Manual of UV lamp disinfection robot

Date: May 11, 2020

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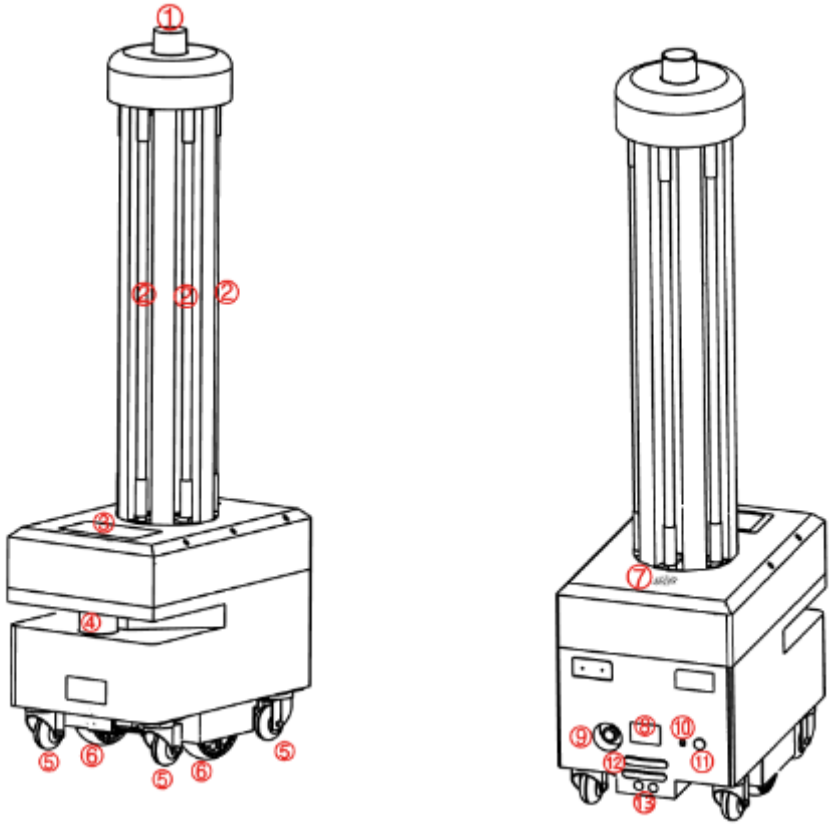
Robot Introduction

Hardware structure

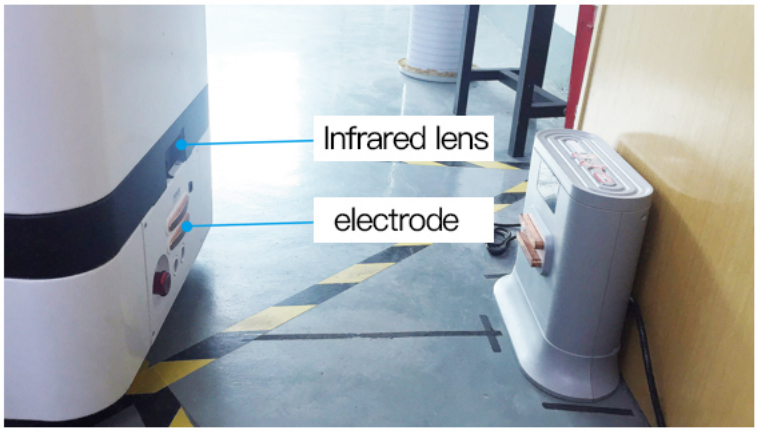


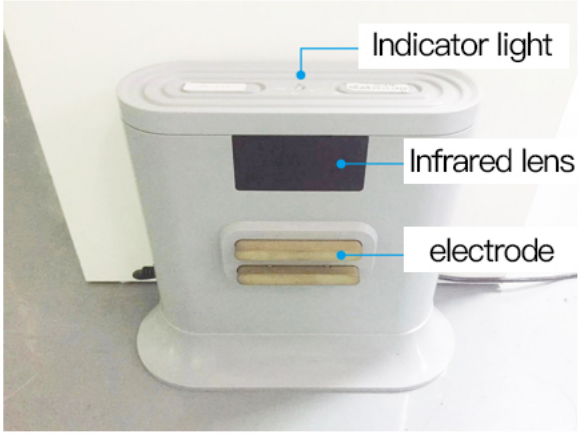
❶ QR code camera
❷ UV lamp
❸ HD seven-inch screen
❹ laser
❺ Vientiane wheel
❻ Driving wheel
❼ horn
❽ Infrared lens
❾ Emergency stop switch
❿ Power socket
switch
Automatic charging contact piece
Ultrasound

Hardware detailed parameters

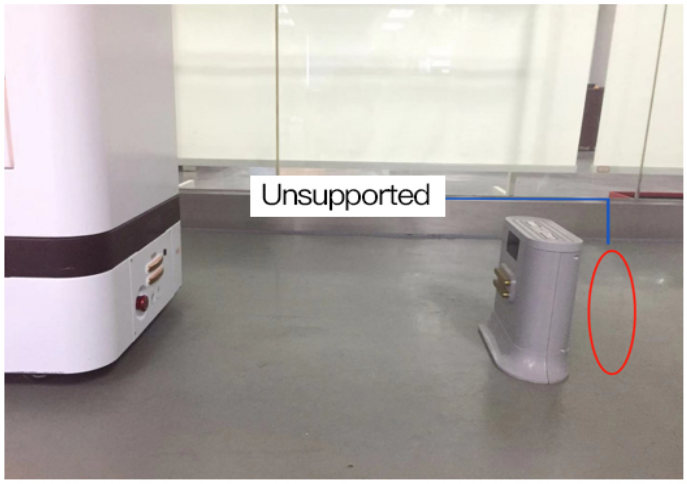
Hardware parameters	Indicators and performance
Product Size	54cm high * 36cm long * 150cm
Product Weight	45KG
Lamp power	228W(48W/root)
color of the product	white
product material	Cold rolled steel plate
Environmental requirements	Storage temperature: -40 ° C ~ 70 ° C; working temperature: -10 ° C ~ + 50 ° C Humidity (RH): 10% ~ 90%
screen size	7 inch
Screen Resolution	1024 * 600
Lidar	30m / 270 ° long distance laser scanning distance measurement
Six-axis gyro sensor	Body balance, angle adjustment
Infrared sensor	Communicate with charging pile
QR code camera	QR code positioning (the height of the QR code from the camera is 1.5-2.3m)
Operator support	Full Netcom 4g router
Network configuration	Support 2.4GWiFi
Moving speed	Default speed 0.8m / s, minimum 0.2m / s, maximum 0.8m / s
Processor frequency	1.2G
operating system	Android 5.1
RAM (memory)	1 G
ROM (capacity)	8 G
adapter	Input: 220V output: 42V--5A
Input power	42V--5A
battery	36 V / 20 AH lithium battery
Charging pile specifications	42 V / 5A, steady green: standby; steady red: charging; Red and green flashing alternately: docking machine
Remote function	Support remote video monitoring, remote navigation status monitoring, remote online update navigation system, Android system
noise	At rest: 45dB In motion: 50 ~ 75dB (different ground materials are slightly different)

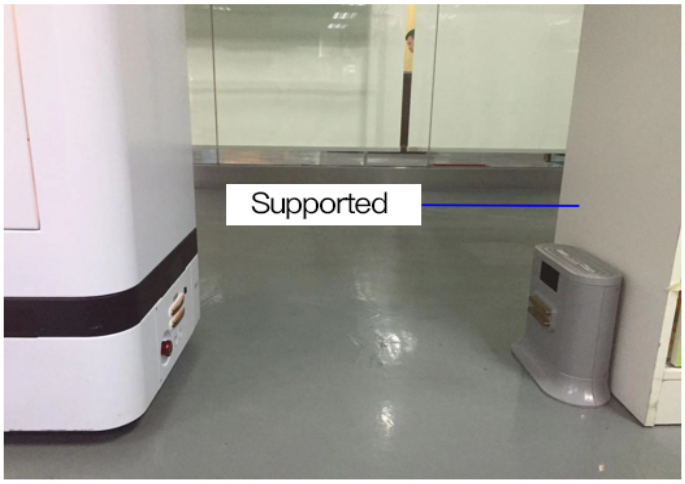
Automatic charging configuration





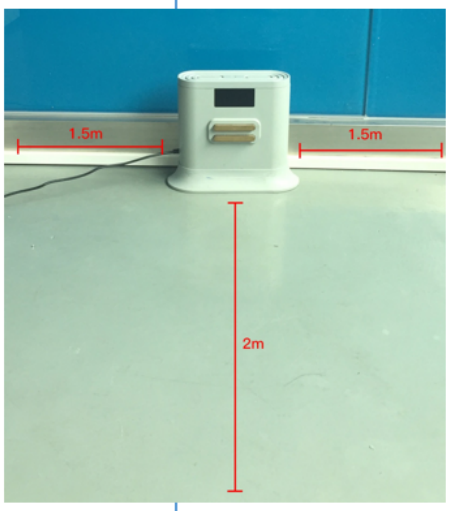
➢Charging pile placement





➢Notes on the selection of charging pile location

- 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;



Steps and instructions

Why build a map?

➢ The purpose of building the map is to let the robot know the working environment

The robot needs to scan the actual environment and build an "original map" to compare with the real-time scanning and find its own location.

Actual environment

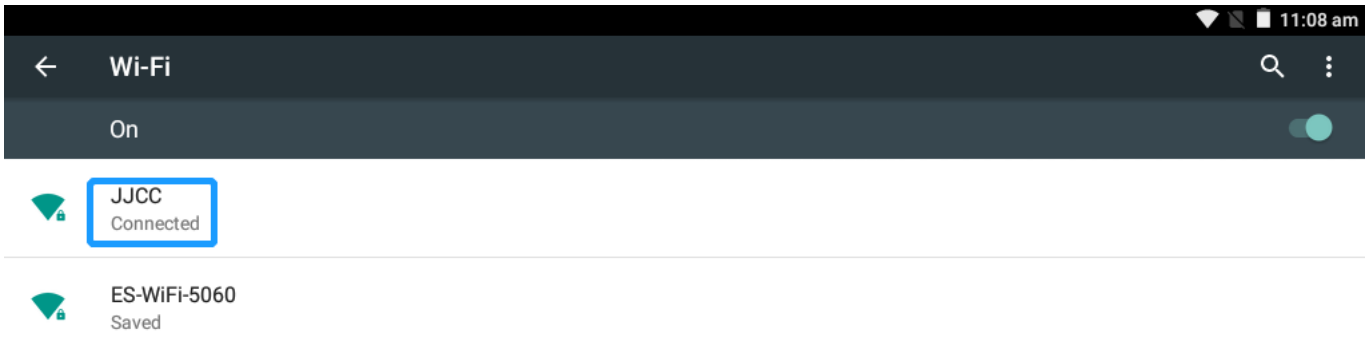
Map scanned by the machine

☞ The following will teach you how to build a usable map

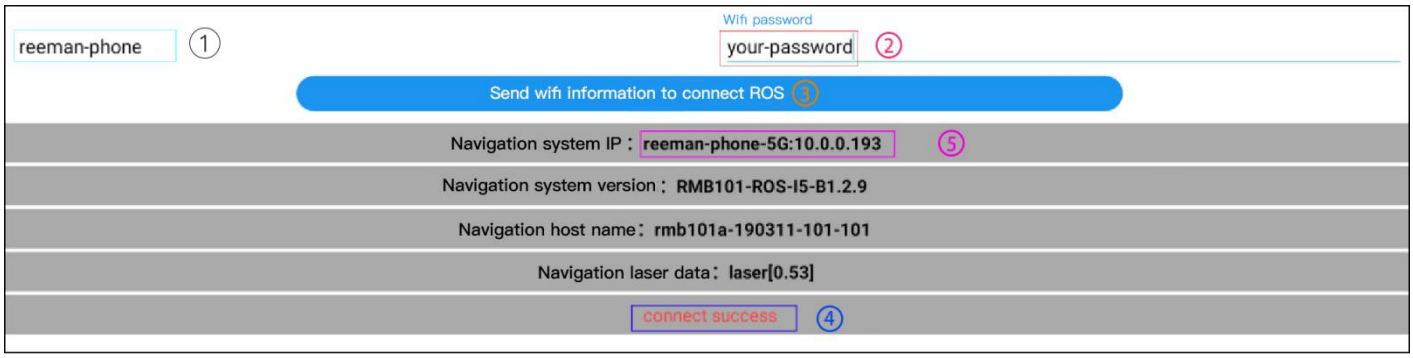
first step [Network settings]

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

1. Open the Android screen "Settings"-"WLAN" to connect Wi-Fi as follows:
 Note:The wifi name cannot contain Chinese characters, spaces and special symbols



2. Open the ReemanFtp application to enter the following interface, and follow the steps shown in the figure. If the wifi password already exists, simply click "Send wifi information to connect ROS".



① Check the WiFi name to be connected
② Enter WiFi password
③ Send WiFi information to navigation system
④ Observe the connection status
⑤ If ip is displayed, the connection is successful (127.0.0.1 is displayed indicating that the connection failed)

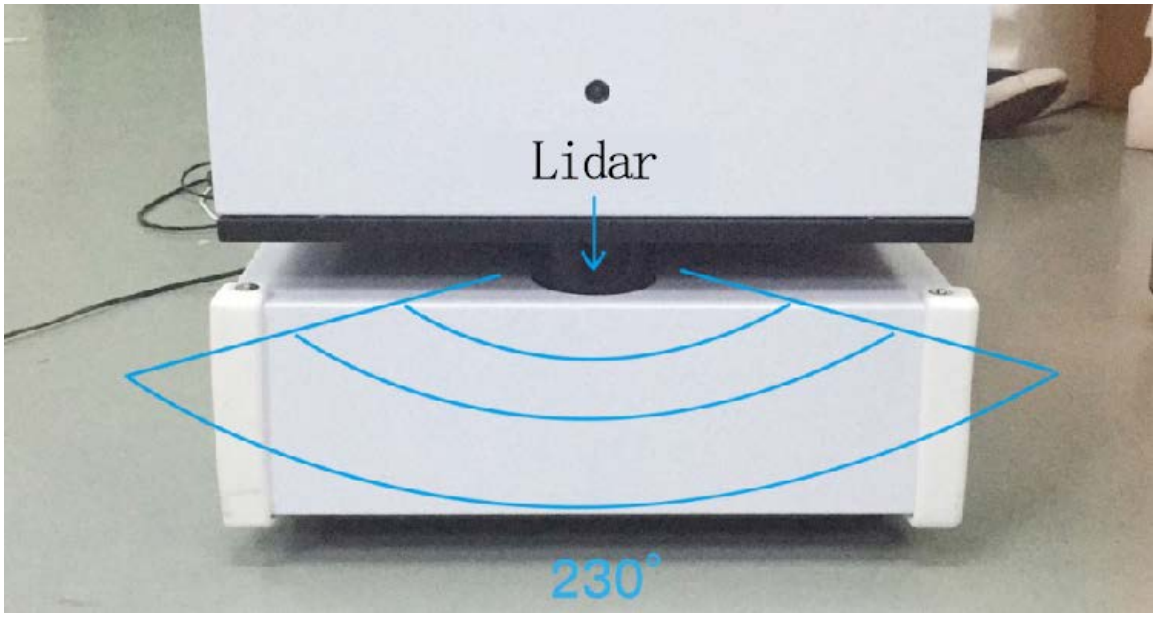
3. The image scanning device must be connected to the same LAN as the machine, open the browser and enter the machine IP address (recommended to use the chrome browser)
Note: If the Wi-Fi connection fails, you can close the application and try again; if it still fails, you can power off and restart the robot and try again.

Second step [Build mode]

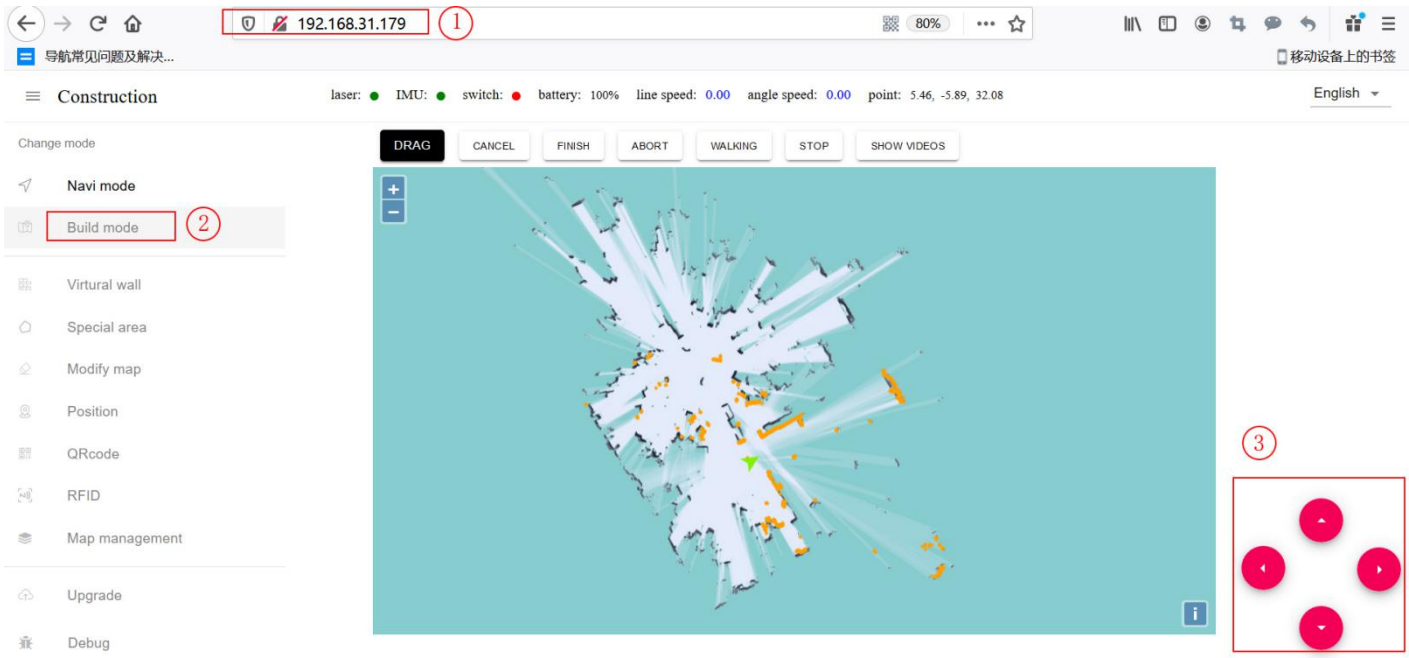
➢ Robot vision and scanning range

- The viewing angle of the radar is 230 ° , and the scanning range is the horizontal plane of the radar height; the scanning distance is 30 meters.

- Ask people to stand behind and push the robot, or use the keyboard arrow keys to control the construction



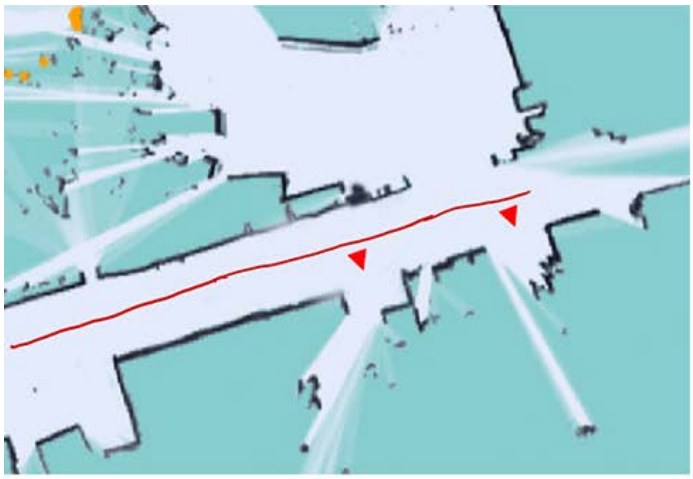
1. After entering the webpage, the default state is "navigation mode". After pushing the machine to the obvious point of the feature point, click "building mode" to enter the following picture state and you can start scanning. The following teaches you how to scan the map.



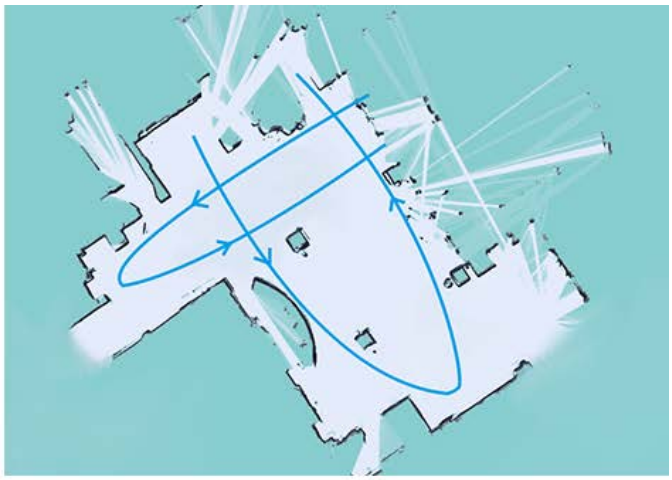
① Get ip from ReemanFtp software
② Switch to drawing mode
③ You can turn on the emergency stop switch and click the button to control the robot, or use the up, down, left and right direction keys on the keyboard to control the robot to build the map, or you can press the emergency stop switch to push the machine to build the map

2. After entering the "Building Mode", the machine will turn around in-situ to clear the surrounding feature points. When turning, the speed should not be too fast. After one turn,

you can push (control) the machine. Straight lines can be used in narrow areas. Pay attention to encountering gaps in the process of walking. Slowly turn the machine 90 ° in front of the gap to sweep the feature points, and then slowly turn back to continue scanning. The open area can follow the U-shaped route as follows:



straight line



u-shaped route

3. When pushing (controlling) the machine, you need to 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:

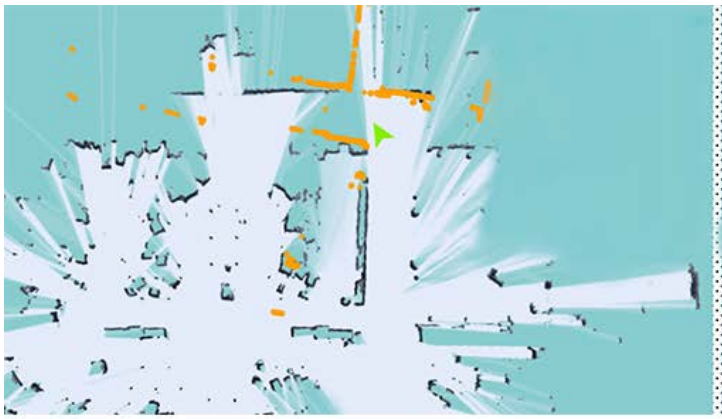


figure 1

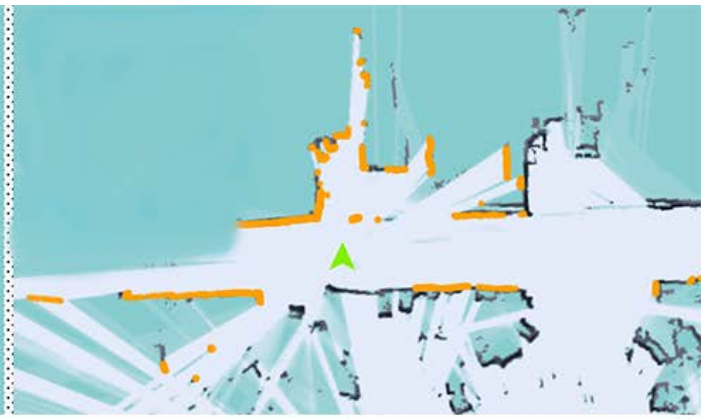


figure 2

figure 1 The laser does not match the terrain

▪ When the laser does not match the terrain, stop and wait for the laser to match the terrain before continuing to push the robot to build a map

figure 2 Laser and terrain matching

▪ Some areas require the robot to turn around to be able to scan clearly, such as the wide terrain and the room

4. Do not move the machine after the machine reaches the end point, just observe whether the map is clean and free of ghosting and matches the actual terrain. If there is no obvious misalignment, you can click "Complete Composition". If there is a misalignment, please wait for a while. Algorithm Will be corrected. If the correction is not successful for 10 minutes, consider rebuilding the map.

Precautions:

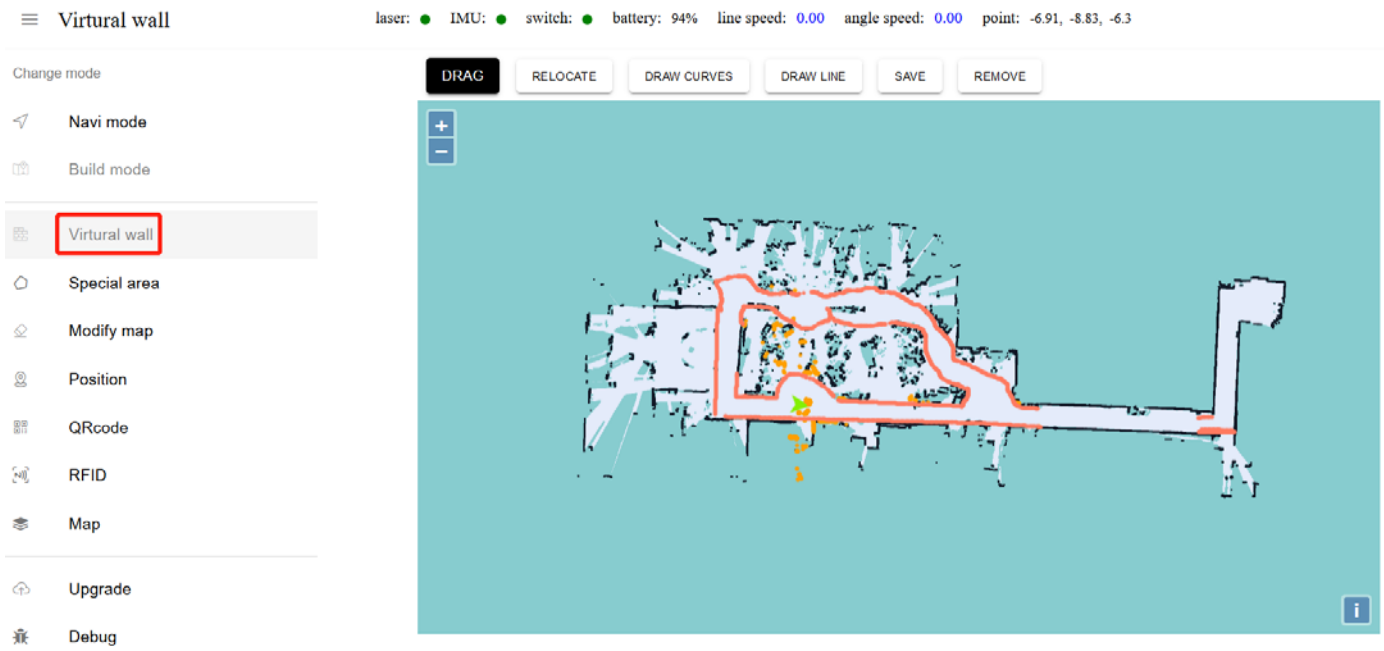
1. Select the obvious feature points, the clean and tidy place as the starting point and the ending point, and at the beginning, slowly turn around in situ to scan the surrounding environment clearly.

2. When pushing or controlling the robot, walk slowly and observe whether the laser matches the terrain at all times. If a mismatch occurs, you need to 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 and without ghosting and matches the actual terrain. If there is no obvious misalignment, you can click "Complete Composition". If there is a misalignment, please wait for a while and the algorithm will correct it. If the correction is not successful for 10 minutes, consider rebuilding the map.

third step [Virtual Wall]

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



Drag: This mode can zoom, pan and rotate the map. In this mode, hold down "ctrl + left mouse button" to select a rectangular area, and the virtual wall in this area will be cleared.

Curve drawing: You can draw a curve, often used for drawing irregular terrain

Draw a straight line: Click two positions, a straight line will be automatically drawn between the clicked positions, often used for regular terrain or rough drawing of approximate areas

Save: Only click Save will 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 you need to draw the virtual wall outside the glass when drawing the virtual wall

figure 1

figure 2

figure 3

figure 4

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 the protruding part of the desktop should be considered when drawing the virtual wall

figure 1

figure 2

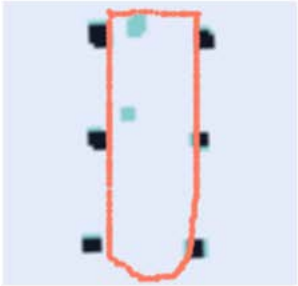


figure 3

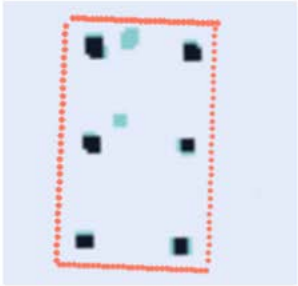


figure 4

figure 1 Actual environment figure 2 Map scanned by laser
figure 3 error figure 4 correct

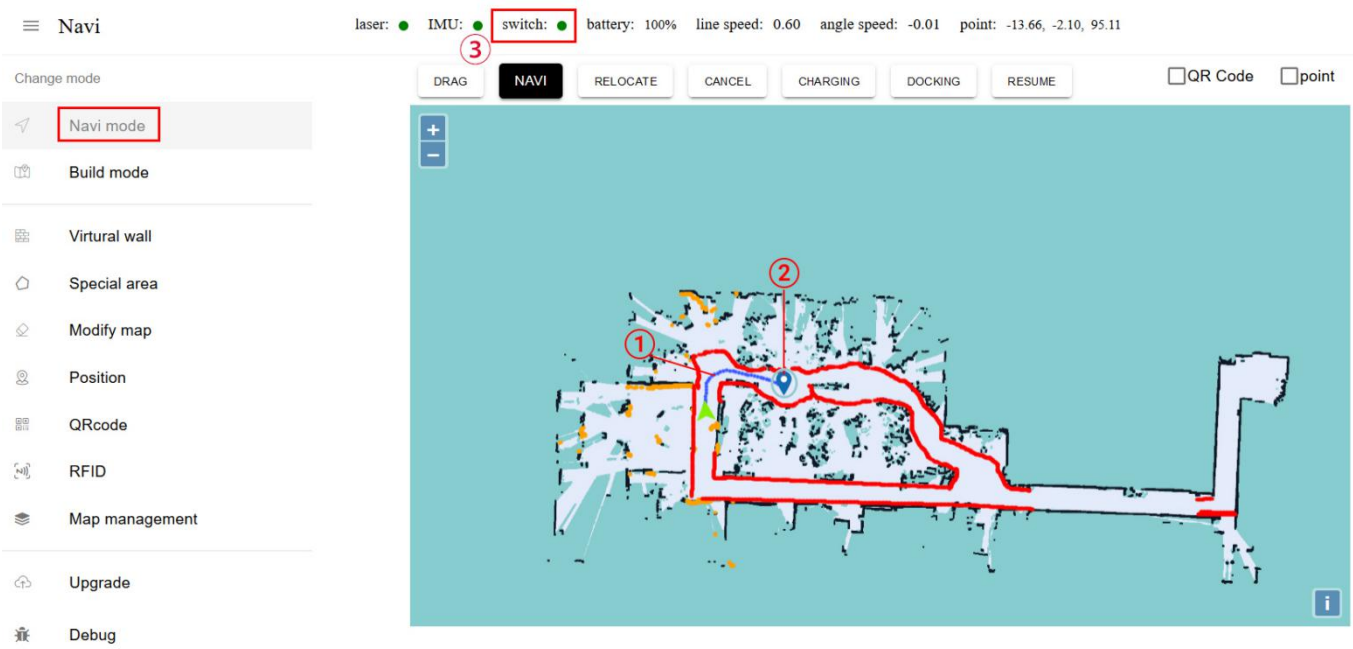
Precautions:

1. The main function of the virtual wall is to draw the robot's active space, and to separate the area where the robot does not want to be driven by the virtual wall.

2. Some areas that do not need to be driven or areas that cannot be scanned by laser (glass walls, tables and chairs, steps, light-transmittable and fragile items, etc.) must be built with virtual walls.

3. After saving, click "Navigation Mode" to return to the navigation mode.

The fourth step [Navigation test]



①The path planned by the robot to the target point
② The target point the robot is going to
③ Make sure that the emergency stop switch is on (red when it is off)

Instructions for use:

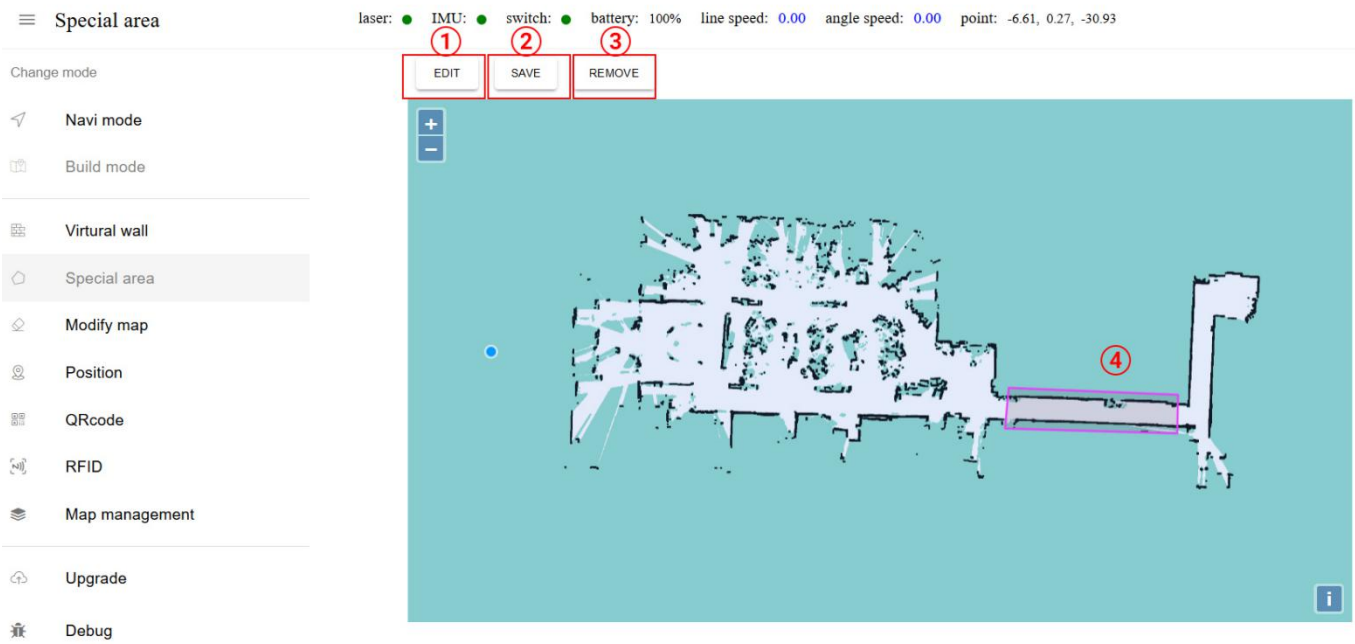
1. When selecting the target point, select as many working activity areas as possible after the robot, and test more times.

2. During the navigation process, it is mainly observed whether the laser and the terrain match during the robot's walking (the laser and the actual terrain match the correct positioning).

3. If the location is easily lost in some areas, you can consider editing special areas, editing maps, and adding QR codes according to specific scenarios.

4. If these methods are not effective, please contact the staff to evaluate and deal with them according to the actual situation.

The fifth step [Special area]



① Click this button to switch to drag mode
② Special areas drawn after saving will take effect
③ Clicking this button will clear all the drawn special areas (clicking save will take effect)
④ Special areas drawn

- In the corridor where the feature points are relatively single (only two lines), special areas can be drawn
- Edit mode Click the left mouse button on the map in sequence to form a polygon
- It is recommended to mark the long corridors with no obvious feature points more than 10 meters in special areas
- When drawing a special area, be careful not to cover the end of the corridor, and leave a distance of at least two meters

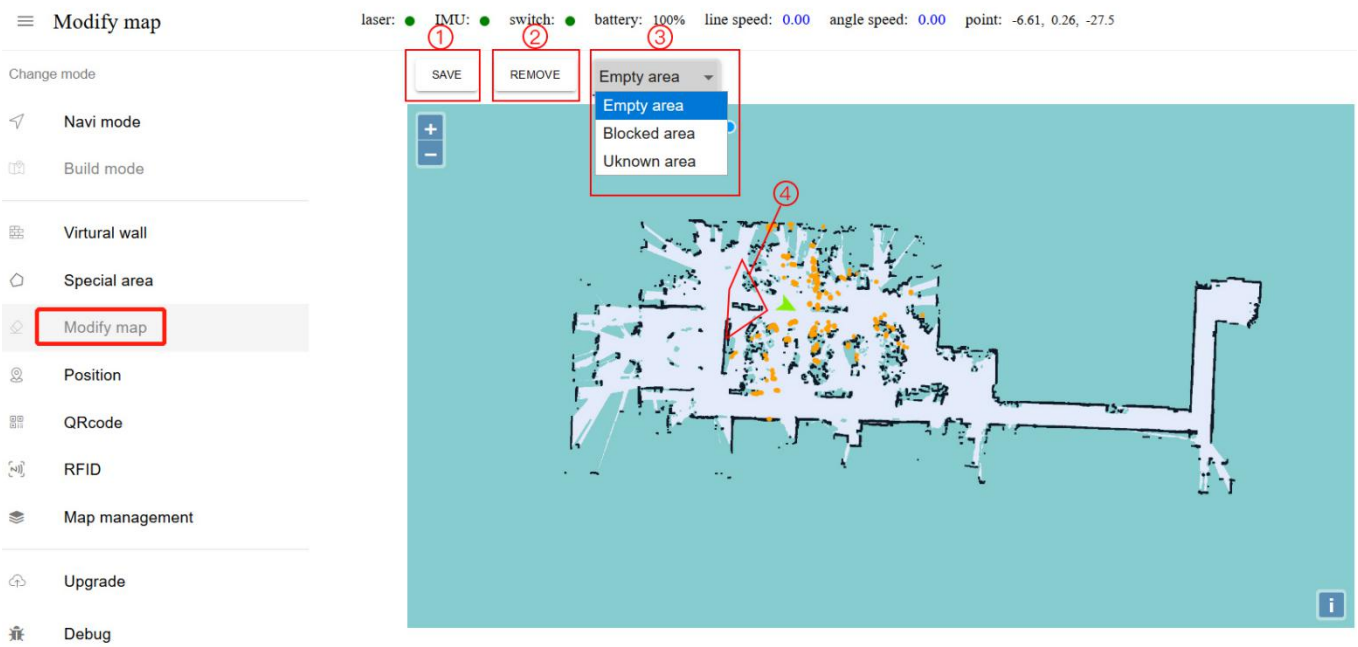
Precautions:

1. The main function of the special area is to perform special algorithm processing on some areas with relatively simple feature points (such as long corridors) or areas with relatively few feature points (such as empty halls).

2. Before drawing a special area, it is recommended to navigate to each area to see if there is a loss of positioning, and draw a special area as needed.

3. After saving the drawing, click "Navigation Mode" to return to the navigation mode.

The sixth step [Edit map]



①Click Save to apply changes to the map   ② Clear all user modifications to the map
③ Drop-down menu, you can choose different map area types (introduced below)
④The operation mode is the same as the special area, the interior of the drawn polygon is the modified area

Additional notes:

1. Blank area: remove noise (for example, pedestrians walk past the noise and temporary obstacles left on the map during scanning the map), do not treat real obstacles as noise.

2. Obstacle area: some real fixed obstacles may not be scanned very clearly when constructing the map. You need to manually draw obstacles on the map (note that the obstacles drawn must match the obstacles that the real laser can scan

3. Unknown area: Some frequently changing feature points need to be drawn as unknown areas (such as the flow area of people outside the glass wall where the robot cannot walk).

4. If there are major changes in the environment, it is recommended to rebuild the map instead of editing the map.

The seventh step[QR code]

➢ Location QR code deployment requirements

1. The ceiling is parallel to the ground and do not reflect
2. The ceiling is flat, preferably painted with paint or latex paint, or has a flat metal surface, and does not support materials with insufficient viscosity
3. There should be no large obstructions above the road where the robot passes, so that the machine cannot see the QR code on the passage
4. The height of the ceiling from the camera is between 1.5 m ~ 2.3 m
5. The QR code should be pasted in the middle of the road as far as possible, not close to

obstacles
6. The two-dimensional code must be kept flat, and the folds on the two-dimensional code label will not match the original
7. The pasting distance of the QR code is 5 ~ 10 meters, and the corners and intersections need to be pasted

➤ QR code pasting method

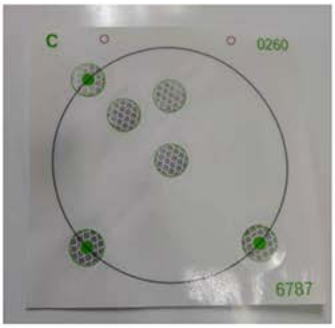


figure 1

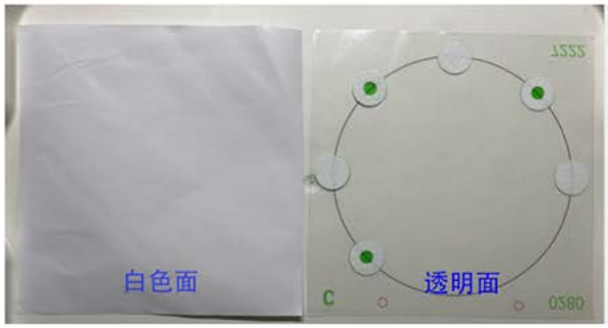
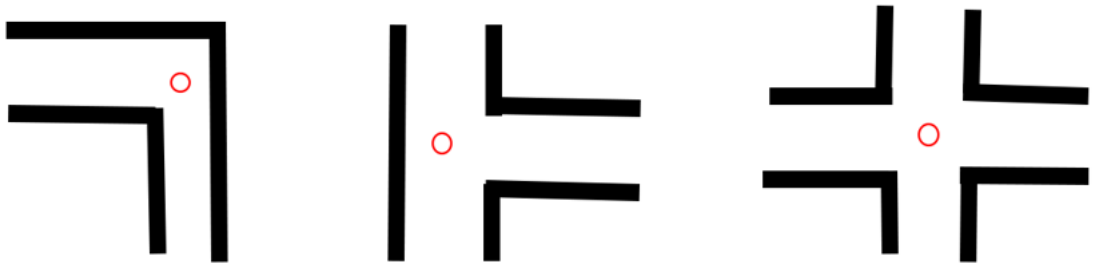


figure 2

figure 3

figure 1 Before pasting
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.

➤ Where to place the QR code label



As shown in the figure: the QR code needs to be placed in the ″ ″ place (the QR code needs to be placed at the corner and intersection) Under ″Navigation Mode″, click ″QR Code″ on the left menu bar as shown :

①When pushing the robot past the QR code label, these two label options will pop up, you can choose the type of label you want to set
②c starts with Ordinary label: When an ordinary label is detected, the robot will relocate near the location, generally used when the machine is easy to lose positioning
③ At the beginning of j- is the forbidden zone label: when the forbidden zone label is detected, the machine will immediately stop navigation, reducing the risk of danger.

➤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".

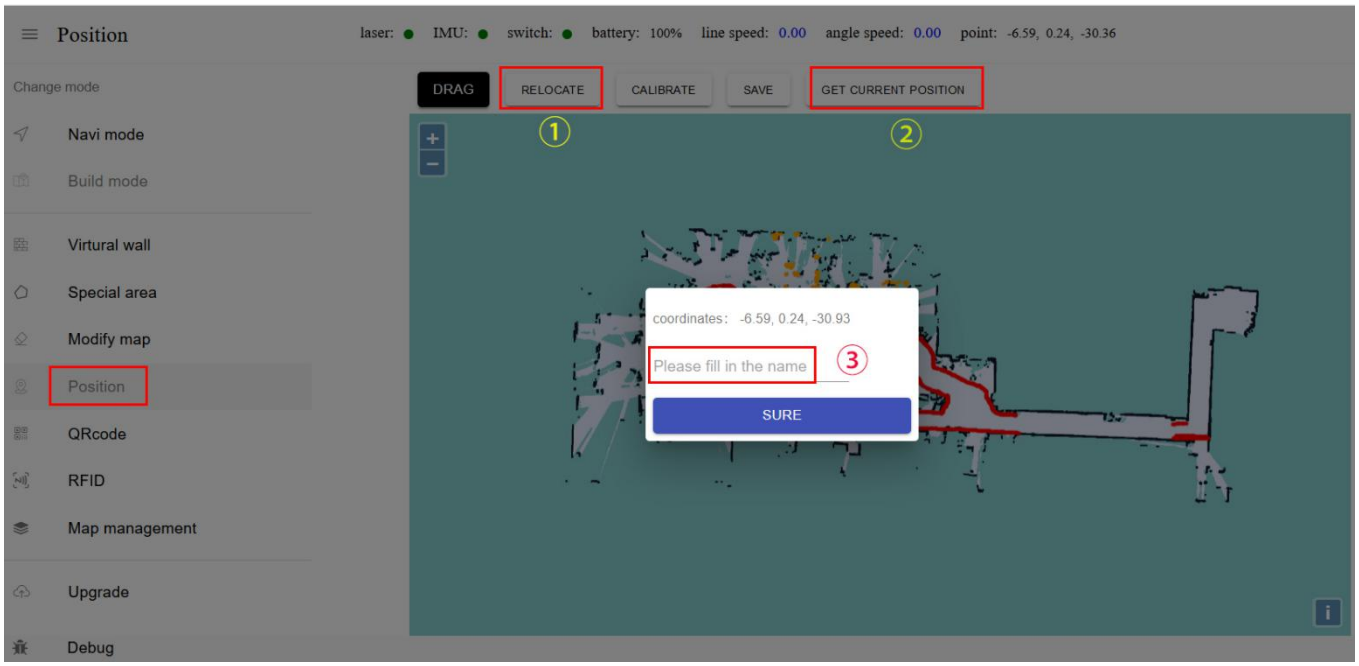
Additional notes:

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.

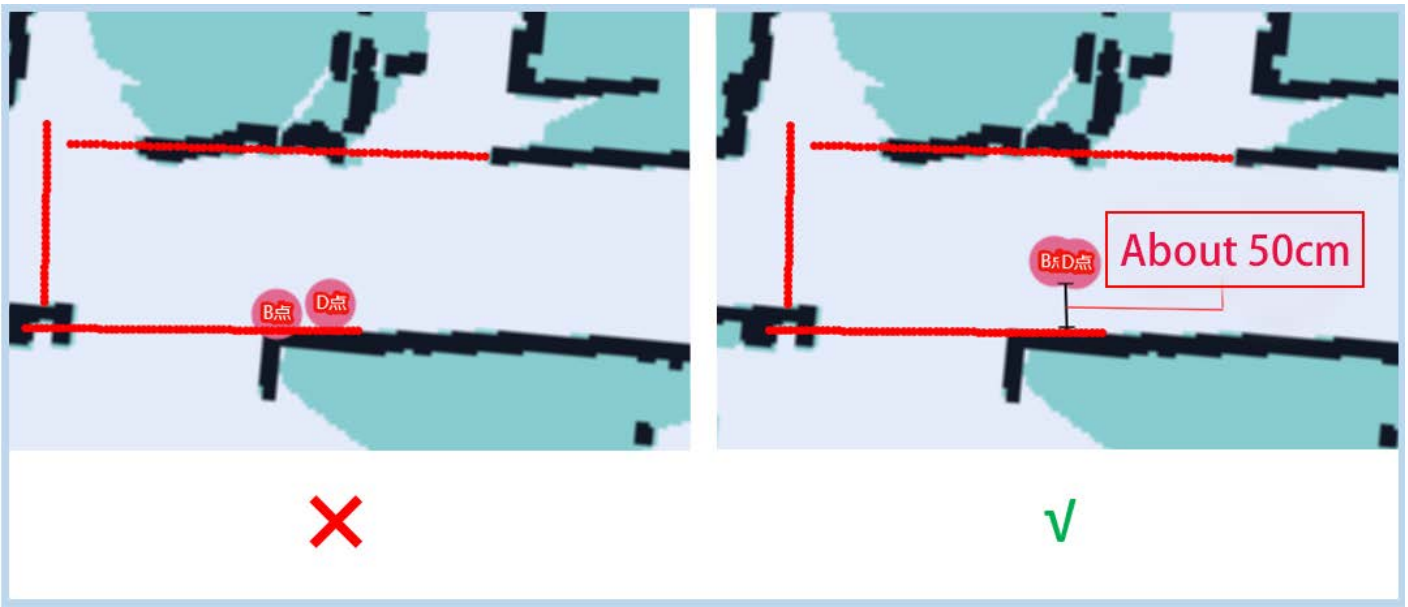
The Eighth step [Calibration position]

Note: The calibration position should be at least 50 cm away from the surrounding obstacles and the virtual wall



① In the calibration position mode, you can drag and drop on the map to get the coordinates of the specified location for calibration
② You can also get the current position of the robot for calibration
③ Enter the name of the calibration point

➤Examples of punctuation are 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.

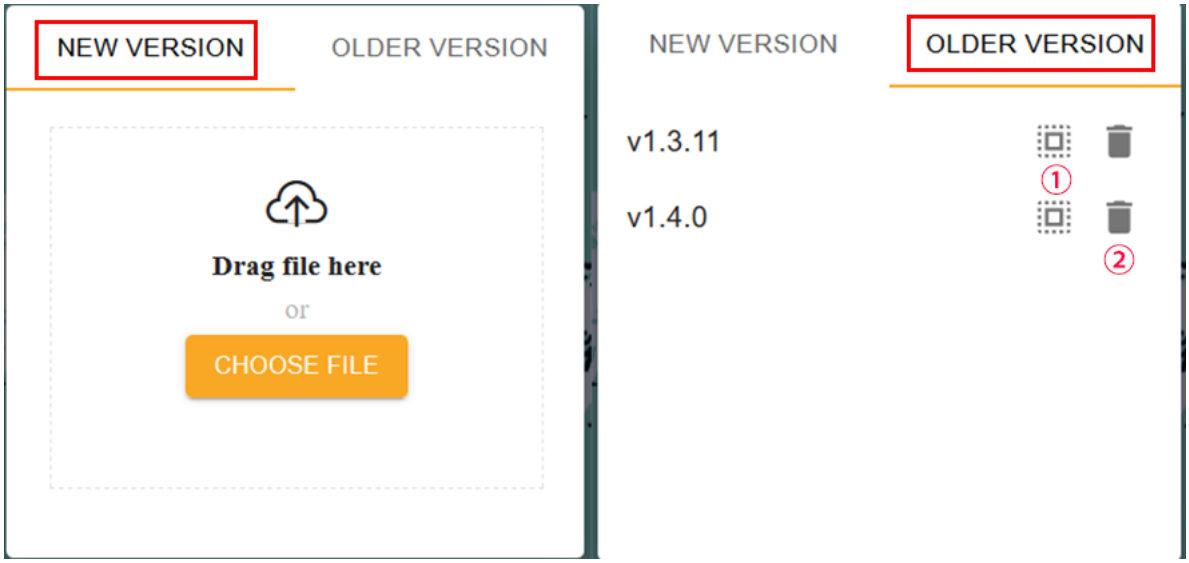
3. It is recommended to control the robot to 1 meter directly in front of the charging pile. Use "Get Current Position" to set it. Make sure that the setting position is accurate.

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

The ninth step[Map management]

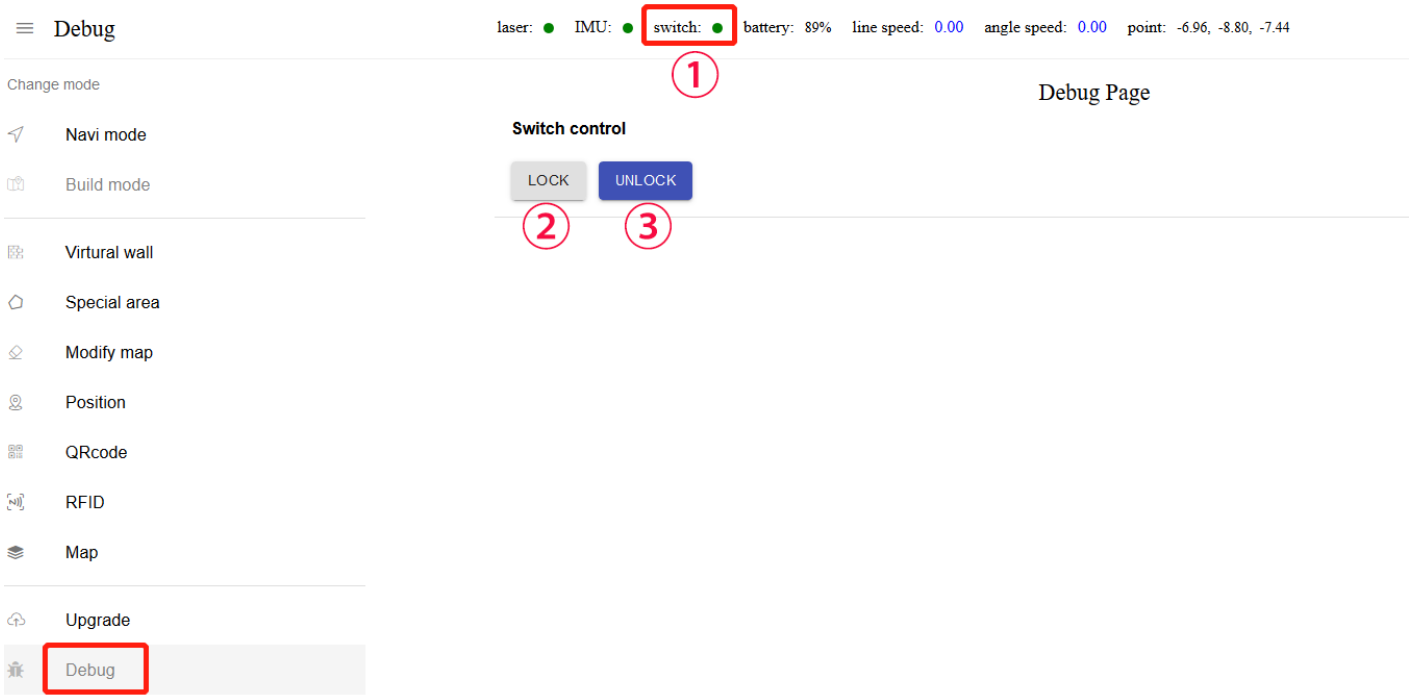
①Edit map name ② Apply this map ③ Export this map
④ Delete this map ⑤ Mouse over to show preview map, click to show original image
Note: The map will not be applied immediately after uploading, you need to find the row of the map in "All Maps" and click the "Apply" icon

The tenth step[upgrade]



① Apply this version ② Delete this version

The eleventh step[debugging]



①Open emergency stop
②Lock: open 36V external power supply
③Unlock: turn off 36V external power supply

Problem handling

Precautions for use

➢The robot has certain requirements for its working environment, asfollows

- Flat and hard ground
- Bathroom and similar environments
- Slope should not be greater than 15 ° , no steps
- Ambient temperature is not lower than 0 ° or higher than 50 °
- The channel width of a single distribution robot is not less than 80cm, and multiple distribution robots are used simultaneously. The channel width is not less than 200cm
- There should be no thin-legged chairs arranged densely in the traveling area
- The route of travel must not have a lot of transparent glass
- Cannot travel on the ground with high friction: thicker, softer carpet

➢Considerations during navigation

1. Start up within 2 meters of the charging pile as much as possible.

2. Try not to push the emergency stop switch and push away during normal use, it may cause loss of positioning .

3. Do not push the machine hard when the emergency stop switch is turned on, which may cause damage to the wheel overcurrent protection.

4. During the navigation process of the machine, try to avoid the crowd from completely surrounding the machine, which may cause the loss of positioning.

Frequently Asked Questions

➢Navigation phenomenon and diagnosis

Phenomenon 1: The robot appears to walk around
Processing method: push the machine under the QR code label to reposition

Phenomenon 2: The machine rotates in place
Diagnosis: wheel loose shaft
Treatment method: press the emergency stop switch, and then turn it on again, if it still fails, power off and restart the machine

Phenomenon 3: The machine does not go at a given target point
Diagnosis: the target point is too close to the obstacle or the virtual wall
Treatment method: re-calibrate the target point to ensure that the target point is at least about 50 cm away from the obstacle or virtual wall

Phenomenon 4: The machine is still some distance away from the target point
Diagnosis: the target point is occupied
Treatment method: check whether the target point is blocked by people or debris

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 20cm distance between the radiator and your body: Use only the supplied antenna.