WANJI

High Precision MEMS Positioning and Navigation Control System User Manual



Version : V1.1

Release Notes

Releases	Updates	Update time
V1.0	–	–
V1.1	1. Add regional sharing function 2. Adding the function of base station 3. Added the function of pointing meter 4. Modify the content of antenna installation method	May 2025

To Users

Dear users, thank you for using NAV-L3 products. In order to make sure that you can use NAV-L3 High Precision MEMS Positioning and Navigation Controller correctly and smoothly, we strongly recommend you to read this user manual carefully and follow the rules mentioned in this user manual.

Disclaimer

Before using this product, please be sure to read the user's manual carefully, which will help you better use this product. The user shall be responsible for any damage caused by failure to follow the user manual. Due to the continuous iteration and upgrading of the product, the content of the subsequent user manual may be changed at any time, please pay attention to the official website of Jining Wanji Intelligent Technology Co., Ltd Due to product batch and hardware version differences, the product you purchase may differ from the pictures and icons in the user manual, please refer to the actual product.

How to contact us

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Technical support e-mail: info@wanji-imp.com

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Product Overview

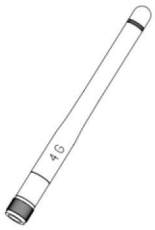
NAV-L3 is a high-precision positioning and navigation control system based on BeiDou-RTK technology launched by SuZhou Cenozoic Intelligence Equipment Pte.,Ltd for the autonomous navigation of low-speed autonomous mobile robots. NAV-L3 can output key information such as positioning information, autonomous operation speed value, angle value and so on.

With the “Intelligent Operation” APP, the low-speed mobile robot equipped with NAV-L3 can be operated autonomously.

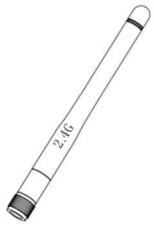
Item List

Please check the contents of the package against this list. If any are missing, please contact your dealer promptly.

(NAV-L3 + accessories, standard NAV-L3 not included)



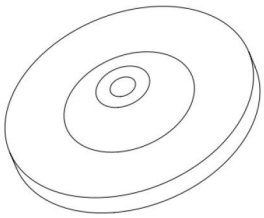
4G Antenna ×1



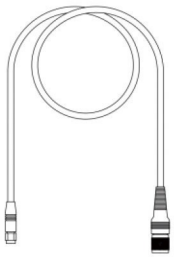
Bluetooth antenna ×1



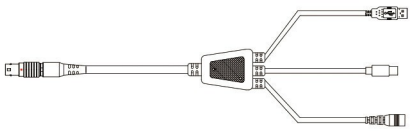
Aluminum strut ×2



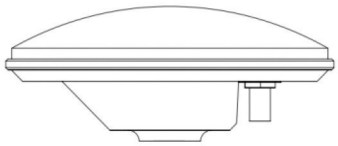
Strong magnetic base ×2



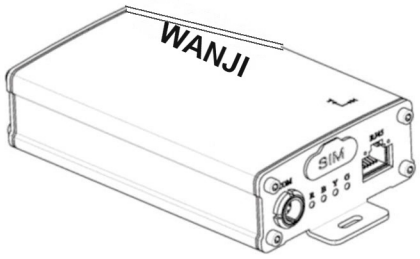
Antenna cable ×2



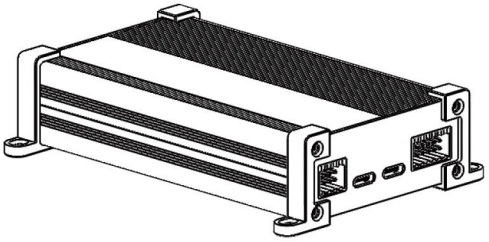
Remo Connection Cable ×1



Antenna ×2



Product body×1

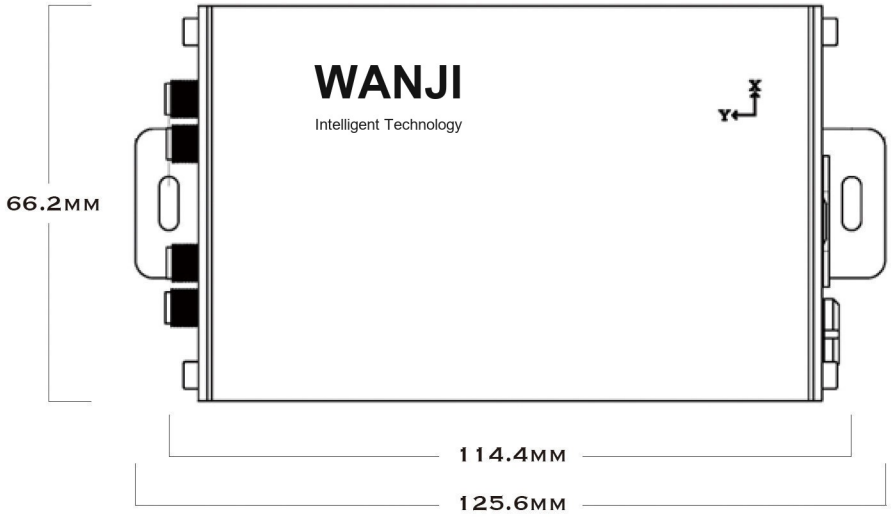


ELC-02 Embedded Layer Controller

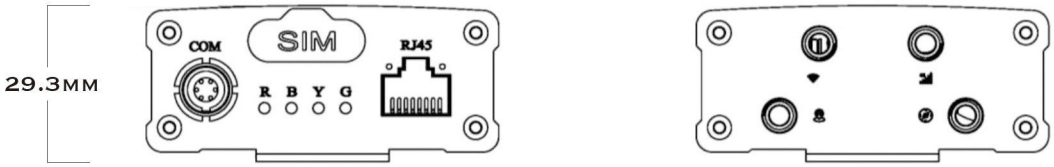
***Check that the controller SIM card is installed and valid.

Structure Introduction

This section mainly illustrates the product installation dimensions and interface types.



Product Dimensions and Mounting Dimensions



Product Interface and Indicator

Definition of indicator lights

This section describes the meaning and status contents of the indicator lamps.

color	state of affairs	hidden meaning
Red (R)	Flashes once per second	Positioning valid
Blue (B)	Normal Bright	Enter RTK Fixed Positioning
Orange (Y)	Constant	Registered to LTE network
	Flashing	Not registered to network
Green (G)	On for 0.2 seconds, off for 1.8 seconds	Normal connection status
	On for 1.8 seconds, off for 0.2 seconds	Standby
	0.125 sec on, 0.125 sec off	Data transfer status

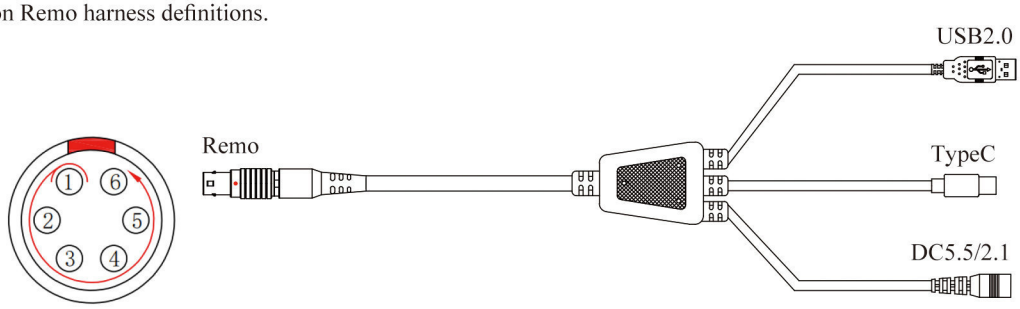
Structure Introduction

This section expresses the types and functions of ports.

port name	functionality
Data Port(Aerial Plug)	Power and data cable
Network Port(RJ45)	External Network Data
4G Network(SMA)	Get 4G network signal
Orientation(SMA)	GNSS position source point
Directional(SMA)	Pointing point for GNSS direction data
SIM Card(Nano Sim)	Access to operator's SIM, acquire network
WiFi(SMA)	Get WIFI network signal

Definition of wiring harness

This section focuses on Remo harness definitions.



Remo Joints Illustration

1. equipped with Remo to Type-A (USB) and Type-C harness, the USB interface for the standard USB2.0 protocol for Linux and Windows and other systems to use and test. USB2.0 built-in USB to serial chip, please install the corresponding system CH340 driver to use, Linux kernel comes with a driver, can be plugged directly into the use of. 2. Type-C interface for TTL serial protocol (3.3V level), for embedded devices such as microcontroller, wiring definition, please refer to the following Type-C definition for wiring.

2. Type-C interface is TTL serial protocol (3.3V level), used for embedded devices such as microcontrollers, wiring definition, please refer to the following Type-C definition of wiring.

USB 2.0 Definition	Functionality	Note
D-	USB2.0	Internal wire color: white
D+	USB2.0	Internal wire color: Green
-	Power Supply Negative	GND

Type C definition	Functionality	Note
RX	Serial Version (RX)	Internal wire color: white
TX	Serial Version (TX)	Internal wire color: Green
-	Power Supply Negative	GND

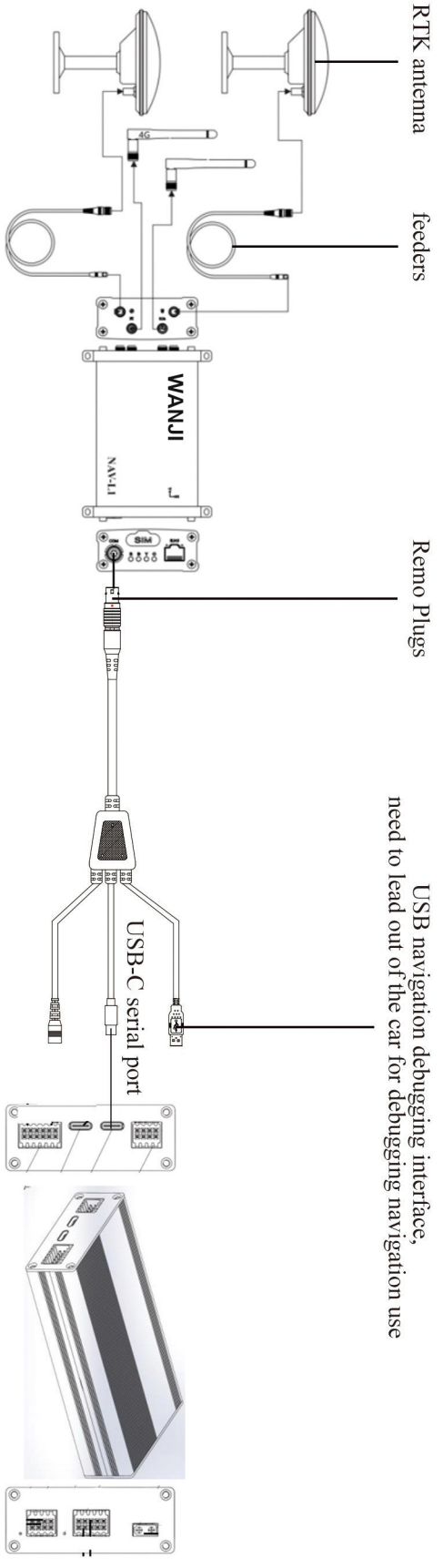
DC5.5/2.1 Definition	Functionality	Note
+	Positive terminal	Supports 12-24 V input
-	Power Supply Negative	GND

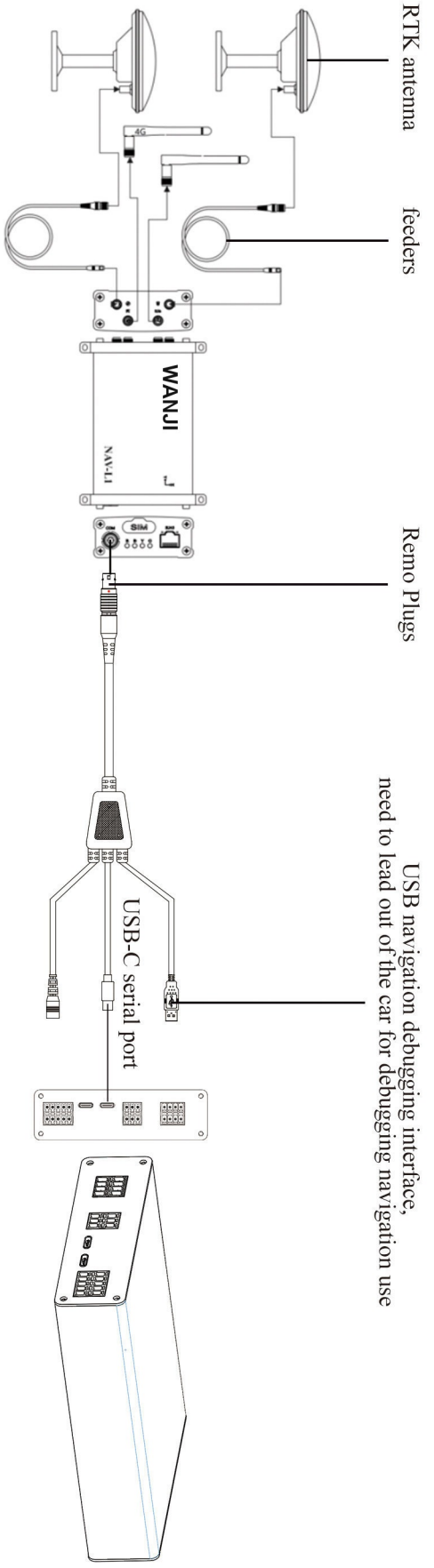
Pin	Define
1	Communication Port
2	Communication Port
3	GND
4	USB-DP
5	USB-DM
6	VCC

Remo Pin Definition

Device Connect

This subsection describes how equipment and accessories are connected to each other. Please rotate 90° to view





*** Note the small red dot at the Remo connector, which needs to be aligned with the bottom notch for smooth access.

Antenna installation method

The two GNSS antennas are installed on the mobile robot, and the antenna is installed at the highest point of the application equipment as far as possible to ensure that good GNSS signals are received, the GNSS antenna is susceptible to electromagnetic waves, laser beam interference, the antenna should be installed away from high-power motors, power batteries and LIDAR and other equipment as far as possible. Recommended amount of antenna installation distance > 0.8 meters, and distance from LIDAR, motor and other equipment more than 0.5m.

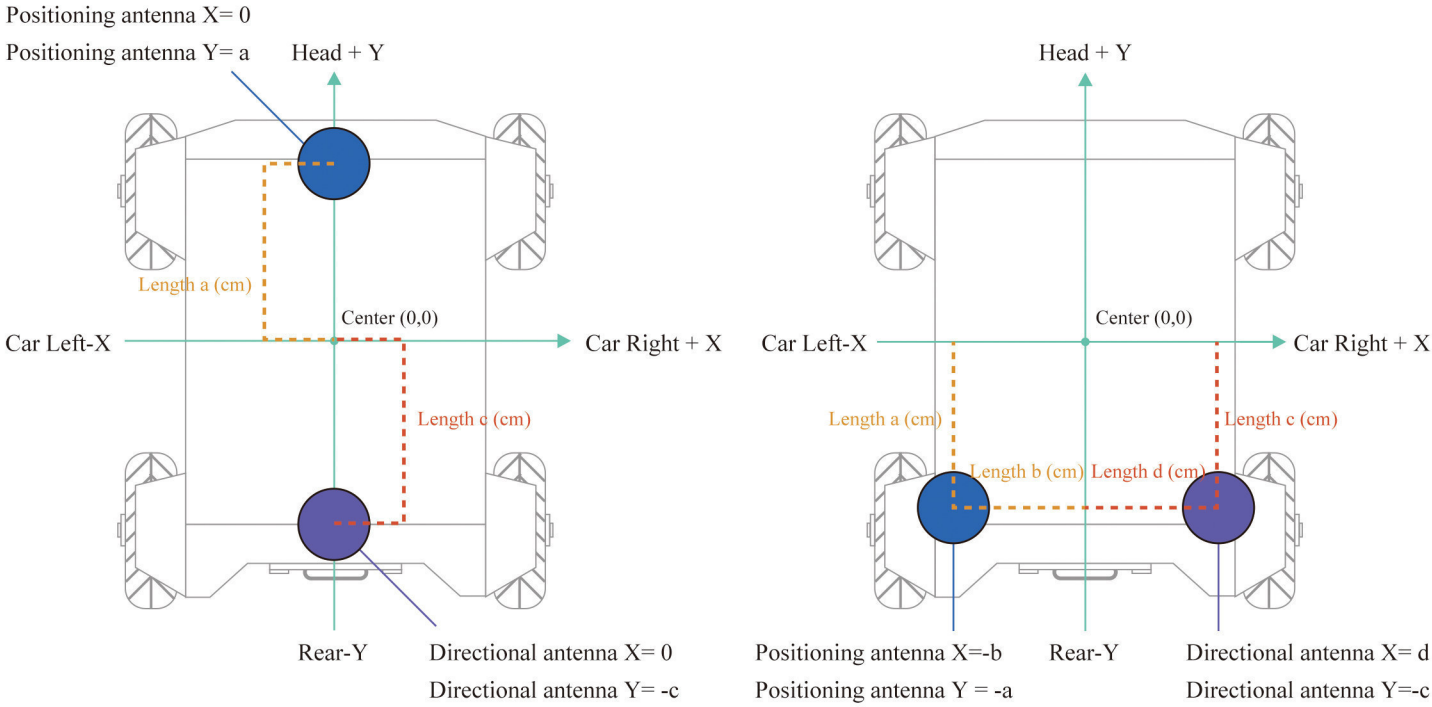
Ideal installation

The GNSS positioning antenna is first installed in the center of mass of the mobile robot (i.e., the center of rotation when the robot is rotating in place), and the directional antenna is installed in the centerline of the mobile robot and not in the first few directions from the robot's center of mass. (As shown in the figure) At this point, NAV-L3 considers the location of the positioning antenna to be the center of mass of the mobile robot, and the ray pointing from the positioning antenna to the directional antenna to be the direction of the nose of the mobile robot.

NAV-L3 is equipped with a strong magnetic suction cup for GNSS positioning and directional antenna. Users can attach the positioning and directional antenna to the surface of the metal casing of the mobile robot, and make sure that the antenna is stable and does not shake when

Customized Installation

Due to the appearance design of the customer's mobile robot as well as the sensor and electrical layout, the GNSS positioning directional antenna may not have the ideal mounting conditions, so the NAV-L3 provides a peg one mounting method. Due to the offset of the GNSS positioning antenna mounting, a center of mass transformation of the GNSS behavioral directional antenna is required. The center of mass conversion method is shown in Fig.



Ideal installation

Customized Installation

Software usage process

Installation of software

This software can only be downloaded, installed and used on mobile devices with Android 6.0 or above.

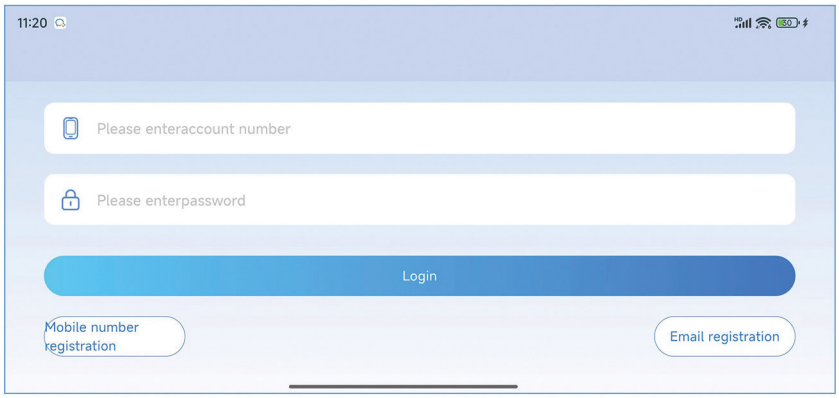
This software only supports installation using the software installation package provided by the developer, if you need to update the software version, please contact the developer.

Initial Use Process

Register -> Login -> Add Device -> Add Job -> Execute Job

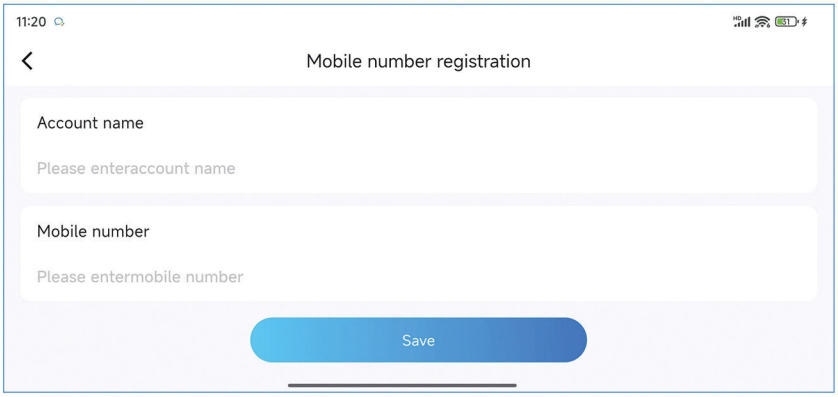
1. Login

After downloading and installing, open the software, the login interface will appear, and you can login by entering your cell phone number and password in turn.



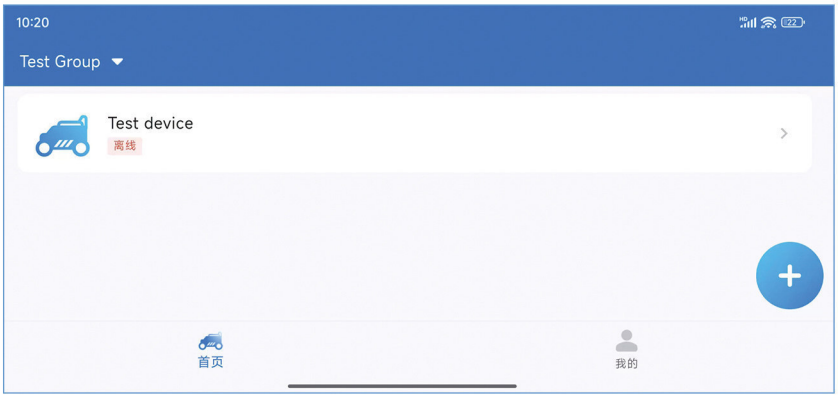
2. Registration

If you do not have a login phone number, please enter the registration page to register your cell phone number or email address.

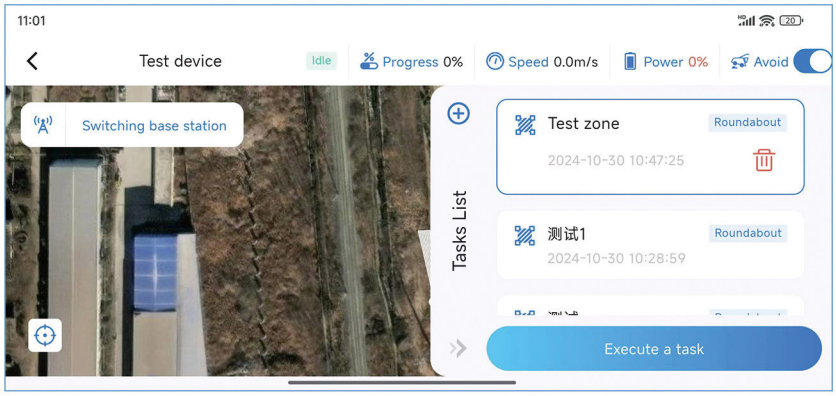


3. Add new device

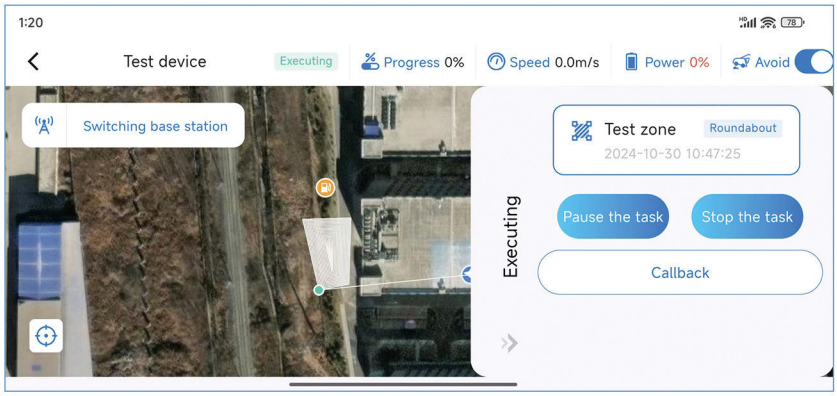
After successful login, you will enter the device homepage. If there is no device in the device list, please click the “+” button in the upper right corner to add a new device.



4. Click on the device to enter the device details. After selecting the job task, click “Start Job”.

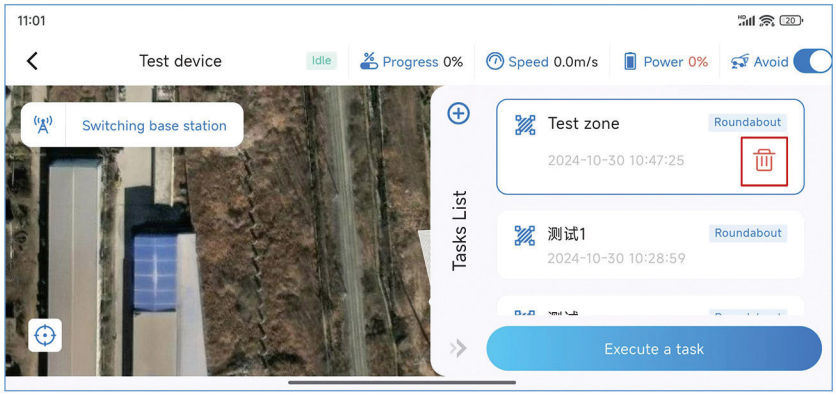


5. When there is a task in progress for the current equipment, click “Pause Operation” or “Stop Operation”. When the task is completed, click “Recall Equipment” and the equipment travels to the return point position.



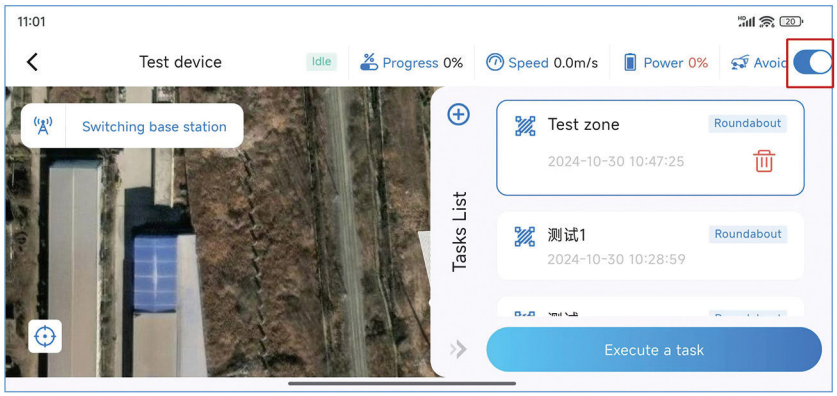
6. Deleting assignments

Tap to select the assignment entry and click on the “Delete Icon”.



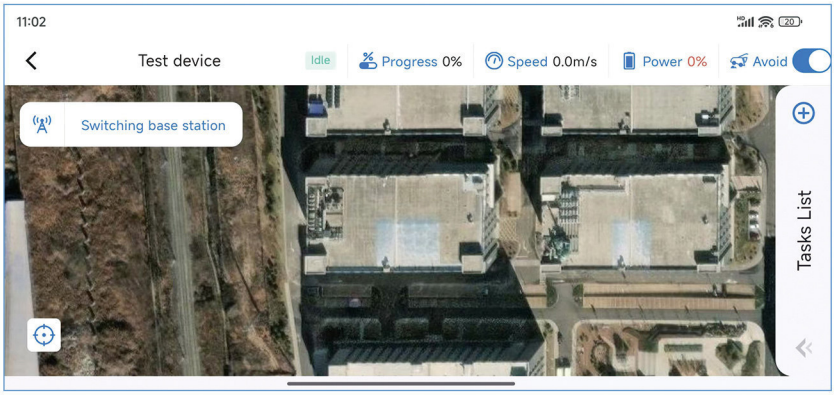
7. Switch Obstacle Avoidance

When the device is online, click on “Obstacle avoidance switch in the upper right corner” to turn on or off the obstacle avoidance function.



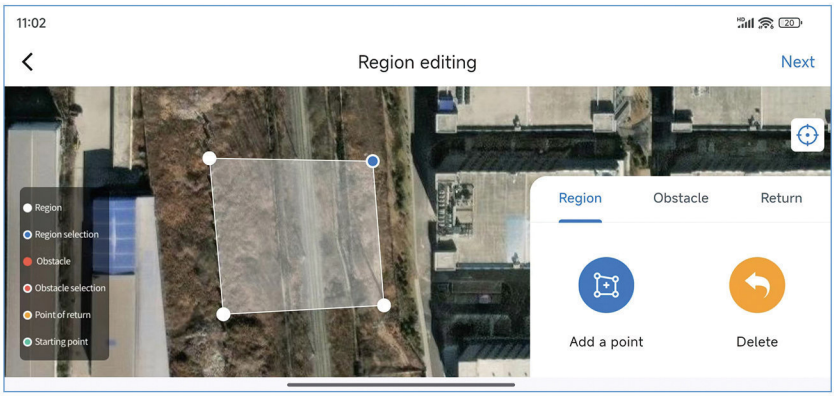
8.To add a new job

Enter the “Equipment Details” page, click the “+” icon on the left side of the job list to bring up the corresponding job area type, select the



9. Back to zigzag area

(1) .Select the corresponding zigzag route type to enter the new area page. Move the machine to the inflection point position of the required work area by remote control, and click the “Add Points” button. Add the endpoints in clockwise or counterclockwise order until all endpoints of the working area are completed. (Note: 1. In order to ensure the effectiveness of the operation, try to ensure that the work area is quadrilateral, do not appear large protruding and concave area. If necessary, it can be divided into multiple areas; 2. The operation area needs to record at least 3 endpoint positions.)



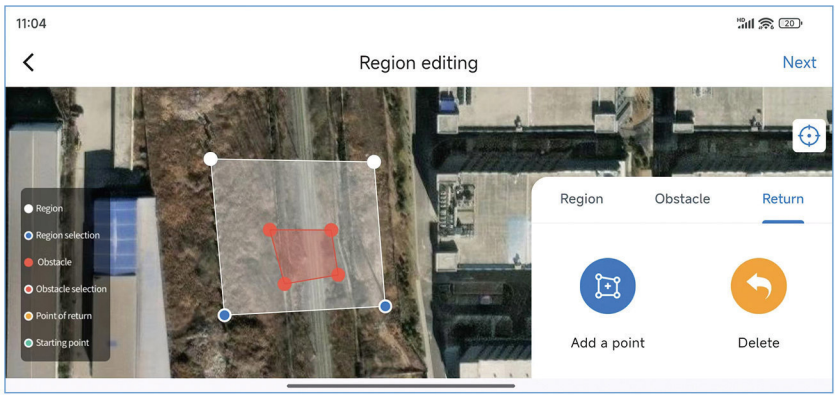
(2) .If you need to adjust the position during the punching process, you can replace the point position by selecting the dot in the map.



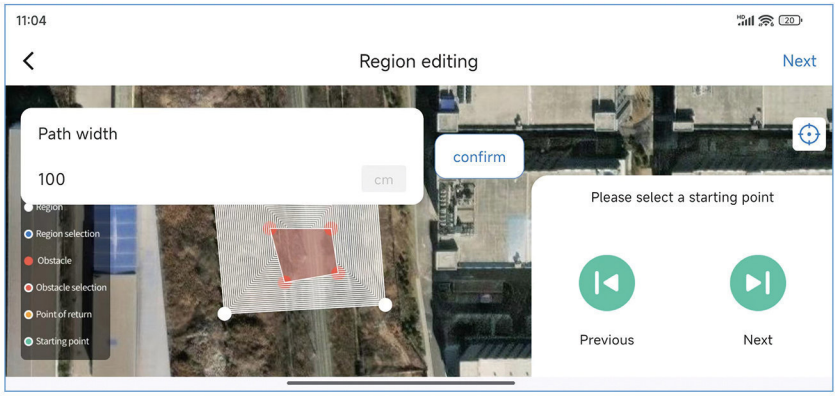
(3). click on the “obstacle point”, through the remote control to move the machine to the obstacle location, click on the “new point” in the obstacle multiple corners in order to hit the point, click on “Finish”.



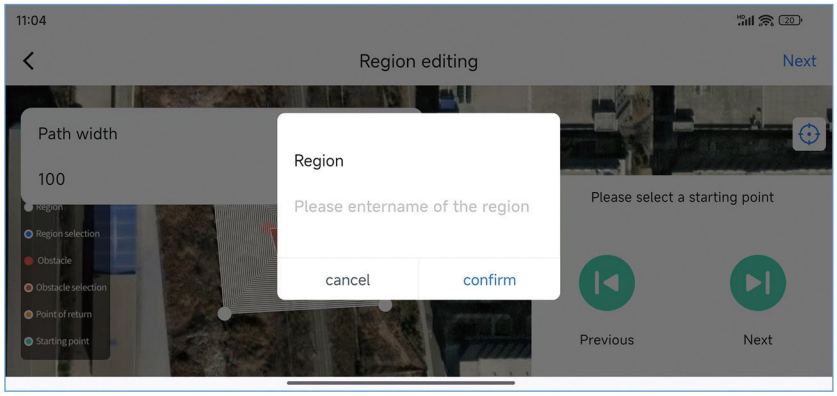
(4) Click “Return Point”, move the machine to the return position by remote control and click “Add Point”.



(5) Click “Next” in the upper right corner to set the starting point of the current operation area. You can switch by clicking the location of the white record point on the map or by clicking the “Previous” and “Next” buttons at the bottom. Click the “Next” button in the upper right corner.

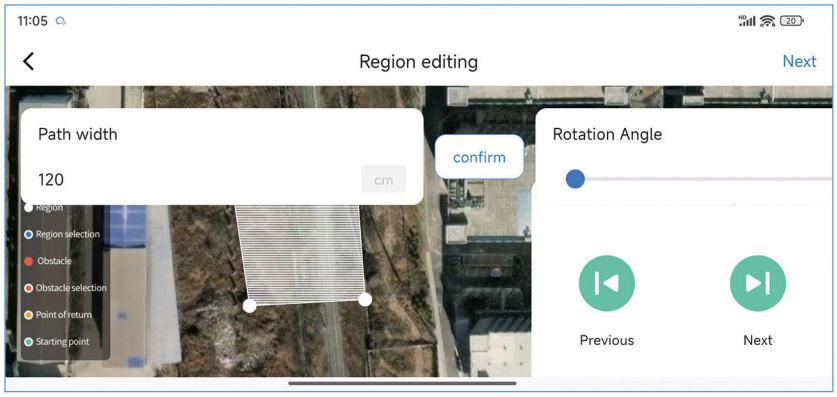


(6).enter the name of the assignment and click “Finish”.



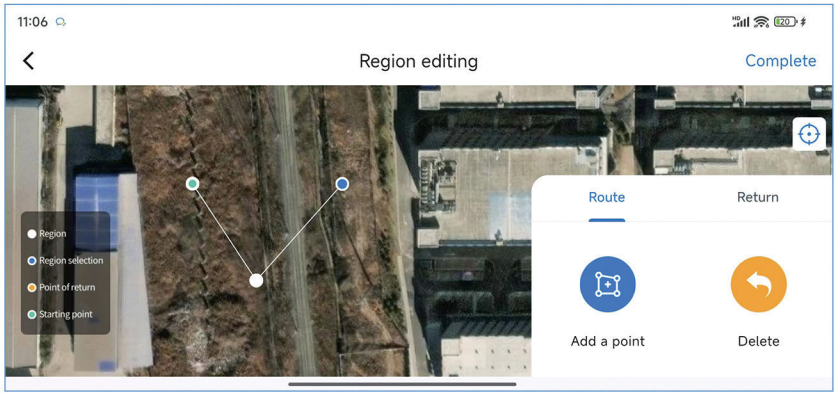
10. Bow-shaped area

The punching method is shown in the steps of the return area, and the bow shape can modify the course angle.

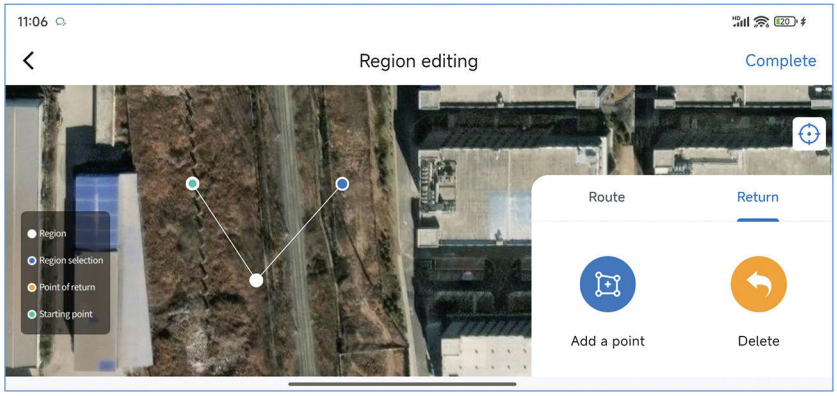


11. Customized area

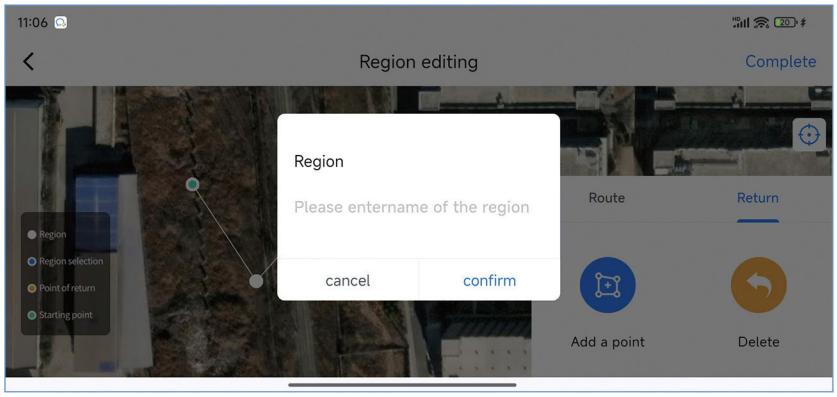
(1). through the remote control to move the machine to the inflection point position of the required operating area, click on the “Add Point” button. During the punching process, you can undo the last recorded end point by the undo button.



(2). Click “Return Point”, remote control the machine to the corresponding position, click “Add Point”.

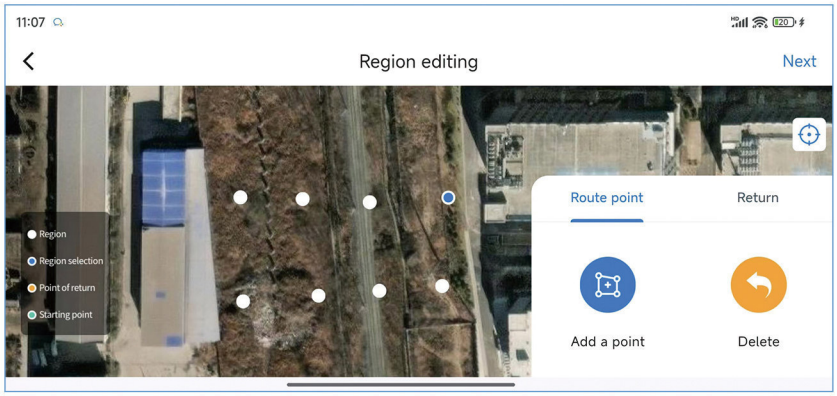


(3). enter the name of the assignment and click “Finish”.

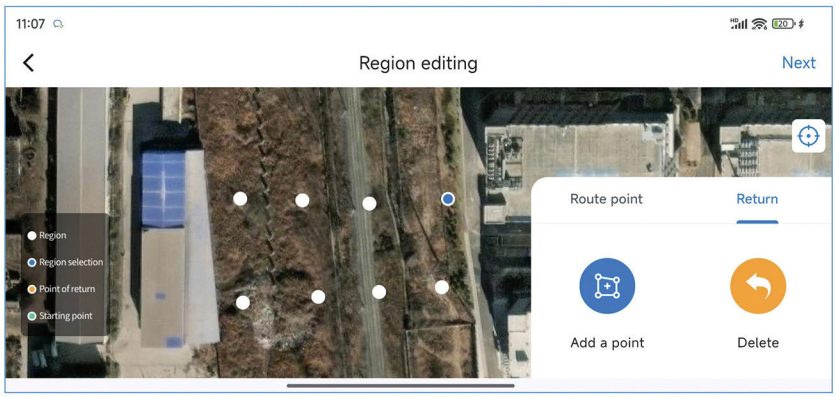


12. Monopoly area

(1) Move the machine to the inflection point position of the required working area by remote control and click the “Add Point” button. During the process of hitting the point, you can use the undo button to undo the end point of the previous record.



(2). click on the “return point”, remote control the machine to the appropriate location, click on the “new point”, click on the upper right corner of the “Next”.



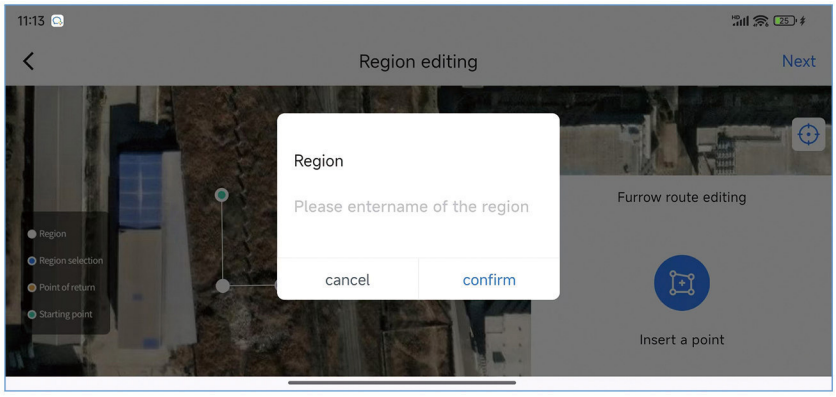
(3). first of all, click on the white area points in the map, the area points into the region of the selected blue points, click on the “line”, in order to connect each point into a route.



(4). click on the upper right corner of the “Next”, enter the route editing page, in this step, you can select the “inflection points” in the map to replace the location. You can also select two “points of inflection” in the map to insert a point to the operation between the two points.

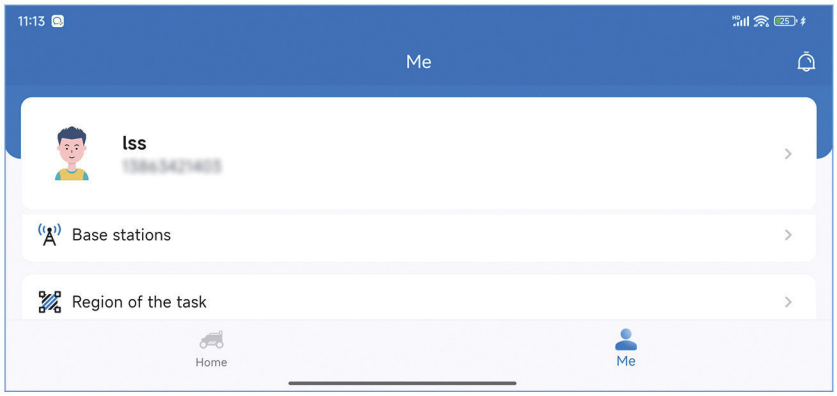


(5). Click “Next” and enter the region name.

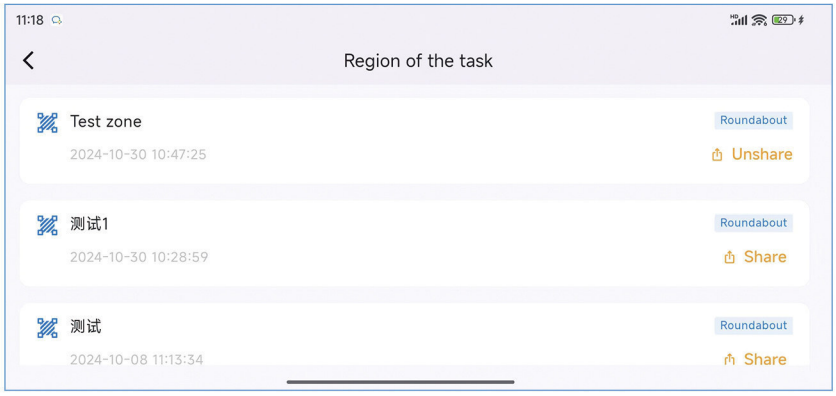


13. Shared area editing

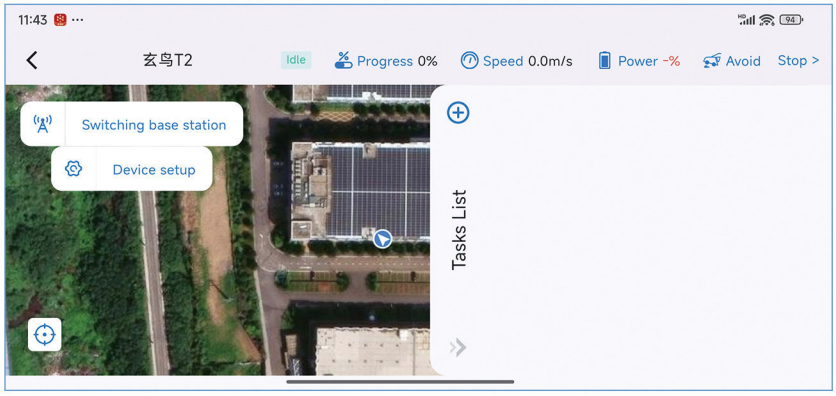
(1). Go to “My” page and click “Work Area”.



(2). Go to the Workspace page and click the “Share” or “Unshare” button. Note: You can only share areas that you have created.



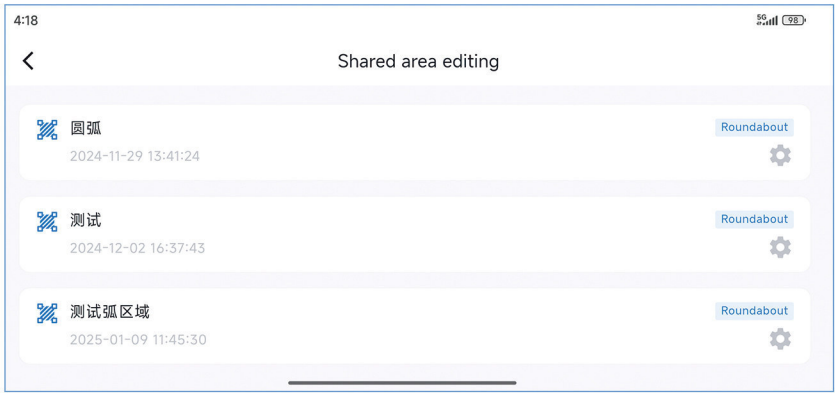
(3). return to the home page, click the corresponding device, enter the device details, click the “+” icon.



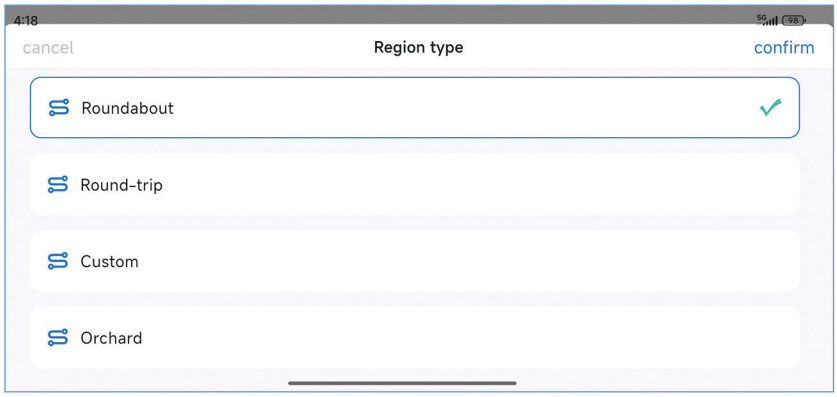
(4). Click “Edit Shared Area”.



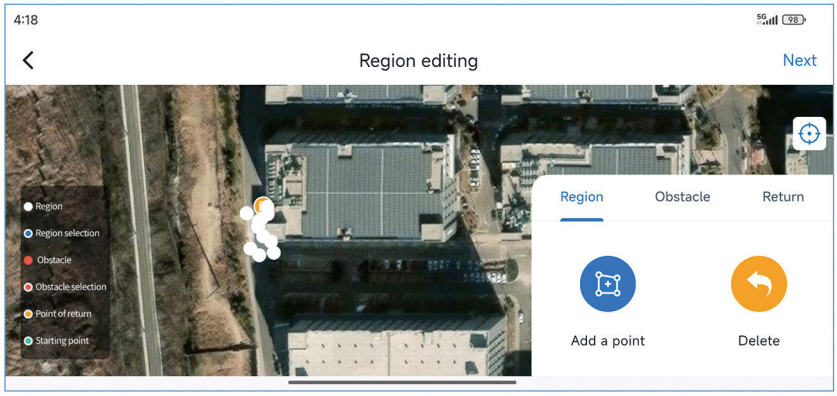
(5). Go to the “Share area editing” screen and click “Area entries” to select.



(6). click on the appropriate area type.

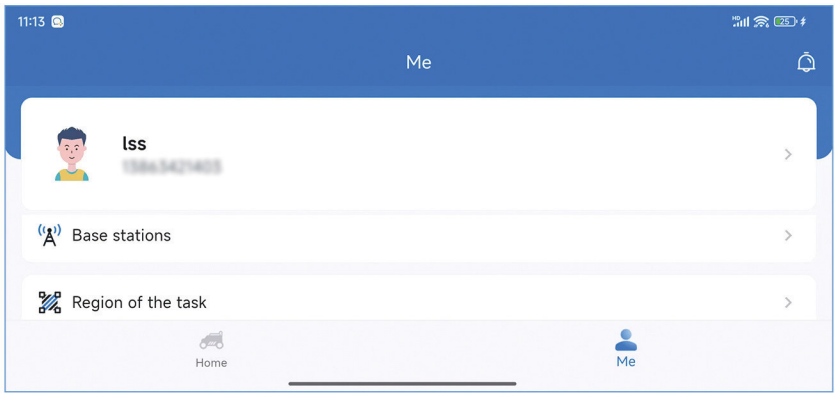


(7). Enter the corresponding region editing page. Dispense with the “Add Point” operation and edit the corresponding area until it is completed. (6) Click the corresponding region type.

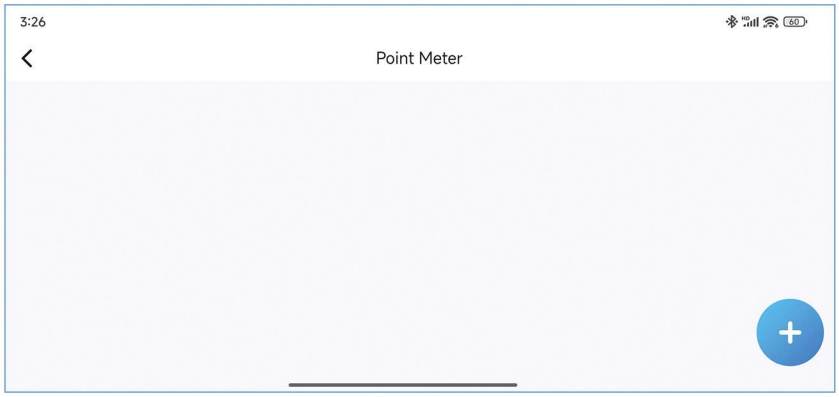


14. Click on the punter

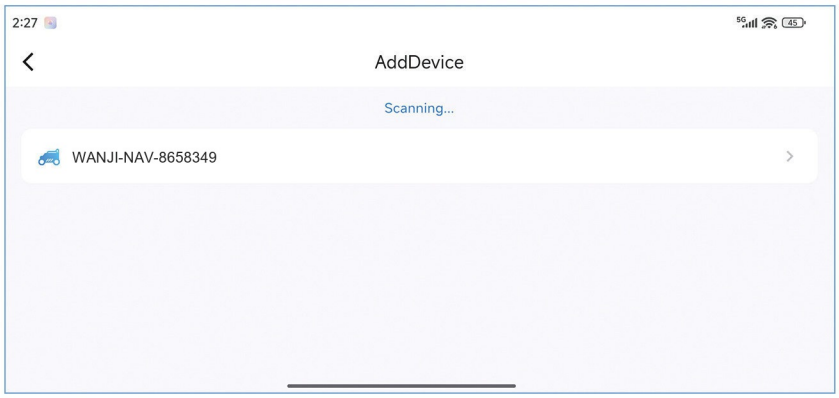
(1). click on “My”, enter my page, click on “punter”.



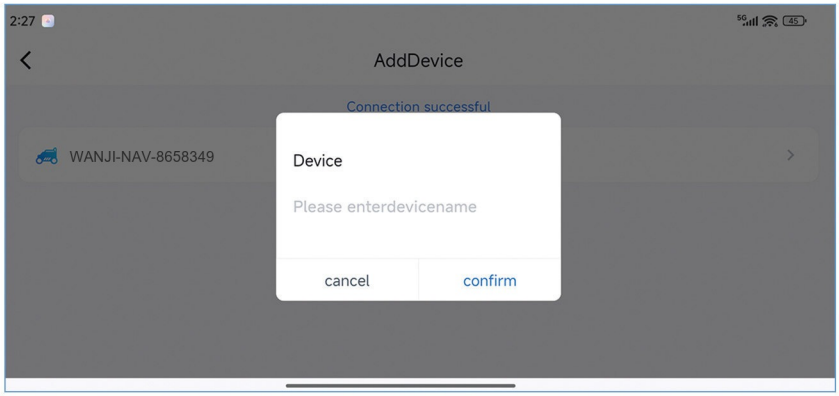
(2). Click “+” to add a new device.



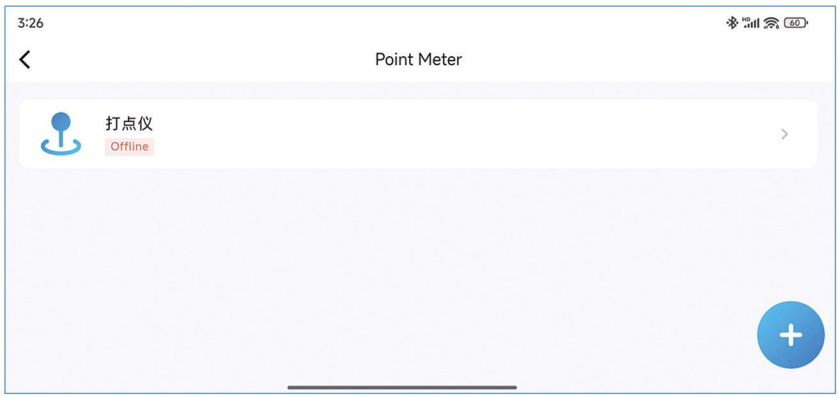
(3). select the corresponding device and start connecting.



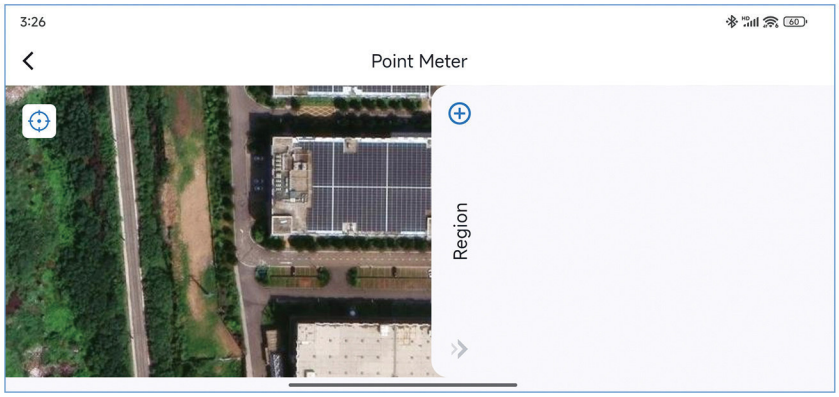
(4). enter the device name, click “confirm”.



(5). static punching instrument, wait for the signal is normal, click the device.



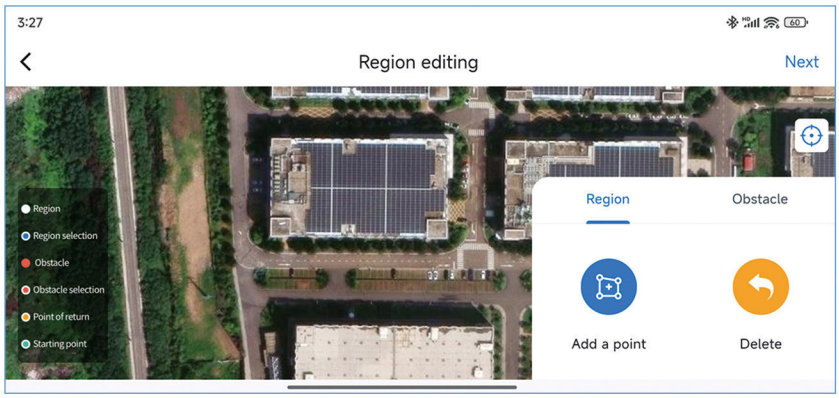
(6). enter the operation page of the punching instrument, click “+” to add a new work area.



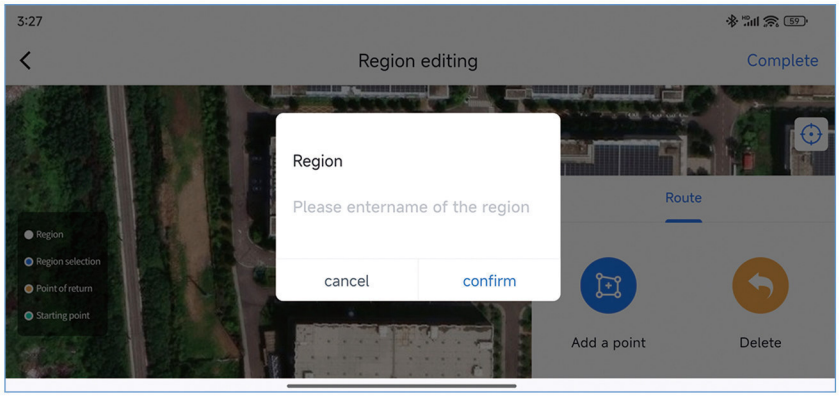
(7). Optional “Area” or “Customized”.



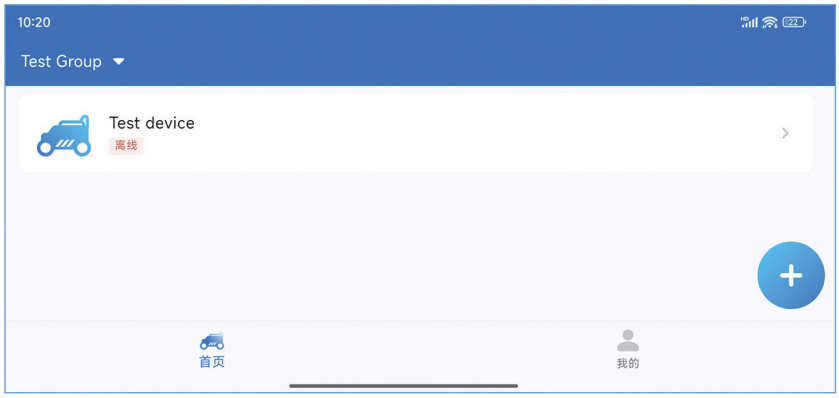
(8). With the pointing instrument in hand, move to the location of the inflection point in the desired operating area and click “New Point”, you can click “Undo” during the pointing process to undo the last recorded end point. Finish all points in the work area, click “Next”. (7), you can choose “Area” or “Custom”.



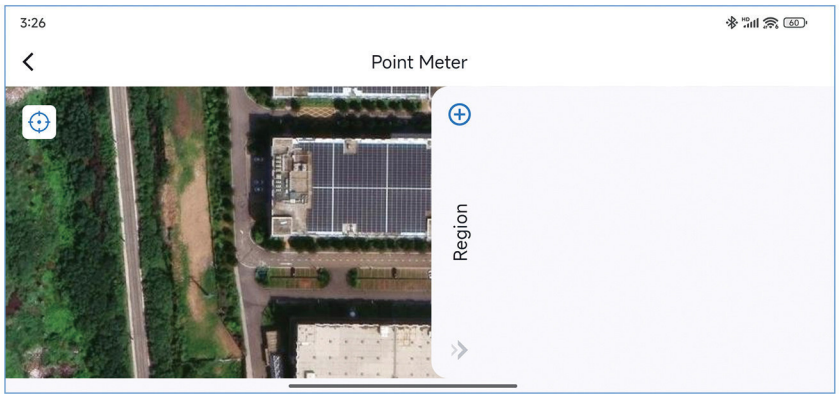
(9). enter the name of the region, click “OK”.



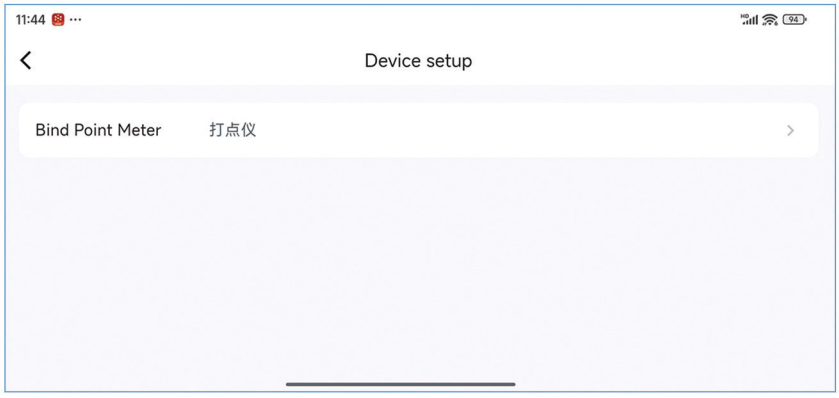
(10). return to the home page, click on the corresponding device to enter the device details.



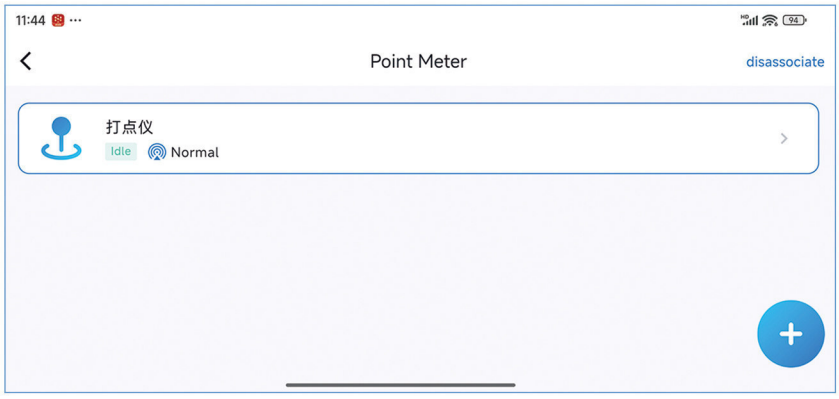
(11). Click “Device Settings” to enter the device settings page.



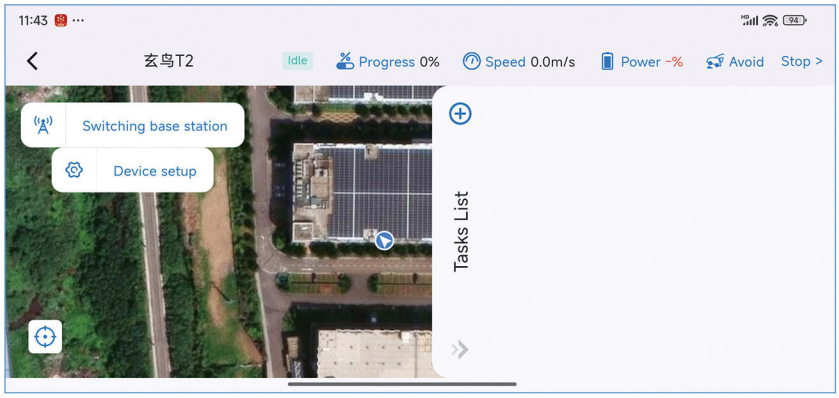
(12). Click “Bind Pointing Machine”.



(13). click the connected punter to complete the binding and return to the device details page.



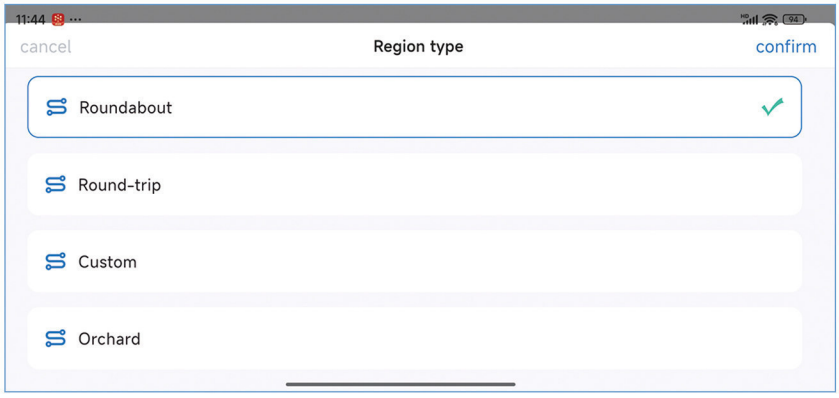
(14). click the “+” icon in the job list to bring up the corresponding job area type.



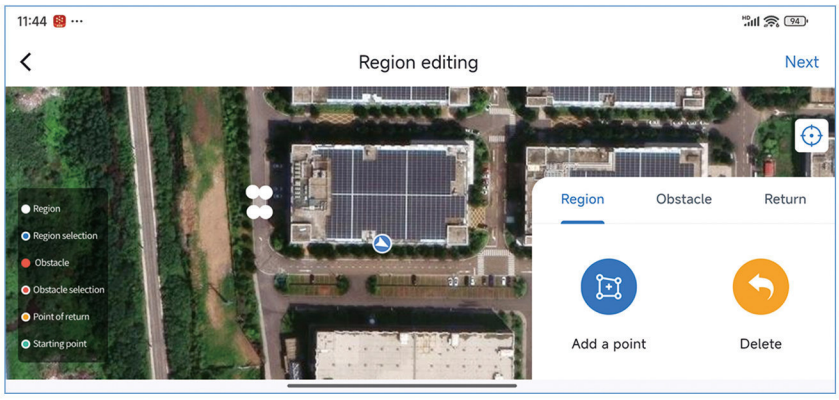
(15). select “Edit punter area”, and click the bound punter.



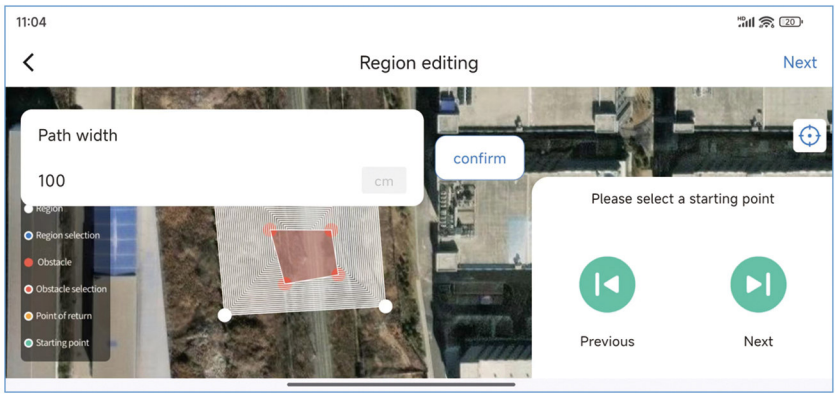
(16). select the type of assignment, click “OK”.



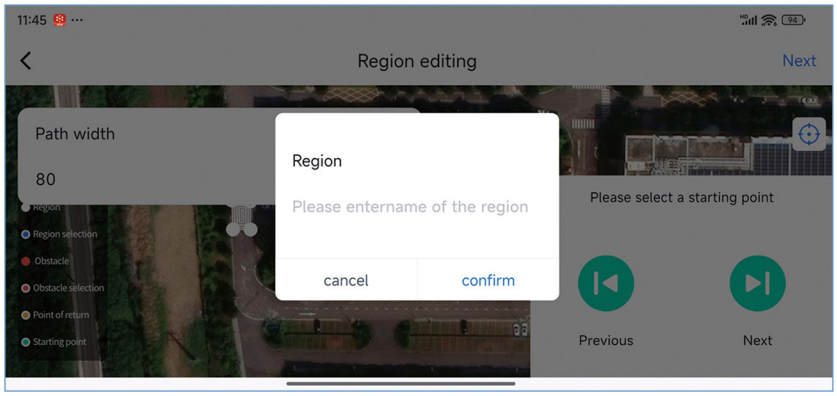
(17). enter the area editing page, click on the “return point”, move the pointing device to the return position, click on the “new point”, click on the next step.



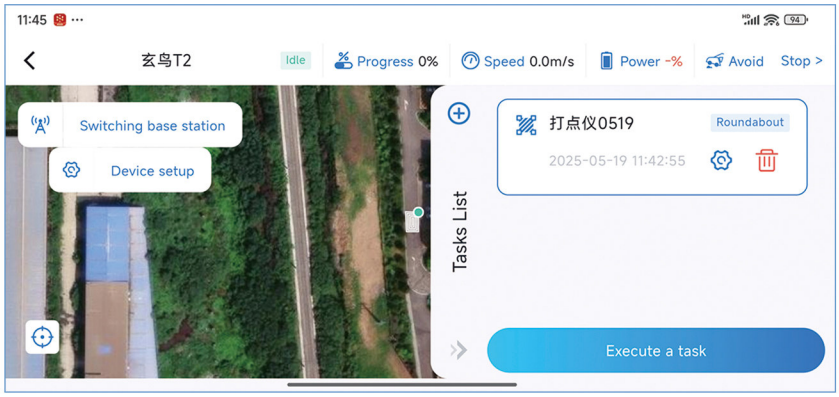
(18). Click “Next” in the upper right corner to set the starting point of the current operation area. This can be switched by clicking on the location of the white record point on the map or by clicking on the “Previous” and “Next” buttons below. Click the “Next” button in the upper right corner.



(19). enter the name of the assignment and click “Finish”.

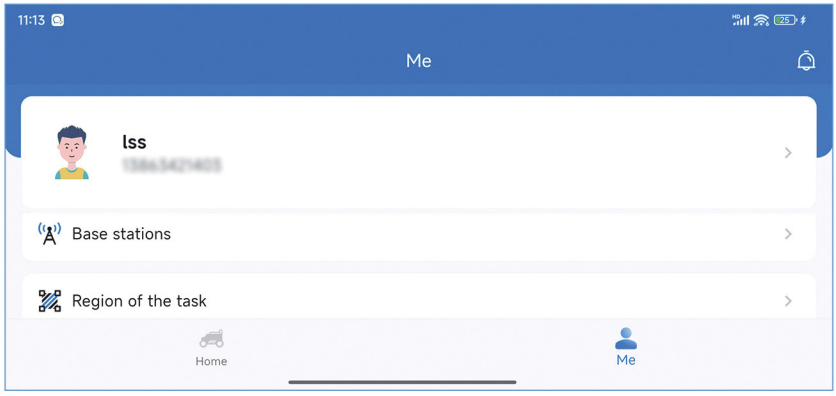


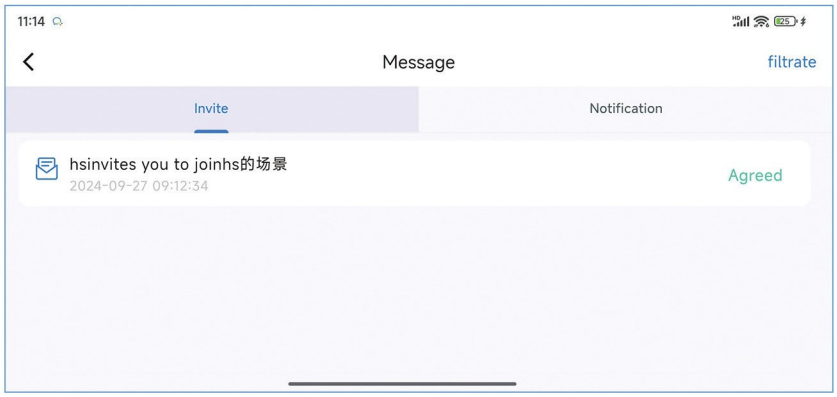
(20). Select the area of the job that has been edited and click “Start Job”.



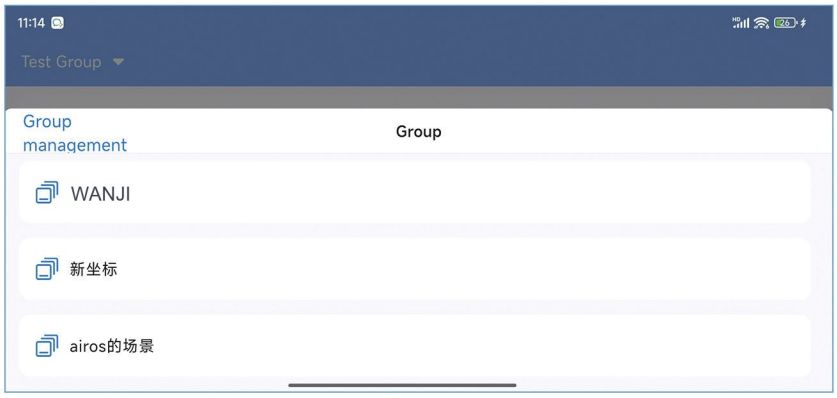
15. Groups

(1). Click “My” to enter my page, click “Messages” icon to view “Invitation messages” and “Notification messages”. “In the invitation message, you can agree or refuse to join other people's groups.



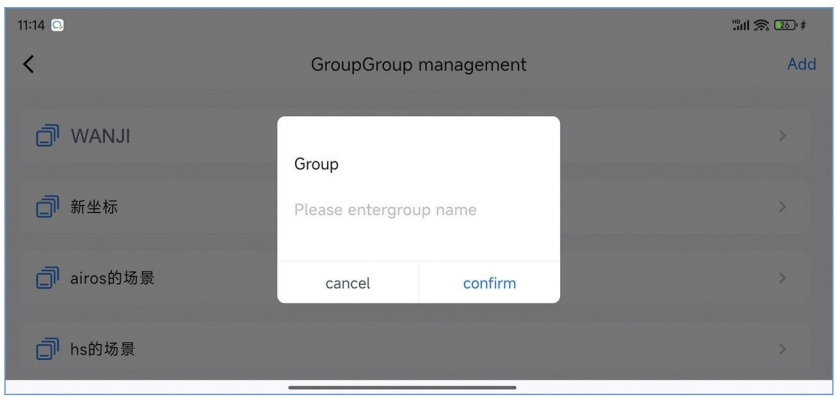


(2). enter the “Home”, click the upper right corner of the “drop-down”, select a specific group, you can realize the group switch. Click the “Management” button to view the “Group List” of the current account.



(3). Enter the “Group Management” page, click the “New” button, and enter a group name.





(4). Dissolve or quit the group. Go to the “Group Management” screen and click “Group Entries”.

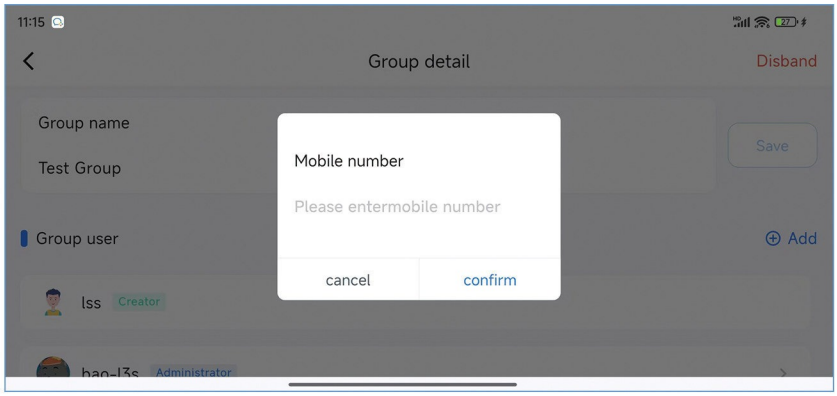


(5). Go to the “Group Details” page, and click “Dismiss” in the upper-right corner of the page if the account is the creator of the group. If the account is not the creator of the group, click “Exit” in the upper right corner.



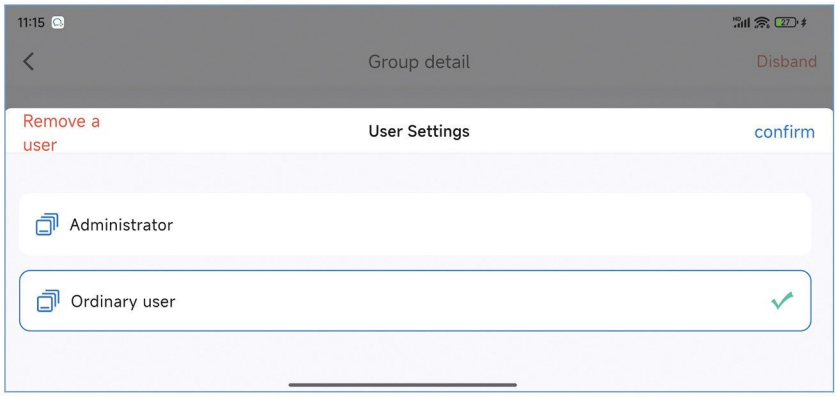
(6). Invite group members.

On the “Group details” screen, if the account is the creator of the group, click “Add”, enter the cell phone number of the new member, and then click “Message” on the “Messages” screen to accept the invitation. After the addition is successful, the new user must agree to the invitation in the “Invitation message” section of the “Messages” page.

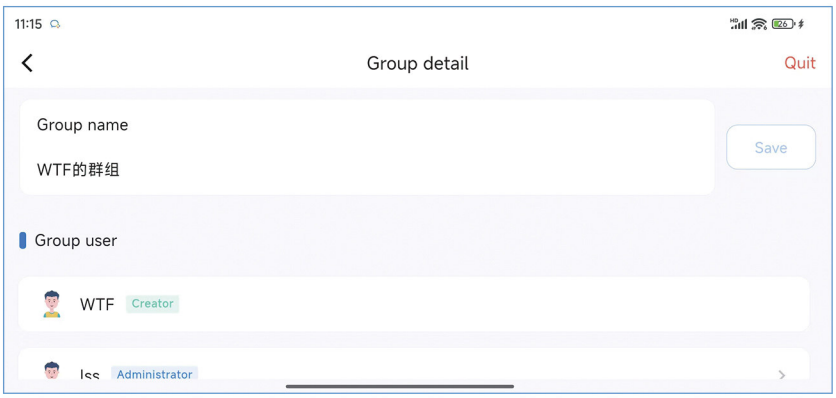


(7). Manage group members.

On the “Group details” screen, if you are the creator of the group, you can click “Membership” to “Remove” and “Modify privileges” for that member. “Modify Privileges”.

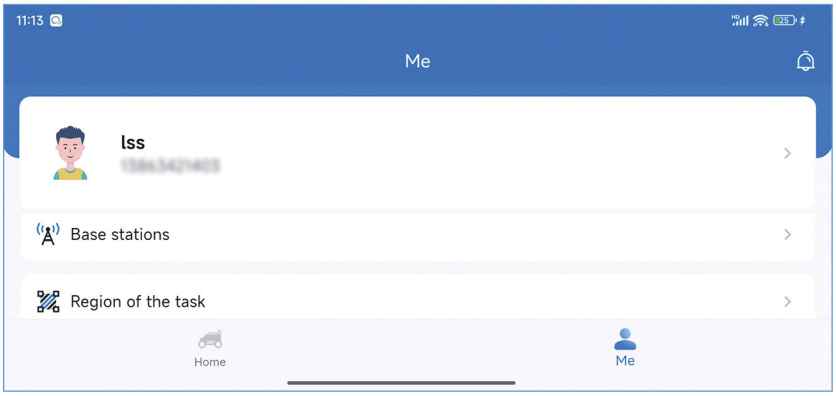


(8). Modify the group name. Go to the “Group details” page, enter the new group name, and click the “Save button”.

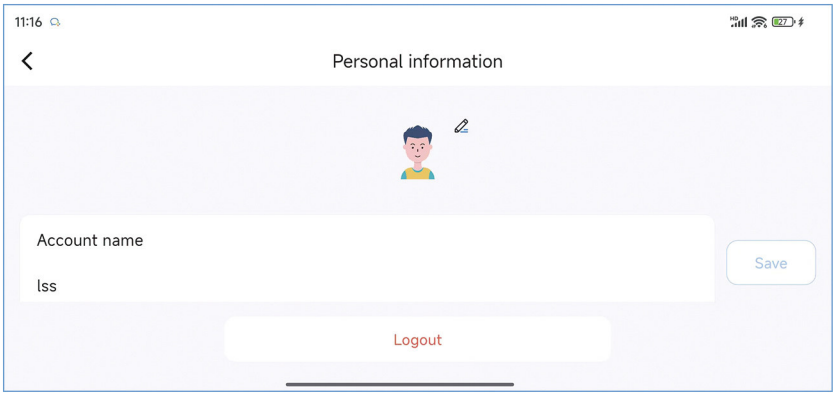


16. Personal Information

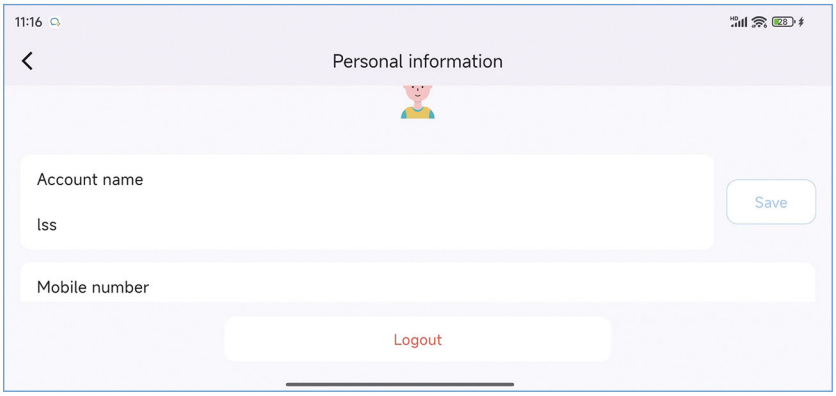
(1). Click “My” to enter my page, and then click “Avatar Entry” to enter the personal information page.



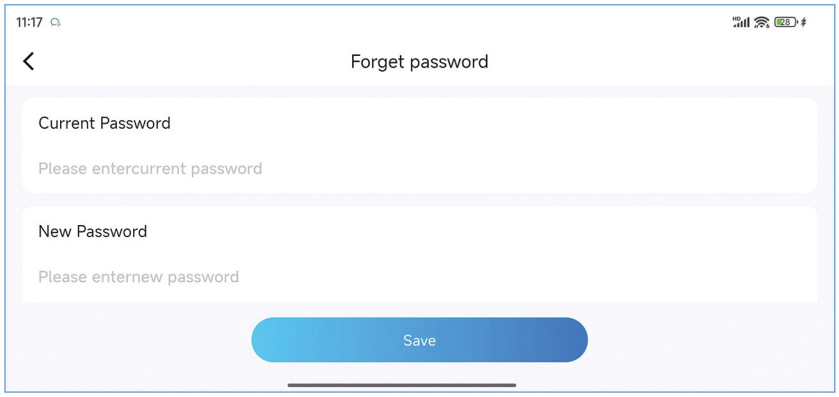
(2).Logout: Click “Log out of current account” to log out of the current login account.



(3). Modify avatar: Click “Avatar” and select the picture. Modify Name: Enter “Account Name” and click “Save” button.



(4)Modify Password: Click “Modify Password” to enter the modify password page, enter the original password and the new password, click “Save”.



17. Base station

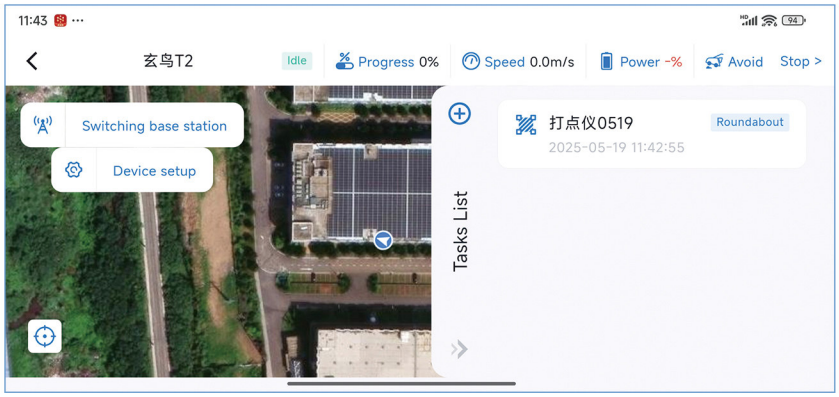
(1). enter “My” page, click “Base station list”, enter “Base station list” page, click ‘Add’ button, enter “Add new page”. Click “Add” button to enter “Add Base Station Page”.



(2). If there is a “private” base station, you can click the “Modify icon” to modify the name of the base station. You can click “Delete icon” to delete the BTS.



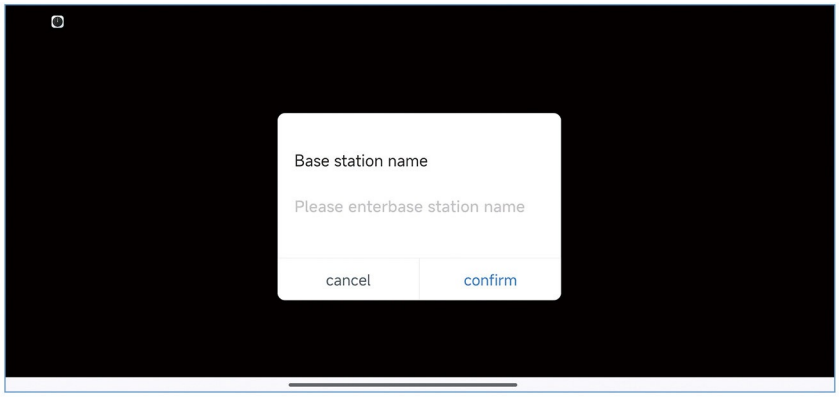
(3). Return to the home page, click the corresponding device, enter the device details, and click “Switch Base Station”.



(4). Enter the “Base Station List” page and click ‘Add’ to enter the “Add Base Station Page”.



(5). select the corresponding base station, enter the name of the base station, click “OK”.

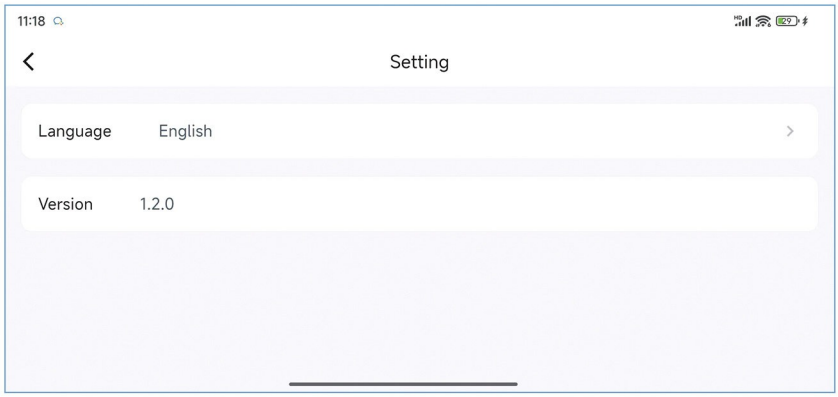


(6). select the base station to complete the binding.



18. Language

Enter “My” page, click “Settings” to enter the settings page. The default language is the same as the language of the cell phone system, if you want to change the language, click “Language”, set Chinese/English.



Points for attention

Power supply matters

1. The device supports 5V power input, please note that Type-A and Type-C power supplies are connected, and different power supply voltages prohibit Type-A and Type-C from supplying power at the same time, so as to avoid Type-C high voltage damage to the 5V USB port on the computer. 2. The device consumes 3.5W typical, 4W maximum.

2. The power consumption of the device is 3.5W typical and 4W maximum, please provide a stable power supply of 5V 1A or above, and note that the device will stop working if the power supply is lower than 4.7V. If the device suddenly loses power during use, please check if the power supply port is working below 5V.

Traffic card matters

The product itself is not equipped with a SIM card, please bring your own valid and usable Nano-SIM card.

Terms of Use

1. positioning and directional receiver is complex and precise equipment, in the daily carrying, handling, use and preservation, only through the correct use and proper maintenance, in order to better ensure the accuracy of the equipment, to extend its service life.

2. When using the receiver, please do not disassemble the instrument by yourself, if any failure occurs, please contact the dealer;

3. Please use the original accessories, the use of non-original accessories caused by equipment failure does not qualify for warranty;

4. Equipment in use may produce high temperature, use please pay attention to prevent scalding. Reduce, avoid placing unnecessary coverings on the surface, and maintain a well ventilated environment;

5. please strictly in accordance with the user manual in the connection method to connect your equipment, each connector should pay attention to plug tight, power switch should be turned on in turn;

6. Prohibit plugging and unplugging the cables without cutting off the power supply; please do not continue to use the connecting cables after they are damaged, and please purchase new cables in time to avoid unnecessary damage.

7. When NAV-L3 is in use, it is recommended that the electric control box of the mobile robot has active heat dissipation channels and active heat dissipation methods, and the cavity temperature is not higher than 50 degrees.

Frequently asked questions

Type of problem	Cure
Wait 2 seconds after plugging in the Remo cable and all the lights don't come on.	Check whether the plug-in cable is correct and secure, if not solved please contact the after-sales service.
Only the yellow light on the right side is flashing.	Check that the 4G antenna is correctly installed and that the SIM card is correctly installed.
Automatic shutdown during device use	Check whether the power supply meets the requirements during operation, and check whether the device temperature data on the APP display is maintained below 75 degrees.
We haven't been in RTK fix mode for a minute.	Check if the SIM card is installed and valid for Internet access, check the accuracy of the account password entered, check if the account is working properly, check if the GPS positioning antenna is installed properly, and check if the number of satellites is greater than 20.
Serial port not detected	Check that the CH340 driver is installed and that the device is functioning properly.
New serial port data format	Use the mobile APP to configure the commands or customize the commands.
Positioning mode jumps	Please use it in an open environment.