

## Product Overview

Thank you for choosing iTR E2 atomizing disinfection robot. I hope that E2 can bring you and your company a more sanitary, intelligent and clean working environment in the future.

This manual will help you better use our products, and as comprehensive as possible to provide you with the use of information, we hope that this manual can give you some help, so as to get the best product experience.

If you have any questions in the process of using, please contact us at the first time, we will serve you wholeheartedly.

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## Product Introduction

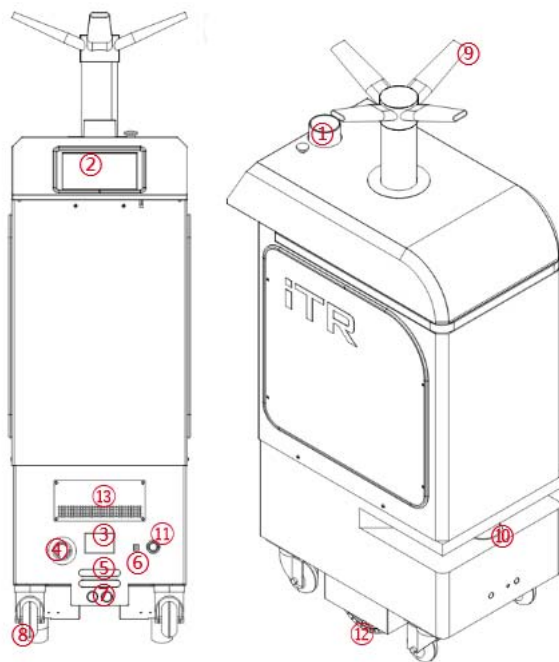
E2 spray disinfection robot, with robot as the carrier, through dilution air atomizing forms of disinfectant in disinfection, according to the actual demand, independent planning route of disinfection, unmanned automatic indoor, can table of interior space to 360 ° no dead Angle and air disinfection, 15 minutes can disinfect 1000 m after space, avoid the risk of infection

## Packing List

The following is the fuselage structure of the product:

- ① Infrared Camera
- ② 7 inch screen
- ③ Infrared sensor
- ④ Emergency stop switch
- ⑤ Self-charging shrapnel

- ⑥ Direct charging source hole
- ⑦ Ultrasonic
- ⑧ Universal wheel
- ⑨ Sprayer
- ⑩ Laser head
- ⑪ Power button
- ⑫ Driving wheel
- ⑬ Air-inlet grille

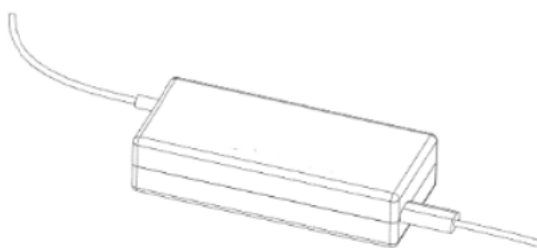


Cleaning precautions: (2) Touch screen ⑩ laser head, do not wipe with a wet towel to avoid water

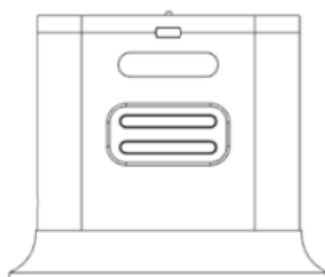
⑩ Laser: Do not block the laser with objects

④ Emergency stop switch: emergency stop switch can only rotate to the right, do not rotate to the left

Charger: The adapter plug needs to be inserted into the voltage of 110-380V, and the DC head is inserted into the automatic charging pile. At this time, the green light of the charging pile will be on, indicating that the charging state is ready.



Power Adapter



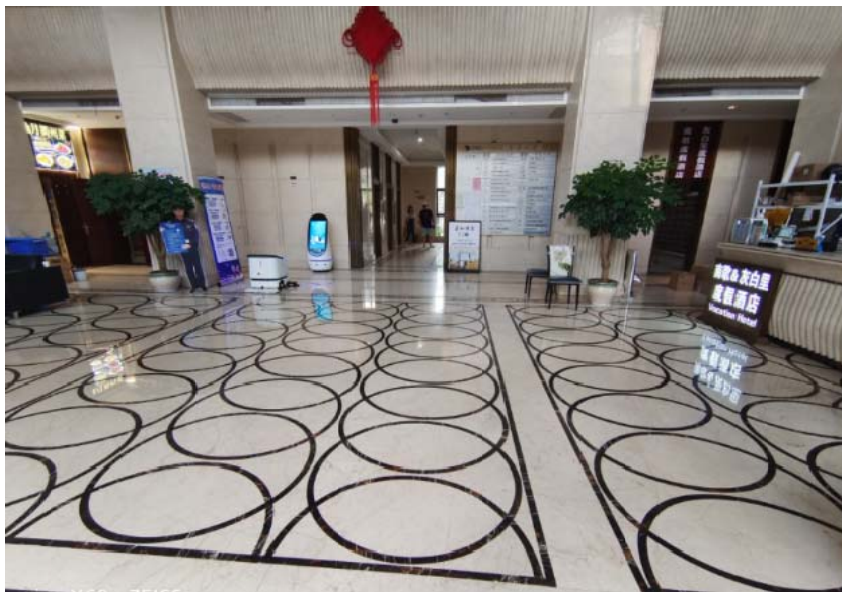
Automatic charging pile

# Operating steps

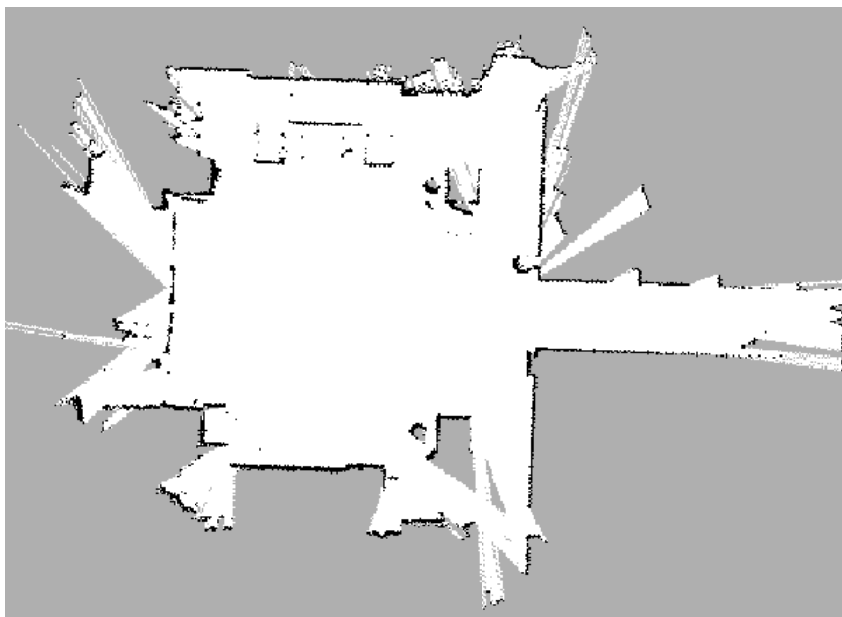
## Preface

### Why we should build a map ?

The robot needs to scan the actual environment, and the original map can be compared according to the real-time scanning situation, so as to find the correct position and improve the accuracy and efficiency of the operation



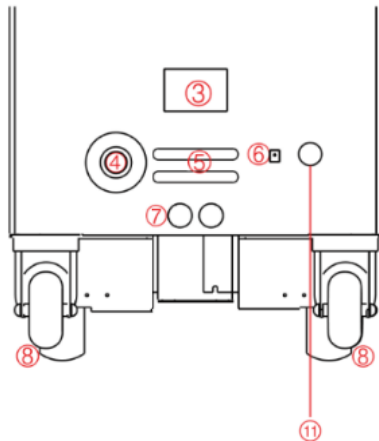
Actual environment (above)



Machine scan of the environment (above)

## Power on

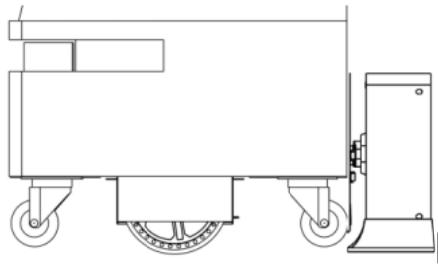
The power button is located on the base ⑫ on the back of the robot. It is a button switch. Press it once to turn it on, and press and hold the power button for 3 seconds to turn it off.



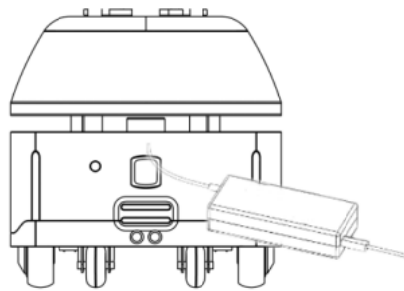
**Note for shutdown:** Press and hold the power button for 3 seconds, the display will first turn off the screen and shut down, then the motor will be powered off, and finally the chassis light will go out!

# Charging

**Automatic charging:** the robot can automatically detect the power and charge automatically when the power is lower than the set threshold (Prerequisite: It is necessary to construct a good icon for the charging pile)



**Direct charging:** plug the power adapter cable into the power supply on the back of the robot



## Automatic charging hardware description



## Charging post placement



## Location selection and precautions of charging pile

- The location of the charging pile must be selected within the map and placed against the wall;
- Obstacles within 2 meters in front of the charging pile and within 1.5 meters on both sides;
- Place the charging pile to avoid moisture, dripping, high temperature environment;
- When multiple charging piles are placed, the charging pile spacing is not less than 1.5 meters;



# Navigation

## Network Settings

Note: The router network segment cannot be the 192.168.10.x network segment

1. Open the [Settings]-[WLAN] on the Android screen of the robot to connect to Wi-Fi
2. Open the Ftp application and enter the following interface. Follow the steps shown in the figure. If the Wi-Fi password already exists, click "Send Wi-Fi Information to Connect to ROS".

The screenshot shows the Ftp application interface with the following elements:

- A text input field containing "man-phone" with a circled 1 next to it.
- A "With password" label above a password input field containing "your-password" with a circled 2 next to it.
- A blue button labeled "Send with information to connect ROS" with a circled 3 next to it.
- A table displaying connection information:

Navigation system IP :	man-phone-5G:10.0.0.193	⑤
Navigation system version :	RMB101-ROS-I5-E1.2.9	
Navigation host name :	rmb101a-190311-101-101	
Navigation laser data :	laser[0.53]	
	connect success	④

- ① Check the Wi-Fi name you want to connect to
  - ② Enter Wi-Fi password
  - ③ Send Wi-Fi information to the navigation system (just click once, don't click repeatedly)
  - ④ Observe connection status
  - ⑤ Show IP for connection success (show 127.0.0.1 for connection failure)
3. The scanning device should be connected to the same LAN as the machine. Open the browser and input the IP address of the machine (Chrome browser is recommended)

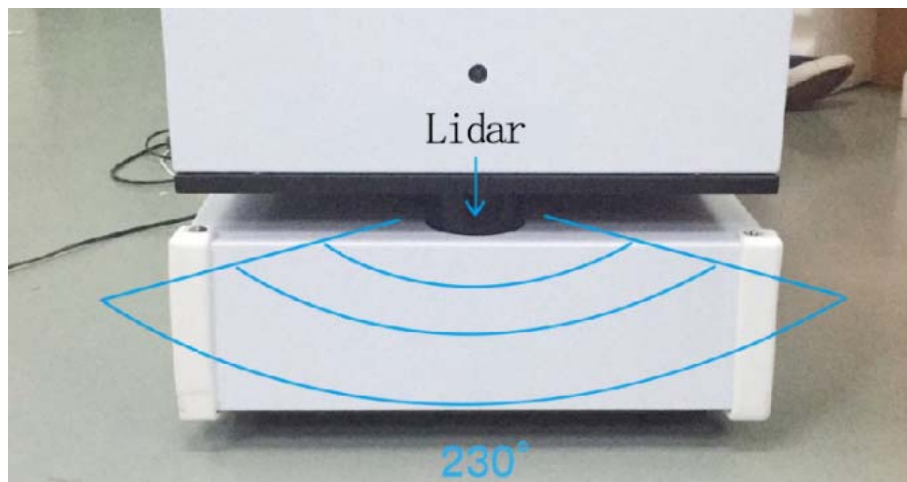
Note: if the connection to Wi-Fi fails, you can turn off the app and try again; if it still fails, you can power off the robot and restart it and try again



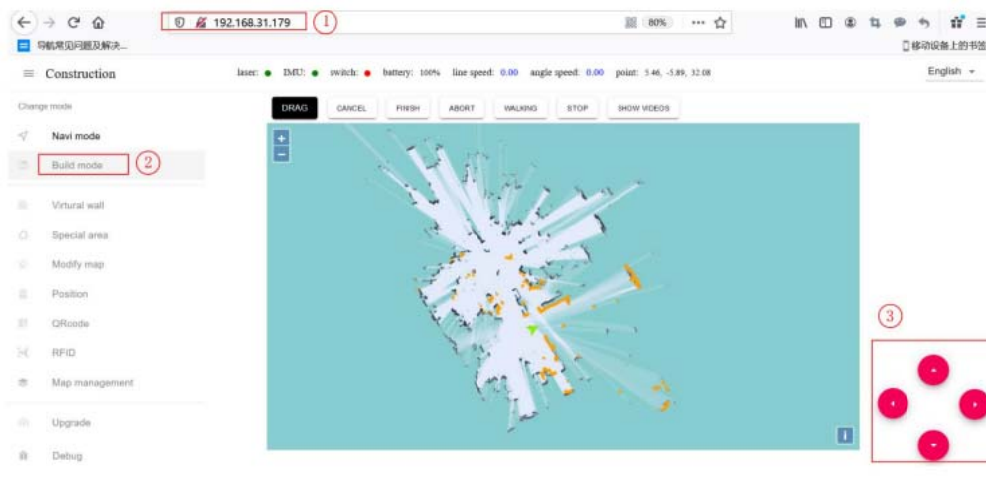
# Build a map

Robot visual field and scanning range

The radar's field of view is 230°, and the range of scanning is the horizontal plane of the radar altitude; The scanning distance is 20 meters  
People are required to stand in the rear to push the robot, or use the direction keys on the keyboard to control the drawing



1. After entering the webpage, the default state is "Navigation Mode", click to switch to "Mapping Mode" and select "Laser Mapping" to enter the state as shown below to start scanning.



① Get IP from FTP software

② Switch to mapping mode and select "Laser Mapping"

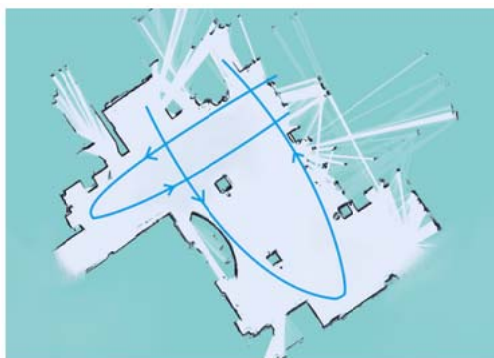
③ You can turn on the emergency stop switch and click the button to control the robot, or use the keyboard arrow keys to control the robot to

create a map; you can also press the emergency stop switch to push the machine to create a map

2. After entering "map mode", the machine first rotates in a circle to clean the surrounding feature points. When rotating, the speed should not be too fast. After one rotation, you can push (control) the machine. You can walk straight in narrow areas. Pay attention to the gaps during walking. Slowly rotate the machine 90° facing the gaps to clean the feature points, then slowly turn back to continue scanning; open areas can follow the U-shaped route, as follows:



**straight line**



**u-shaped route**

3. When pushing (controlling) the machine, pay attention to whether the laser matches the actual terrain. If it does not match, stop and wait for a while, wait for the laser to match the actual terrain, and then go. As shown below:



**figure 1**

**figure 2**

Figure 1: Laser does not match with terrain (when laser does not match with terrain, stop and wait for laser to match with terrain before continuing to push the robot to build maps)

Figure 2: Laser matching with terrain (some areas need the robot to turn to clear, such as wide terrain and room)

4. Do not move the machine after the machine reaches the end point, just observe whether the map is clean without double shadow and matches with the actual terrain. If there is no obvious dislocation, click "Composition completed". If the correction is not successful in 10 minutes, consider rebuilding the map.

Attention:

1. Select locations with obvious feature points and clean terrain as the starting point and ending point, and slowly turn around to scan the surrounding environment clearly at the beginning.
2. When pushing or controlling the robot, walk slowly and observe whether the laser matches the terrain at all times. In case of mismatching, stop and wait for the laser to match the current terrain.
3. After the robot reaches the end point, observe whether the map is clean without glow-out and matches with the actual terrain. If there is no obvious dislocation, click "Composition completed". If the correction is not successful in 10 minutes, consider rebuilding the map.

# Edit virtual wall

Edit the virtual wall to limit the robot's movement area

After composition is completed, it will automatically switch to "Navigation mode" and click "Edit Virtual Wall" on the left menu bar.



**Drag:** in this mode, you can zoom, pan and rotate the map. In this mode, you can select a rectangular area according to "Ctrl + left mouse button", and the virtual wall in this area will be cleared

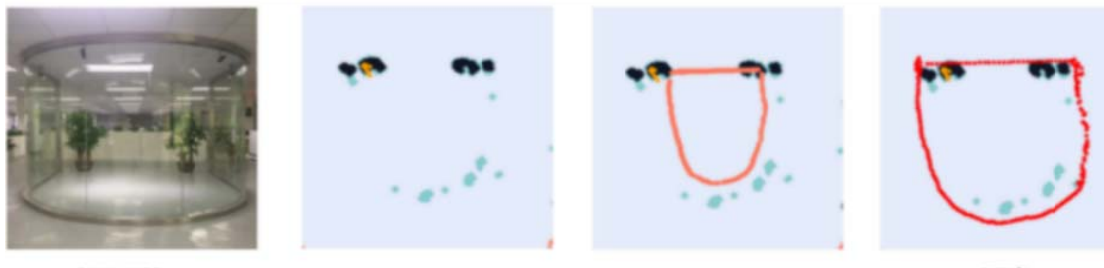
**Draw curve:** you can draw a curve, which is often used to draw irregular terrain

**Draw a straight line:** click two positions to draw a straight line between the positions you click. It is often used in regular terrain or rough area drawing

**Eraser :** Circle the virtual wall that needs to be cleared

**Save:** only click Save to save the drawn virtual wall

**Clear:**if you are not satisfied with the current virtual wall, click the clear button to clear all the virtual walls (you need to click Save to take effect)



**Example: glass wall**

Note: the laser can penetrate the glass, so when drawing the virtual wall, pay attention to the virtual wall outside the glass

figure 1 Actual environment figure 2 Map scanned by laser

figure 3 error figure 4 correct



figure 1 Actual environment figure 2 Map scanned by laser

figure 3 error figure 4 correct

### **Example: table**

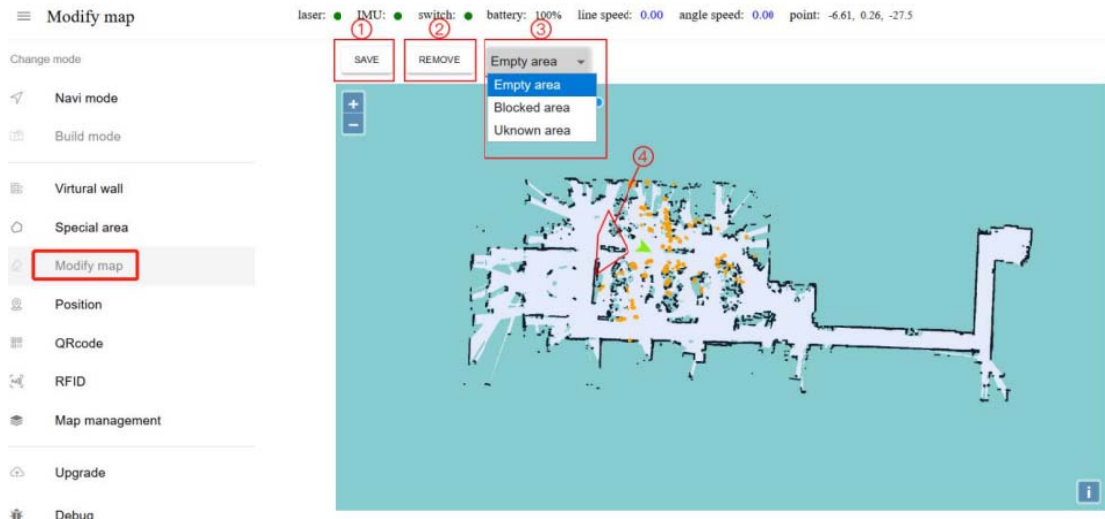
Note: the laser can only scan one horizontal plane, so when drawing the virtual wall, consider the desktop projection

### **Attention:**

1. The minimum passing distance of the machine is 80cm, so attention should be paid when drawing the virtual wall
2. The main function of the virtual wall is to draw the robot's moving space and separate the areas where the robot does not want to travel with the virtual wall.
3. Some areas that do not need to be driven or cannot be scanned by laser (glass walls, tables and chairs, steps, transparent and fragile objects, etc.) please make sure to build virtual walls.
4. After saving, click "Navigation Mode" to return to the navigation mode.

# Edit special area

Tip: No long corridors to skip this step



- ① Clicking this button will switch to "drag" mode
- ② Special areas drawn will only take effect after saving
- ③ Clicking this button will clear all the special areas drawn (again, it will take effect only after clicking save)
- ④ Draw special area requirements

λA corridor, which features a single point (just two lines), allows special regions to be drawn

λMingle editing mode by clicking the left mouse button on the map in order to form a polygon

λA long corridor with no obvious feature points above 10 meters is suggested to be marked by a special area

λWhen drawing a special area, pay attention to not covering the end of the corridor, reserving a distance of at least 2 meters

## Notes :

1. The main function of special areas is to perform special processing on algorithms for areas with single feature points (such as long corridors) or few feature points (such as empty halls).
2. Before drawing a special area, you are advised to navigate to the vicinity of each

area to check for lost location and draw a special area as required.

3. After the drawing is finished and saved, click "Navigation Mode" to return to the navigation mode.

# Edit Map

Tip: Please be careful in this step. In general, we use the "blank area" (i.e. people or temporary obstacles are swept onto the map during the scanning process). In this case, we need to use the "blank area" to remove the obstacles. Skip this step if you do not need to perform this step.



① Click save to apply changes to the map

② Clear the drawn polygon

③ Here is the drop-down menu, you can choose different map area types

λStatic empty area: Noise is removed (such as the noise left on the map by pedestrians during map scanning and temporary obstacles, etc.), instead of removing real obstacles as noise.

λVirtual obstacle area: Some real fixed obstacles may not be clearly scanned during map construction, so obstacles need to be drawn artificially on the map (note that the drawn obstacles must match those that can be swept by real lasers).

λUnconsciously unknown regions: Some frequently changing feature points need to be drawn as unknown regions (for example, people flow zones outside glass walls where robots can't walk).

④The operation mode is the same as that of the special region. The interior of the drawn polygon is the modified region



# QR code

## Positioning QR code deployment requirements

1. The ceiling is parallel to the ground and does not reflect light
2. The ceiling shall be flat, and it is better to apply paint or emulsion paint, or have flat metal surface, and do not support materials with insufficient viscosity
3. There should be no big obstructions above the robot's road, so that the machine can't see the QR code on the road
4. Ceiling to camera height between 1 m and 5 m
5. The QR code should be pasted in the middle of the road as much as possible, not close to the obstacles
6. The two-dimensional code shall be pasted smoothly, and the circular spot position of the two-dimensional code label shall not be inconsistent with the original position due to too many wrinkles
7. The pasting distance of the QR code is 5-10 meters, and the corner and intersection should be pasted

## QR code paste method

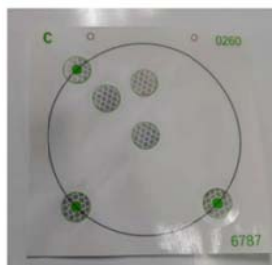


Figure 1 Before tearing

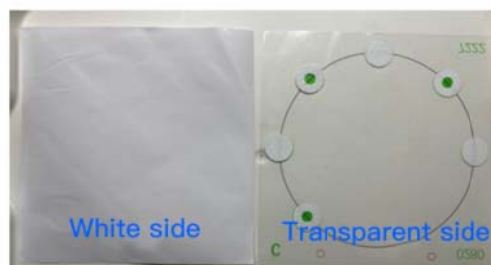


Figure 2 After tearing

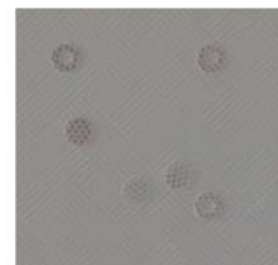
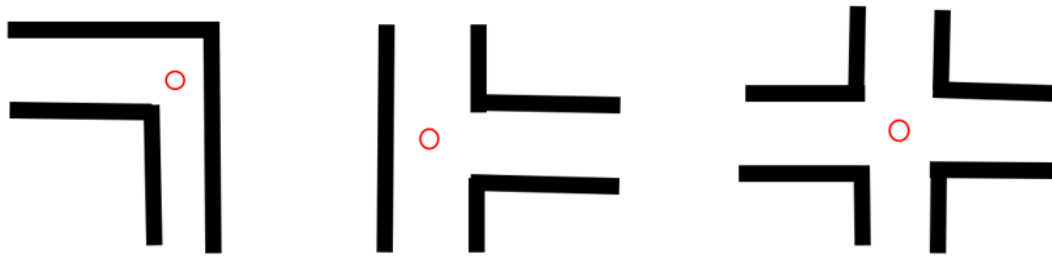


Figure 3 After pasting

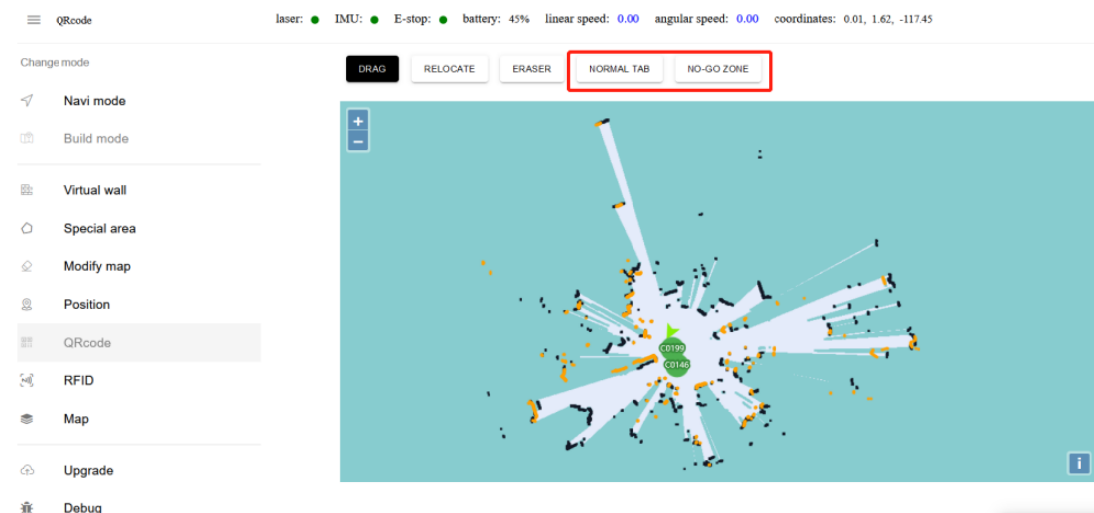
Pasting method: as shown in Figure 2, first tear off the white paper of the QR code label, paste the transparent surface onto the ceiling, and then tear the transparent surface, taking care not to drop the round or ring spots during the tearing process, after completion As shown in Figure 3.



The position of the QR code label

As shown in the picture: Qr code should be placed at "□" (qr code should be placed at corners and intersections)

Click the left menu bar to switch to the "QR CODE" mode



**Eraser:** Hold down the left button of the mouse and drag it, a rectangular box will appear, select the label to be deleted

**Ordinary label:** When an ordinary label is detected, the robot will relocate near the location, generally used near the machine where it is easy to lose its location

**Forbidden zone label:** The machine will immediately stop navigation when detecting the forbidden zone label, reducing the chance of danger. The restricted area label is marked with "J-".

# Calibration QR code process

1. After switching to the "QR code" interface, make sure that the robot positioning is correct, and control the robot to walk in the area where the QR code label is located.
2. If you encounter a mismatch between the laser and the map of the robot (the positioning is wrong), you need to perform a relocation operation first to reposition the robot accurately.
3. After controlling the robot directly under the QR code label, the button "Common Label" and "Forbidden Area Label" will appear in the button bar at the top of the map. If the QR code label is only used for positioning purposes, click "General Label" Click OK; if this area is more dangerous (for example, there are steps), you can select "Forbidden Area Label".

## **Additional notes:**

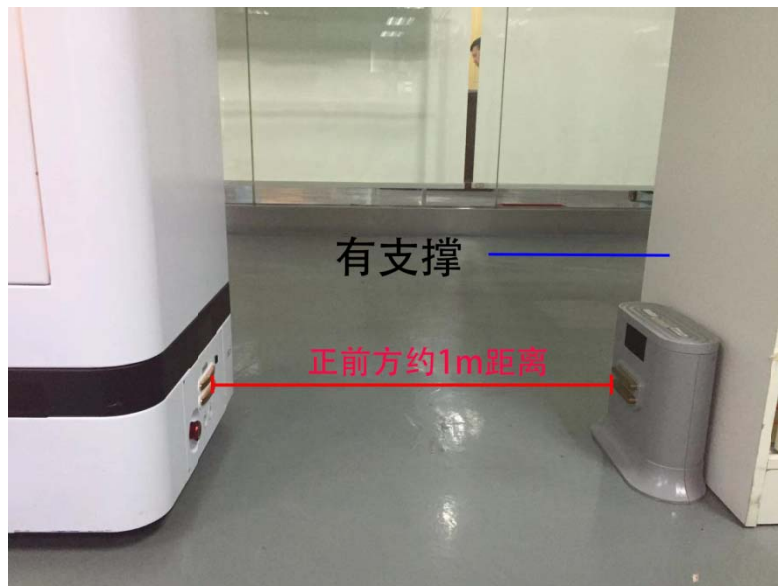
1. There is no need to save the calibration of the QR code label, it will be automatically saved after the calibration and deletion.
2. Deleting the label is similar to the previous one. In the "drag" or "calibration" state, hold down "Ctrl + left mouse button" to drag and drop, a rectangular frame will appear, and the label inside the rectangular frame will be deleted.

# Position

Note: The calibrated location must be at least 50 cm away from surrounding obstacles and virtual walls; the point "charging\_pile" must be marked on the map and the device must be powered on near this location.

Purpose of calibration location: Provide reachable target points for business layer applications

The points of charging piles must be calibrated according to the following method, otherwise it will affect the machine's self-navigation and docking of charging piles  
As shown in the figure:

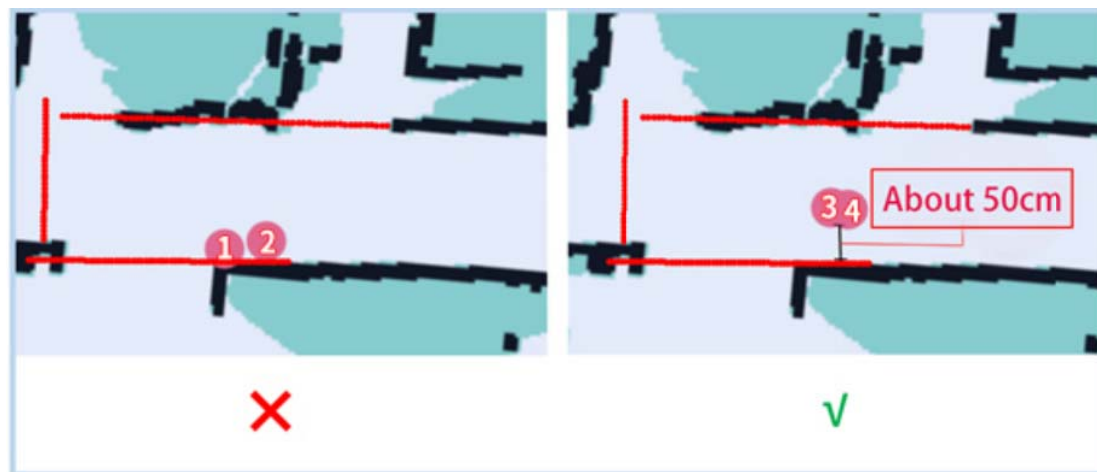


Calibration method: first move the machine to a position about 1m in front of the charging pile, and use the "Get current position" button to name it as "charging pile" to ensure that the current positioning of the machine is correct.



- ① In the calibration position mode, you can drag on the map to get the coordinates of the specified position for calibration
- ② The current position of the robot can also be obtained for calibration
- ③ It can display information about all points

**The calibration example is as follows:**

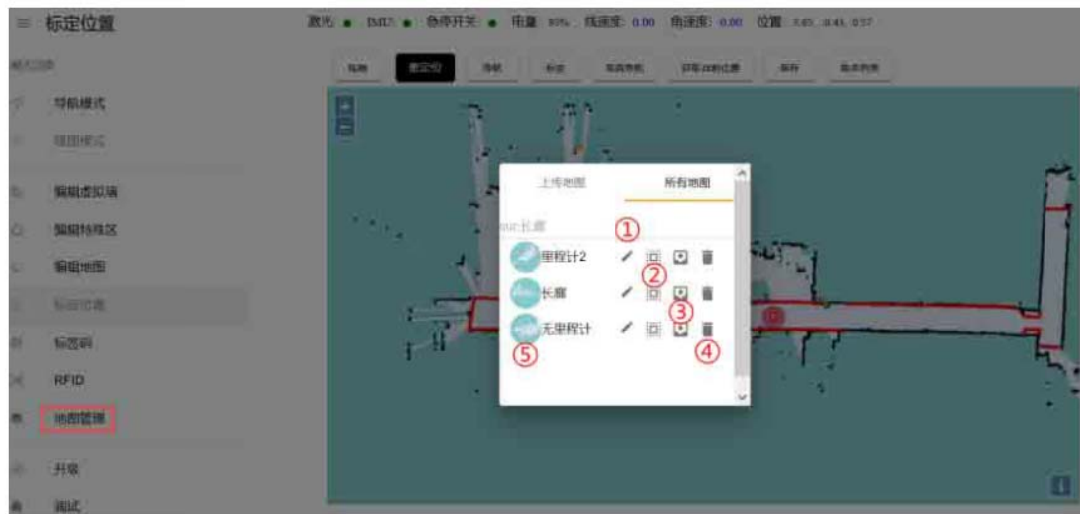


### **Precautions:**

1. When calibrating the position, make sure that the current positioning of the machine is correct.
2. The calibrated position must be at least 50 cm away from surrounding obstacles and virtual walls.
3. It is recommended to control the robot to 1 meter directly in front of the charging pile. Use "Get Current Position" to set it. Make sure that the setting position is accurate.

4. It is recommended that there are no obstacles within 1.5 meters on the left and right sides of the charging pile

# Mapping



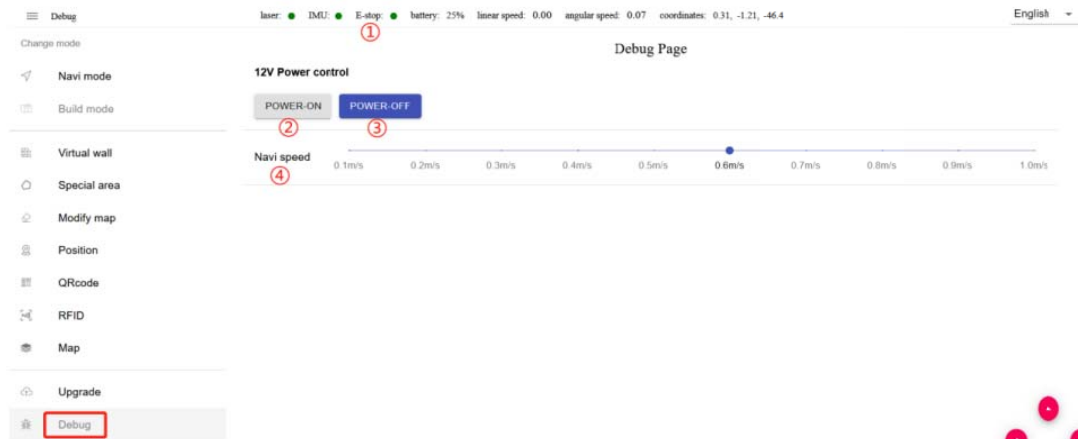
- ①Edit map name ② Apply this map ③ Export this map  
④Delete this map ⑤ Mouse over to show preview map, click to show original image

# Upgrade

① Apply this version ② Delete this version



# Debug



- ① Turn on the emergency stop switch of the machine manually
- ② Power on: open 36V external power supply
- ③ Power-off: turn off 36V external power supply
- ④ Navigation speed: Adjust the driving speed of the machine

# Daily maintenance

## Operating Environment Requirements

1. The working environment should not have a lot of clear glass
2. Do not use in the place with stairs or a drop of more than 2cm
3. There should not be a lot of black marble and black reflective cabinets at the height of 30cm on the ground
4. Can't travel in the ground of big friction: thicker, softer carpet
5. The slope shall not be greater than 5° without steps
6. Do not use in bathroom or similar environment
7. There should be no tightly packed chairs with thin legs in the traveling area

## Precautions for the use of atomizer

1. Water tank and 84 disinfection ratio according to the amount of 20:1 or 50:1 to add, do not concentration is too high or too low, affect the disinfection effect. (It is best to mix according to the proportion on the disinfectant, which can avoid corrosion of the humidifier and reduce the harm to human body)
2. Under normal working condition, the indicator light of the water tank is green and red when there is water shortage; When the robot prompts water shortage, please turn off the robot before adding disinfectant, and then restart the robot equipment after adding.
3. After the disinfection robot runs for a period of time, it needs to clean the dirt at the bottom of the water tank in time (it is recommended to clean it every two weeks). If it is not cleaned, it will cause certain corrosion to the ultrasonic and affect the disinfection effect.

# Hardware parameters

E2	
Product size	Length 540mm * width 360mm * height 1368mm
Product net weight	44KG
The tank volume	16L
Product color	White
Product material	cold-roll steel sheets
Environmental requirements	Storage temperature :-40°C~70°C; Operating temperature: -10°C to +50°C Humidity (RH):10% to 90%
The screen size	7 inch
PPI	1024*600
Laser radar	20m/ 270°Remote laser scanning ranging
Single-axis	angle measuring apparatus
Gyroscope sensor	Communicate with the charging pile
QR code camera	QR code orientation ( The QR code is the height from the camera1-3m or 1-5m ) ; 5 mega-pixel
Carrier Support	Fully netcom
Network	Supports 2.4G WIFI
Movement speed	Default speed 0.8m/s, minimum 0.2m/s, maximum 0.8m/s
GHz	1.2G
Operating system	Android 5.1
ROM	8G

RAM	1G
Adapter	Input : 220V Output : 42V--3A ( 5Amatch )
Robot input power	42V--3A ( 5Amatch )
Battery	37 V/20 AH lithium battery
Charging pile specification	42 V/3A (5A optional), steady green: Standby; Steady red: Charging; Blinking alternately red and green: connecting machine
Remote features	Support remote video surveillance, remote navigation status monitoring, remote online navigation system update, Android system
Noise	At rest : 45dB In motion : 50~75dB ( Different floor materials are slightly different )

## 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.

To maintain compliance with FCC's RF Exposure guidelines, This equipment should be installed and operated with minimum distance between 20cm the radiator your body: Use only the supplied antenna.