards that were developed by independent scientific organizations through periodic and thorough evaluation of scientific studies. The standards include a substantial safety margin designed to assure the safety of all persons regardless of age or health.

FCC RF Exposure Information and Statement

– This radio is designed for and classified as "General population/uncontrolled Use", the guidelines are based on standards that were developed by independent scientific organizations through periodic and thorough evaluation of scientific studies. The standards include a substantial safety margin designed to assure the safety of all persons regardless of age or health.The exposure standard for wireless radio employs a unit of measurement known as the Specific Absorption Rate, or SAR, the SAR limit set 1.6W/kg.

– Body-worn operation; this device was tested for typical body-worn operations with the back of the handset kept 0mm for body worn. To maintain compliance with RF exposure requirements, use accessories that maintain a 0mm for body worn. The use of belt clips, holsters and similar accessories should not contain metallic components in its assembly. The use of accessories that do not satisfy these requirements may not comply with RF exposure requirements, and should be avoided.

– The highest reported SAR value for worn on the body is 1.2 0 7 W/kg.