AE Disinfection Robot Operation Manual

Version 1.4.7.1

Note: This document provides the deployment process and precautions related to model **AE01**. The use method indicated in the document can avoid the abnormal situation during the later use of the machine.

Model: AE01

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Introduction to Robot

Robot use environment requirements

✧ There should be no large amount of transparent glass in the working environment.

✧ Cannot be used where there are stairs or where the drop is more than 2cm

✧ There cannot be a large number of black marble and black reflective cabinets at the ground height of 30cm.

✧ Can't travel on high friction ground: thicker and softer carpet

✧ Slope cannot be greater than 5°, no steps

✧ Can not be used in bathrooms and similar environments

✧ There should be no densely packed narrow-legged chairs

Hardware parameters

| Hardware parameters	Index performance
Product Size	Length 540mm * Width 360mm * Height 1368mm
Product Weight	44kg
Water tank volume	16L
Product color	white
product material	Cold rolled steel sheet
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	20m/270° long-distance laser scanning distance measurement
Single axis gyroscope sensor	Yaw angle measurement
Infrared sensor	Communication with charging pile
QR code camera	Two-dimensional code positioning (the height of the two-dimensional code from the camera is 1-3m or 1-5m); 5 million pixels
Networking configuration	Support 2.4 & 5G Wi-Fi

Moving speed	The default speed is 0.8m/s, the minimum is 0.2m/s, the maximum is 0.8m/s
Processor frequency	1.2G
operating system	Android 5.1
ROM (capacity)	8G
RAM (memory)	1G
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 floor materials vary slightly)

Meet your robot

The Hussar robot has a beautiful beige appearance, centimeter-level precise navigation, world-leading remote deployment technology, multi-machine coordination ability, automatic obstacle avoidance and other functions. It can automatically navigate to a designated location indoors.

The following is the body structure of the robot:

① Infrared camera

② 7 inch screen

③ Infrared sensor

④ Emergency stop switch

⑤ Automatic charging shrapnel

⑥ Direct charging source hole

⑦ Ultrasound

⑧ Universal wheel

⑨ Sprinkler

⑩ Laser head
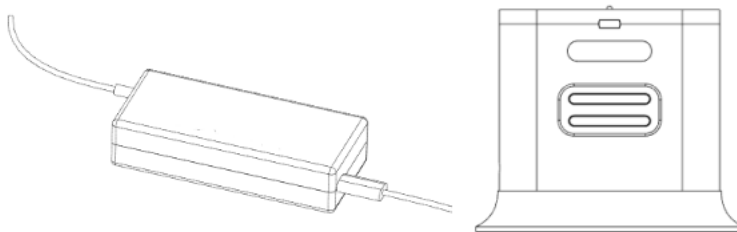
11 switch

12 Driving wheel

13 Atomizer switch
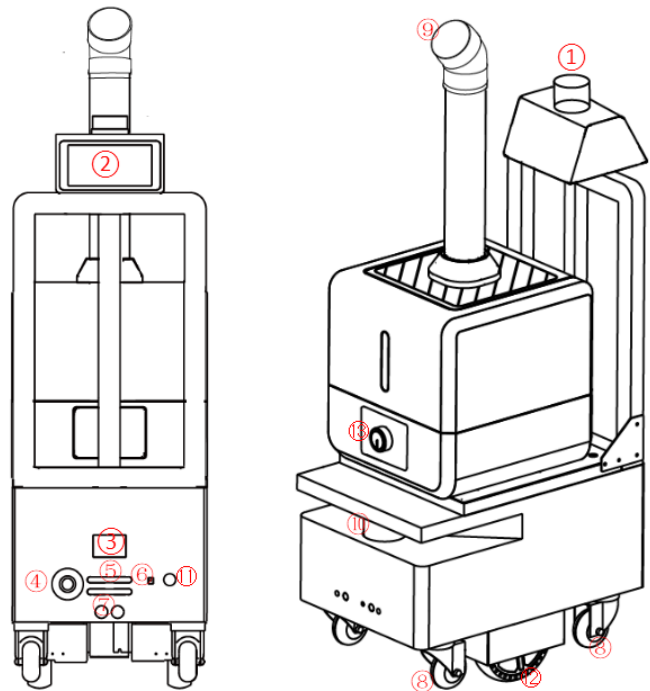
Cleaning precautions: ②7 inch screen ⑩Laser navigation, please do not wipe it with a wet towel to avoid water ingress!

Precautions for use: ⑩Laser: Do not block the laser with objects

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

Get to know your charger

The adapter plug needs to be plugged into the 220V mains power supply, and the DC plug is plugged into the automatic charging pile. At this time, the green light of the charging pile will be on, indicating that it is ready for charging.
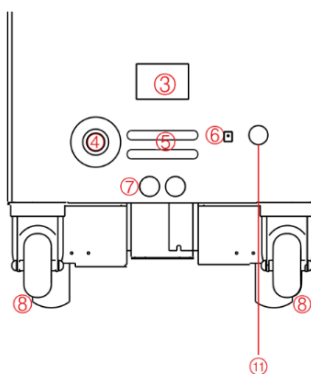
Power Adapter   Automatic charging pile

Use your robot

1. Boot

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!
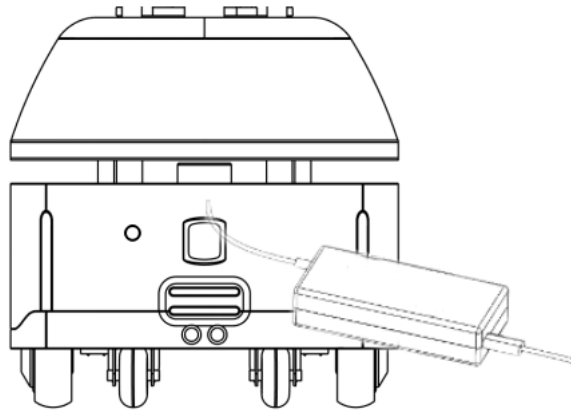
2. Charging

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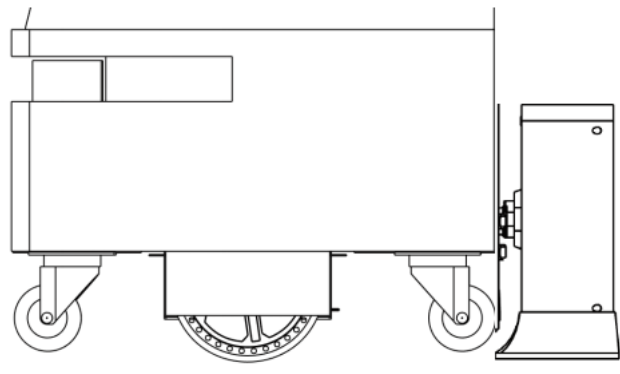
Direct charging: plug the power adapter cable into the power supply on the back of the robot

## 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;
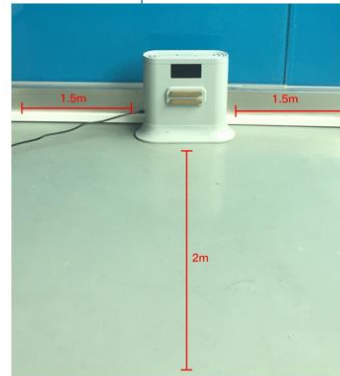
3. Navigation

The step 1 [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".

man-phone ①	Wifi password	
	your-password ②	
Send wifi information to connect ROS ③		
Navigation system IP：	man-phone-5G:10.0.0.193	⑤
Navigation system version： RMB101-ROS-I5-B1.2.9		
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

The step 2 [build a map]

- The viewing angle of the Lidar is 230°, and the scanning range is the horizontal plane of the radar height; the scanning distance is 20 meters

- Ask people to stand behind to push the robot, or use the keyboard arrow keys to control the mapping
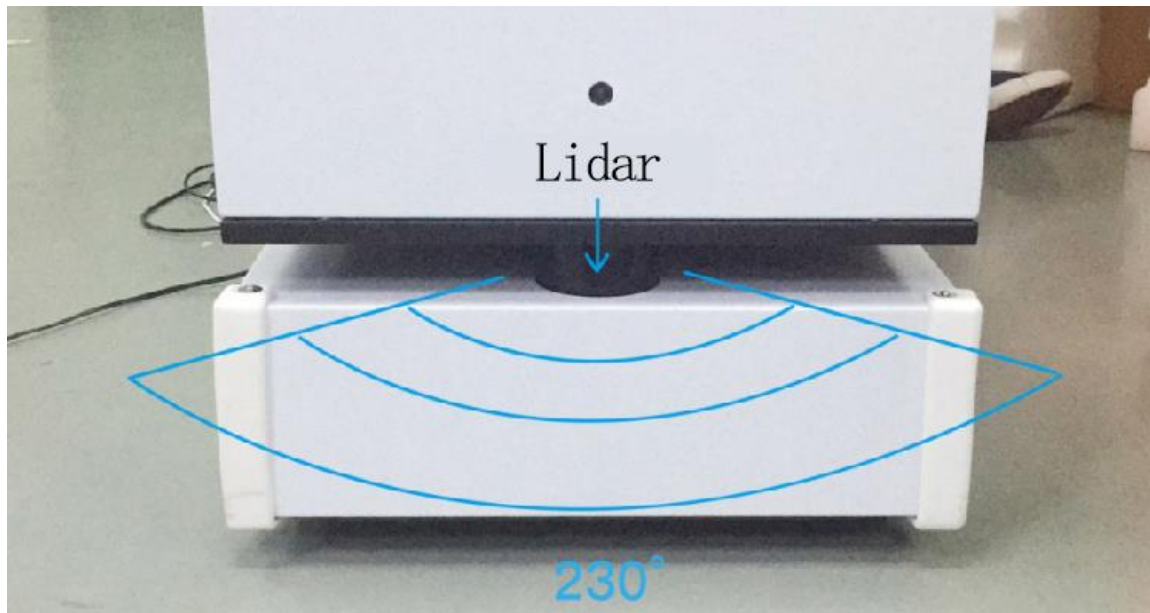
1. After entering the webpage, the default state is "Navigation Mode". After pushing the machine to a spot with obvious feature points, click "Mapping Mode" and select "Laser Mapping" to enter the state as shown in the figure below to start generating the map. Let me teach you how to Generate a map.
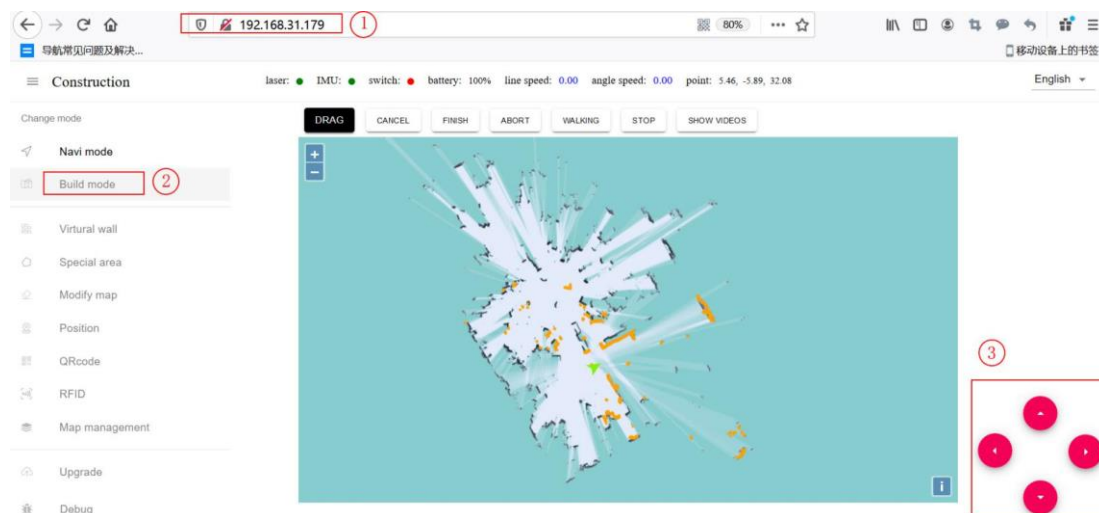

①Get IP from FTP software

②Switch to mapping mode and select "Laser Mapping"

③You 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:
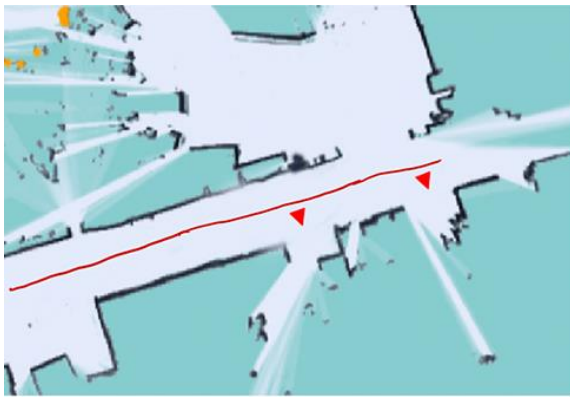
straight line
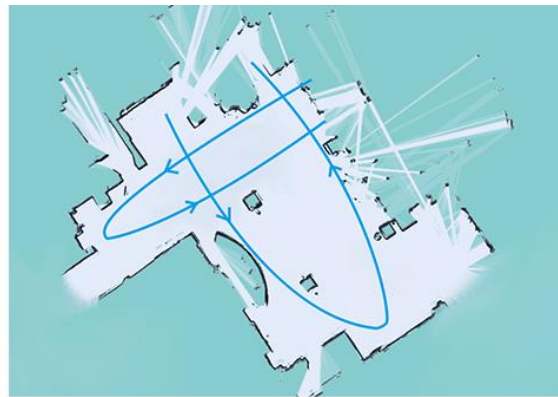
u-shaped route

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:
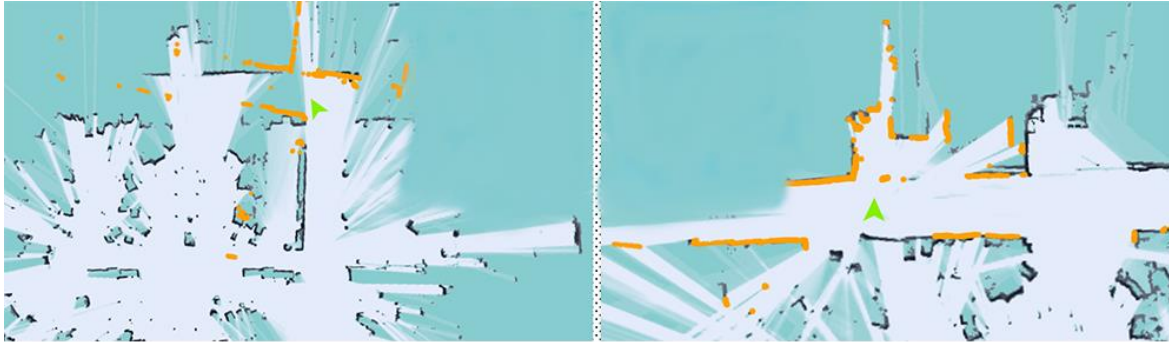
figure 1   figure 2

Figure 1: mismatch between laser and terrain (when the laser does not match the terrain, stop and wait for the laser to match the terrain before pushing the robot to build the map)

Figure 2: matching of laser and terrain (some areas need robot to turn to be able to scan clearly, 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 ghosting and matches the actual terrain. If there is no obvious dislocation, click "composition completed". If there is any dislocation, please wait for a period of time, and the algorithm will correct it.If the correction is not successful in 10 minutes, consider rebuilding the map.

matters needing attention:

1. Select the place with obvious feature points and clean terrain as the starting point and end point, and scan the surrounding environment in a slow circle at the beginning.

2. When pushing or controlling the robot, walk slowly and observe whether the

laser matches the terrain. If there is a mismatch, stop and wait for the laser to match the current terrain.

3. After the robot reaches the destination, observe whether the map is clean without ghosting and matches the actual terrain. If there is no obvious dislocation, click "composition complete". If there is any dislocation, please wait for a period of time, and the algorithm will correct it.If the correction is not successful in 10 minutes, consider rebuilding the map.

The step 3 [virtual wall]

Edit the function of virtual wall: restrict the active area of robot

After composition, it will automatically switch to "navigation mode", 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
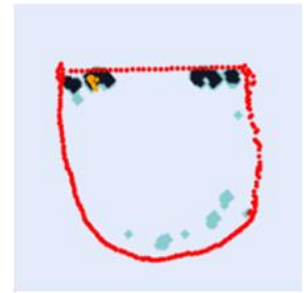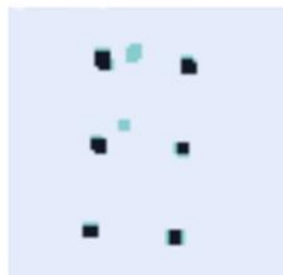
figure 1   figure 2   figure 3   figure 4

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 when drawing the virtual wall, consider the desktop projection
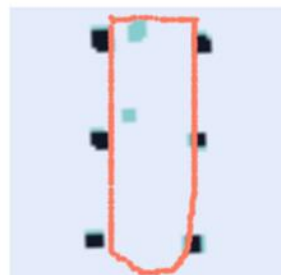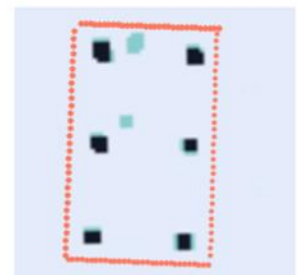

figure 1   figure 2   figure 3   figure 4

figure 1 Actual environment

figure 2 Map scanned by laser

figure 3 error

figure 4 correct

matters needing 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、Click "navigation mode" after saving to return to navigation mode.

The Step 4 [Special Area]

Tip: skip this step if there is no long corridor

The function of special area: optimize the corridor area
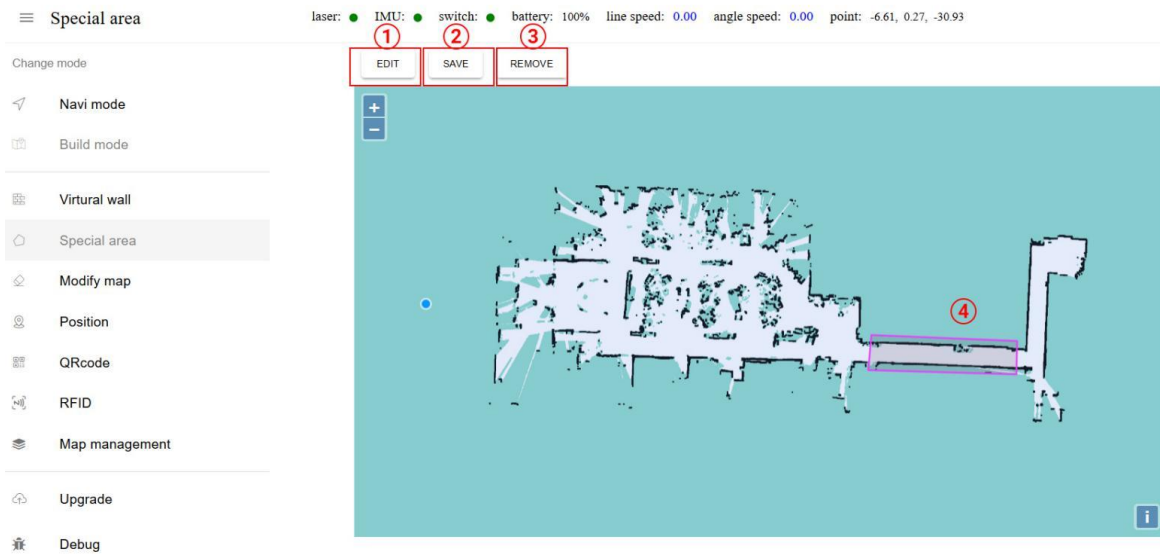
① Click this button to switch to "drag" mode

② Special areas drawn will not take effect until they are saved

③ Click this button to clear all special areas in the Council (also click Save to 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 order to form a polygon

- It is recommended to mark the long corridor with no obvious characteristic points more than 10 meters with special area

- When drawing special areas, pay attention not to cover the end of the corridor, and reserve a distance of at least 2 meters

matters needing attention:

1、The main function of special area is to deal with some areas with single feature points (such as long corridor) or few feature points (such as open hall).

2、Before drawing special areas, it is recommended to navigate to the vicinity of each area to see if there is any missing location, and draw special areas as required.

3、Click "navigation mode" after drawing and saving to return to navigation mode.

The step 5 [Modify map]

The function of editing map: correcting the errors in scanning map

Tip: Please operate carefully in this step. Generally, we use the "blank area" (i.e.the obstacles placed temporarily or by people are swept onto the map during the process of scanning). At this time, we need to use the "blank area" to remove the obstacles.Skip without this step.

Premise of map editing: if an obstacle is missed in the process of scanning, or the map changes after scanning, and the change is not big, you can use the map editing function to edit the map properly.If the map is too different from the actual environment, it is recommended to scan again.
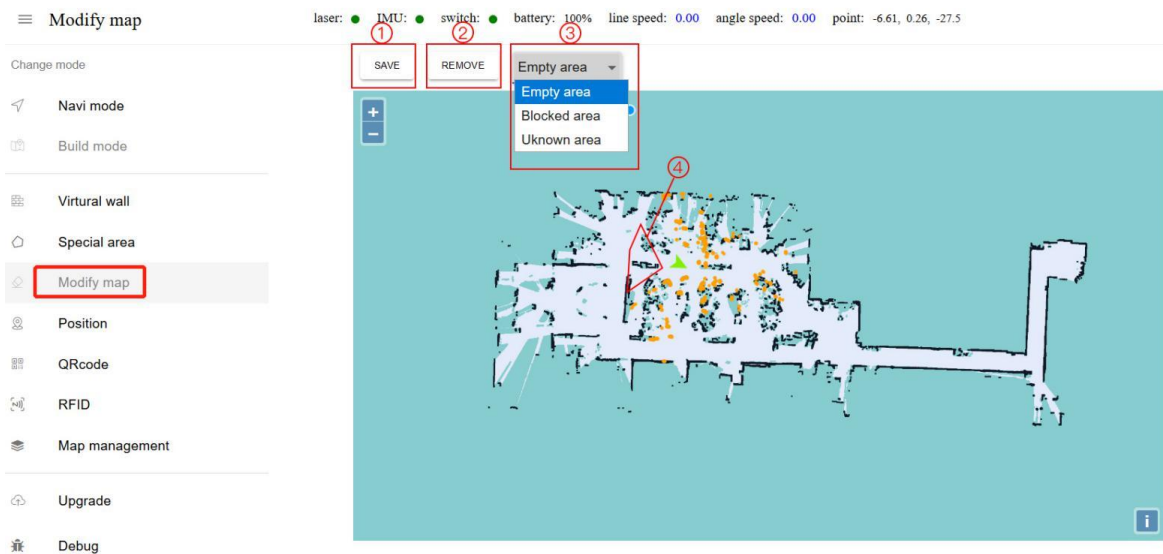
① Click Save to apply the map modification

② Clear drawn polygons

③ Here is the drop-down menu. You can select different amount map area types

- Blank area: remove the noise (such as the noise left by pedestrians walking on the map and temporary obstacles, etc.) during the process of scanning the map. Do not remove the real obstacles as noise.

- Obstacle area: some real fixed obstacles may not be scanned very clearly when building the map, so it is necessary to draw obstacles artificially on the map (note that the obstacles drawn must match the obstacles that can be swept by the real laser).

- Unknown area: some frequently changing feature points need to be drawn into unknown areas (for example, the area where robots will not walk outside the glass wall).

④ In the same way as a special area, the interior of the drawn polygon is a

modified area

The step 6 [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 3 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
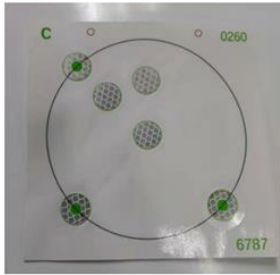
➢ QR code paste method
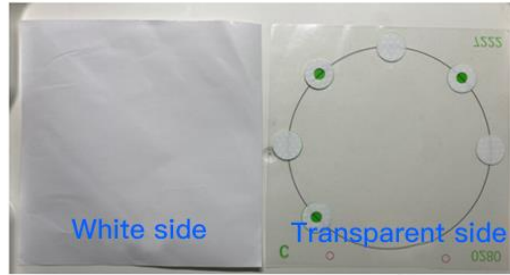
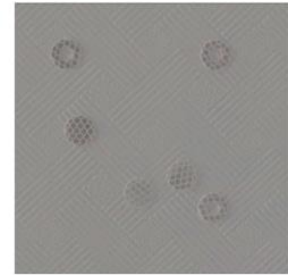Figure 1 Before tearing   Figure 2 After tearing   Figure 3 After pasting

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.

➢ **Where to place the QR code label**
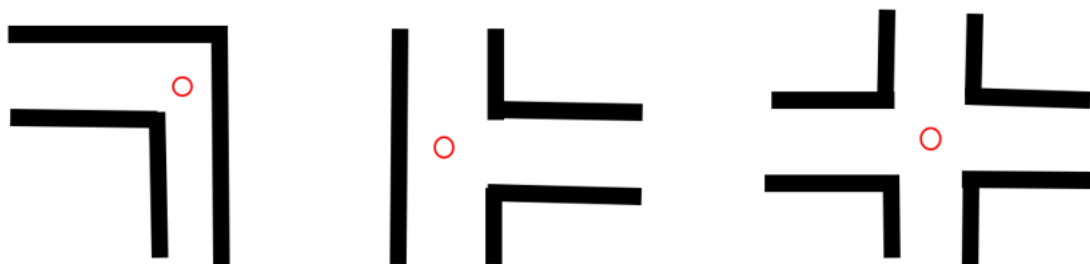
As shown in the figure: in "〇" Place QR code at the corner and intersection

Click the left menu bar to switch to QR code mode
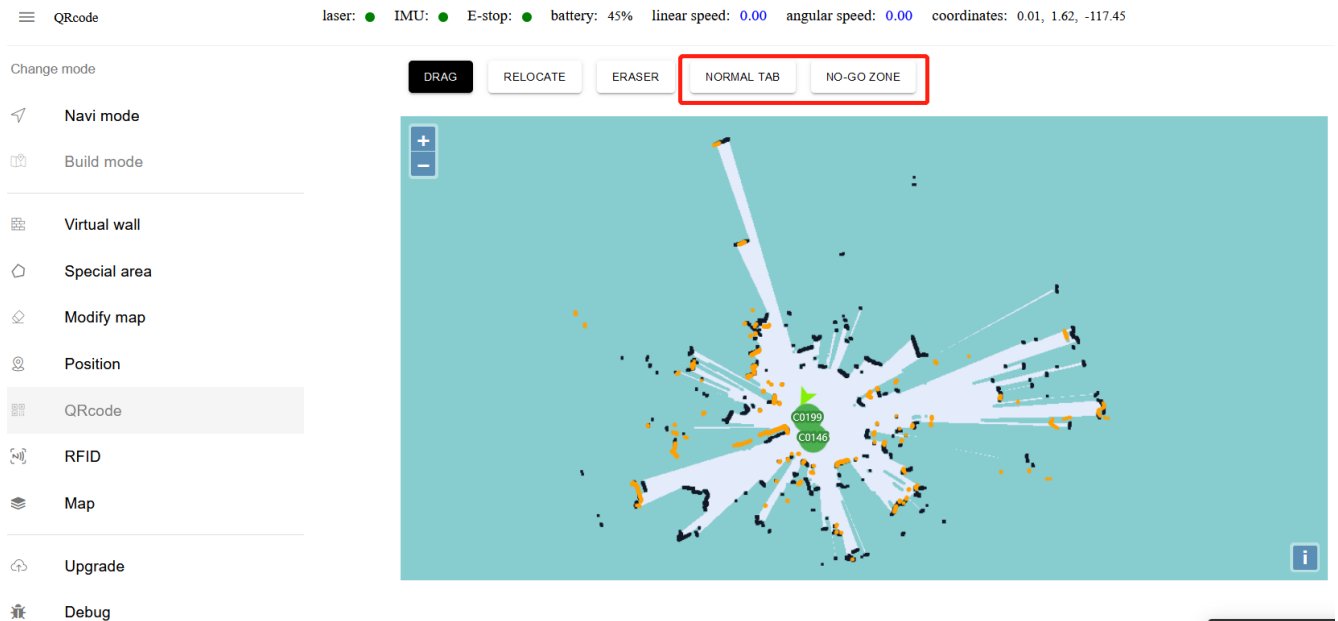
Eraser: Hold down the left button of the mouse and drag it, a rectangular box will appear, select the label to be deleted

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.

The Step 7 [Position]

The function of calibration location: provide reachable target points for business layer applications

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.
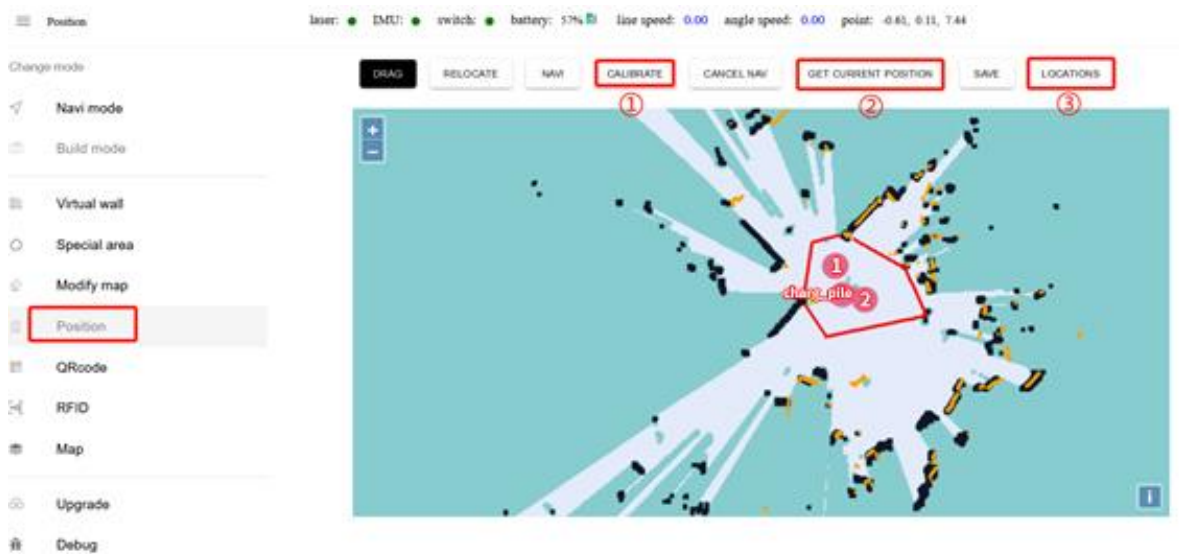
①In the calibration position mode, you can drag and drop on the map to get the coordinates of the specified location for calibration

② You can also get the current position of the robot for calibration

③ Can display relevant information of all points

The calibration example is as follows:
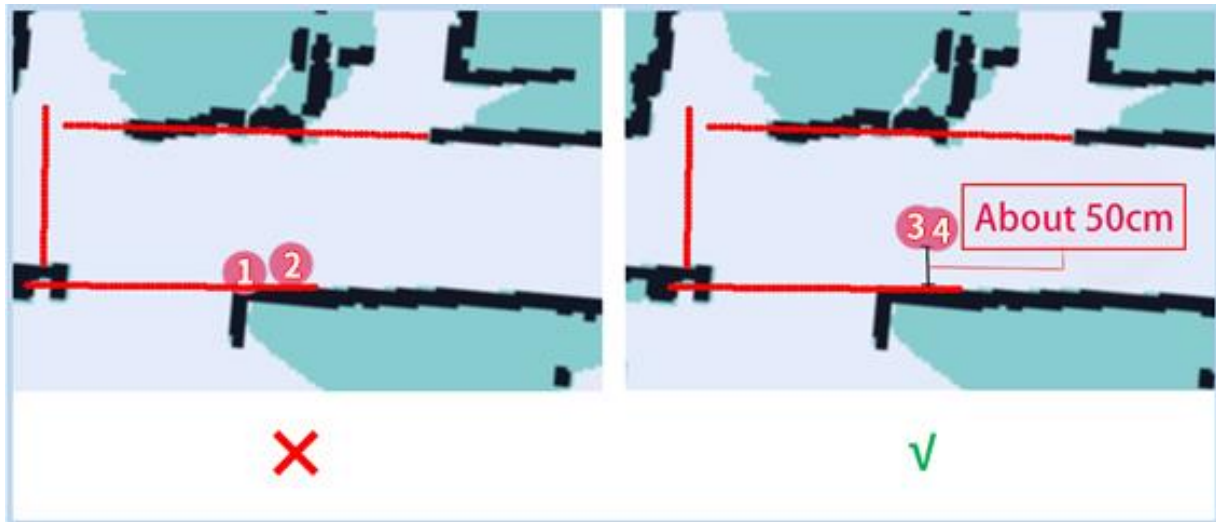
Precautions:

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
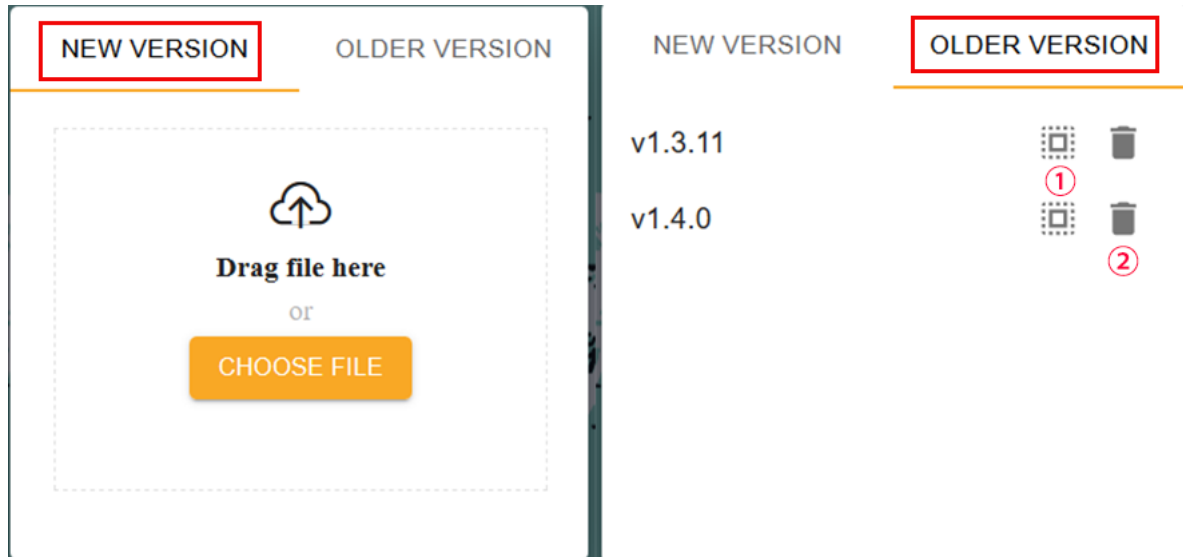
The Step 8 [map]
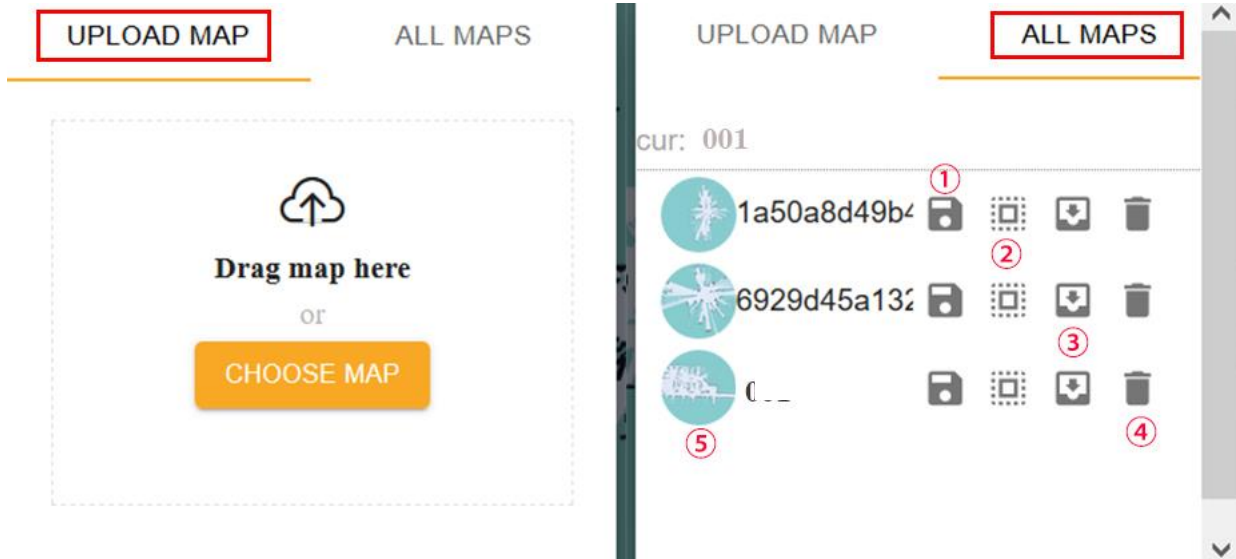
①Edit map name   ② Apply this map ③ Export this map

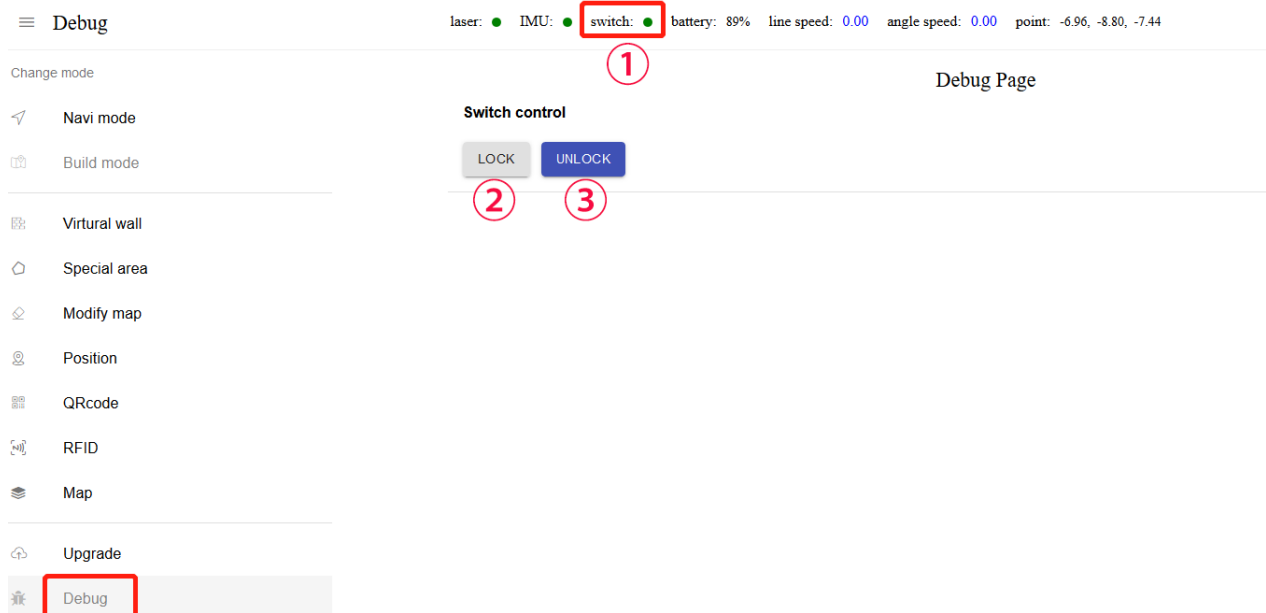④ Delete this map ⑤ Mouse over to show preview map, click to show original image

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 Step 9 [upgrade]

① Apply this version   ② Delete this version

The Step 10 [Debug]

① Turn on the emergency stop switch of the machine manually

② Close lock: open 36V external power supply

③ Unlocking: turn off 36V external power supply

4. Precautions for the use of atomizer

4.1. The water in the water tank and the disinfection ratio of 84 should be added according to the amount of 20:1 or 50:1, and the concentration should not be too high or too low to affect the disinfection effect. (It is best to refer to the mixing ratio on the disinfectant for mixing. Proportional mixing can avoid corrosion of the humidifier and reduce harm to the human body)

4.2. In normal working state, the indicator light of the water tank is green and red when there is water shortage; when the robot prompts that there is water shortage, please turn off the robot before adding the disinfectant, and then restart the robot equipment after adding.

4.3. After the disinfection robot has been running for a period of time, it needs to clean the dirt at the bottom of the water tank in time (recommended to clean it every two weeks). If it is not cleaned, it will cause some corrosion to the ultrasound and affect the disinfection effect.

5.Operation instructions for disinfection robot APP

Note: Before using this function, you need to refer to the catalog page point 3"Navigation" of "Use your robot" for map deployment, and calibrate the disinfection point according to the disinfection area. Numbers are names and must be marked in order starting from 1 as shown in the figure below, the machine is disinfected in this order.
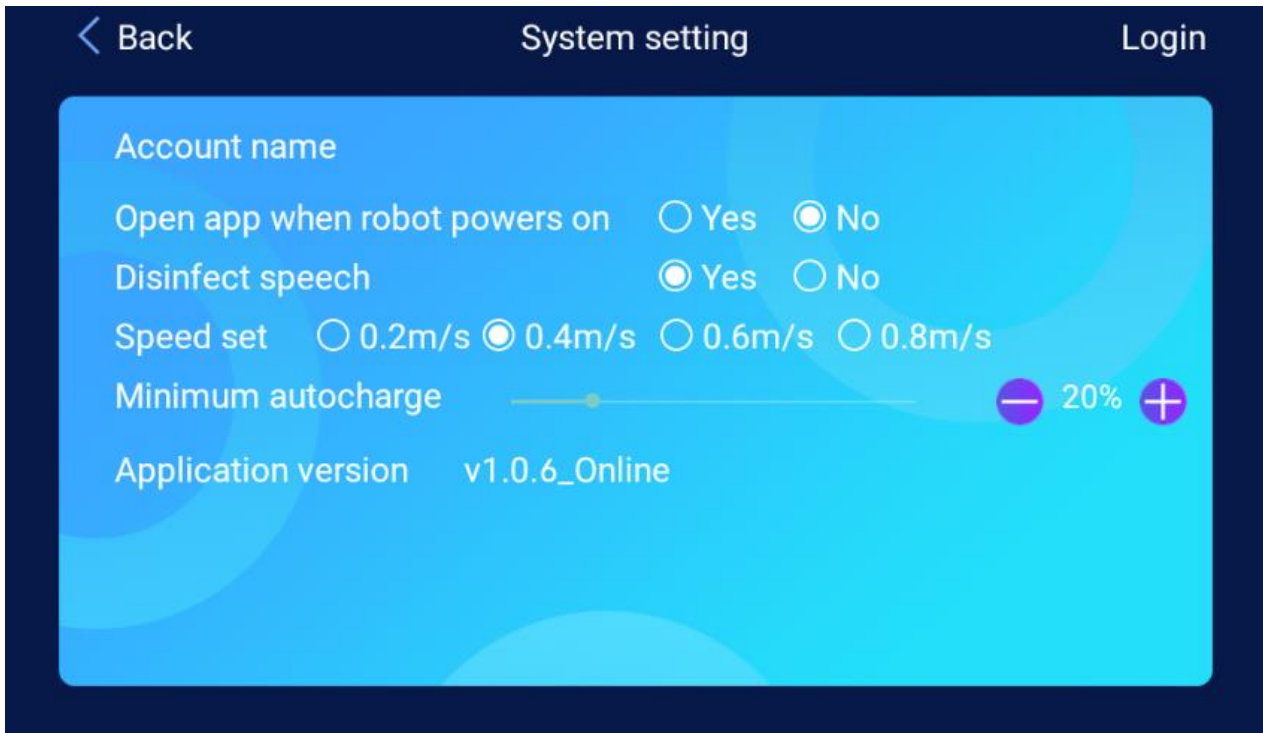
Open the "Disinfecting Robot" App on the Android screen as bellow picture:
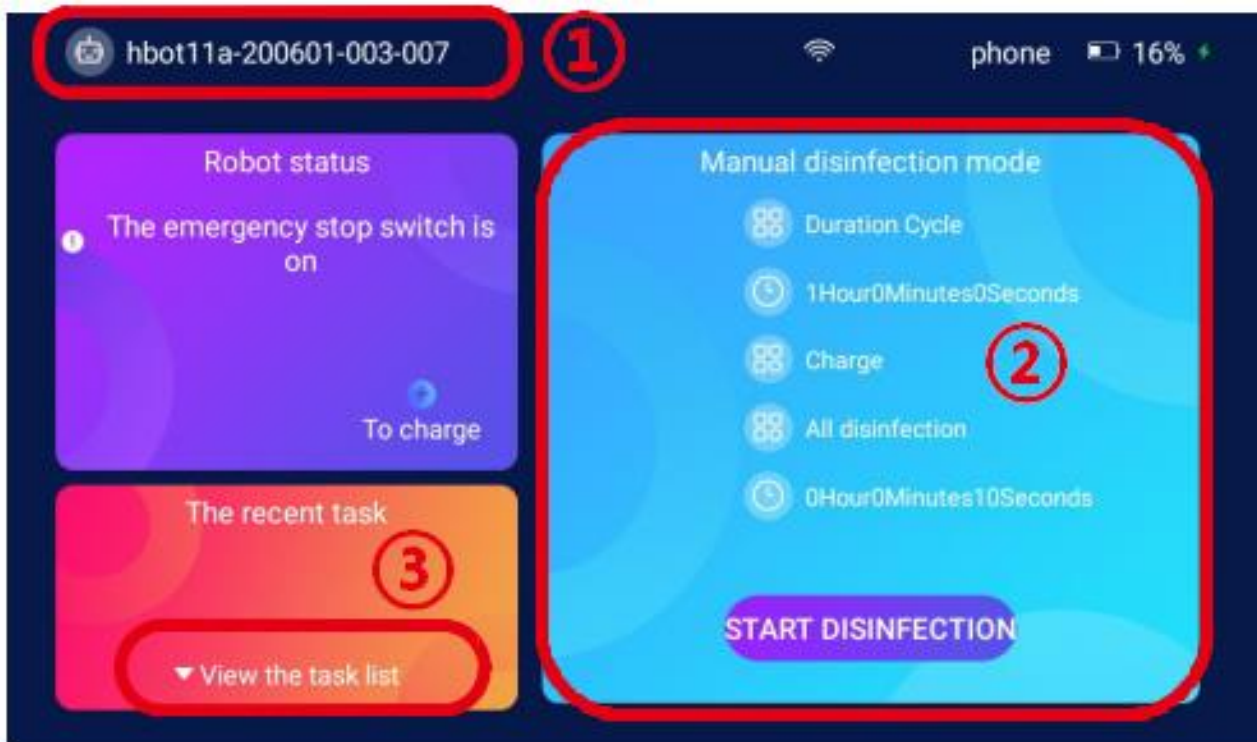
① Click to enter "System Settings"

② Click to enter the "disinfection plan settings"

③ Click to enter "Create Disinfection Task"

5.1、 System settings

Account Name: Account ID name, if skipped, nothing will be displayed and it will not affect the use

Open app when robot powers on： Whether to start the application automatically
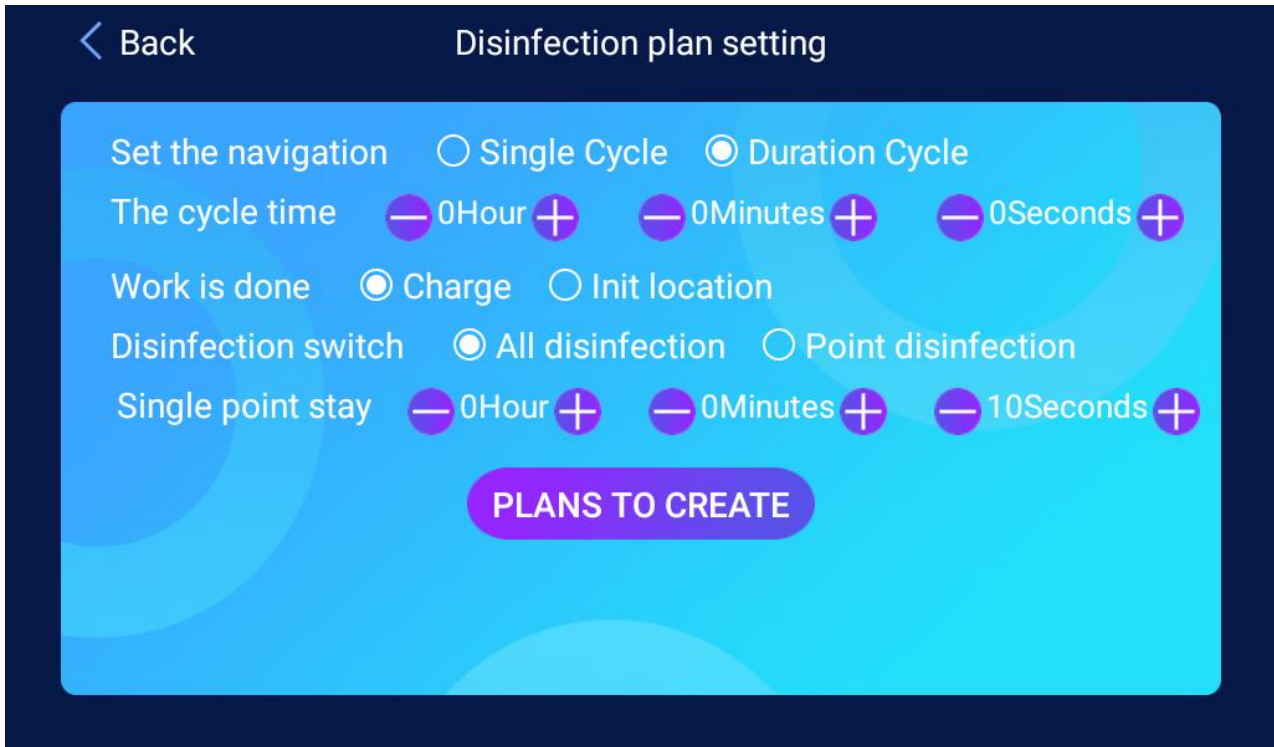
Disnfect speech： Whether to broadcast voice during disinfection

Speed set： Machine walking speed

Minimum autocharge： When the power is lower than the set value, trigger automatic charging

(Note: When the power of the machine is lower than the set value, it will immediately end the task and return to charging)

5.2、Manual disinfection mode

Set the navigation: single disinfection or time cycle (time cycle means disinfecting according to the time set by "cycle duration")
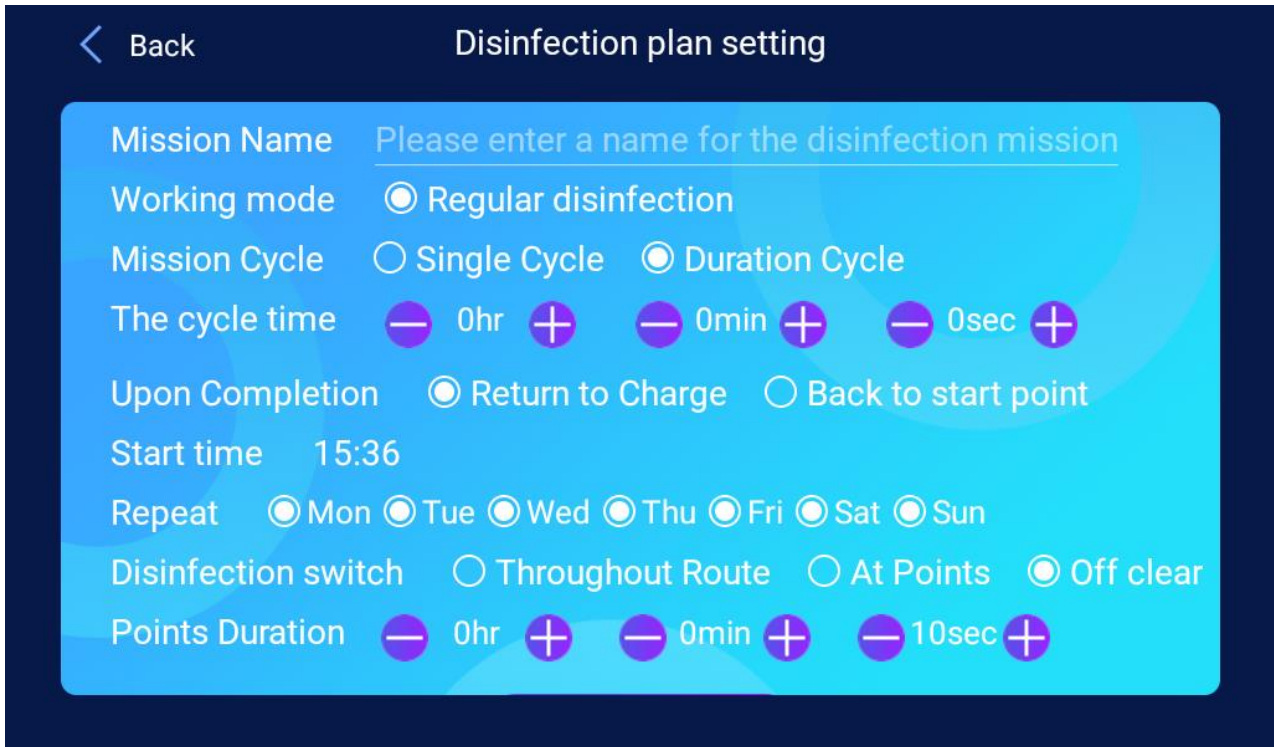
The Circulation time: disinfection time

Work is done: return to charging or initial position after task completion (initial position refers to target point 1)

Disinfection switch: disinfection status of the disinfector

Single point stay: the length of stay at the target point

5.3、Create a disinfection task

Mission Name：Name the plan

The cycle time: the time of the working cycle

Upon completion: return to the charging or initial position after the task is completed (initial position refers to target point 1)

Start time:Task start time

Disinfection switch: disinfection state of disinfector

Point Duration: the time to stay at the target point

5.4、 **Start manual disinfection mode**

Click the "Start Disinfection" button at the bottom of the main interface to enter the

disinfection mode.

Precautions for use

1.The "charging pile" point must be marked on the map otherwise the machine cannot be charged.

after completing the task (for the method of charging pile calibration, refer to point 3"Navigation" of "Use your robot")

2.The disinfection task has been created and turned on, and the machine will come out to work at the set time without human intervention.

3.The time interval of disinfection tasks start should not be too short.

(if the machine is performing the first disinfection task when the second disinfection task time is up, then The machine will only execute the first one and not the second one)