

Cleaning Robot Manual

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Note: This document provides machine-related deployment procedures and precautions. Follow the instructions in the document to avoid other abnormal situations when using the machine in the future.

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1、 Introduction to Robots

Use environment requirements

**Please use the robot in accordance with the instructions of the manual.
Any loss caused by improper use shall be borne by the user.**

- ✓ Do not use in places with stairs or drop

- ✓ There should not be a lot of black marble and black reflective cabinets at

the height of 27 cm

- ✓ Do not travel on the ground with high friction: Thick soft carpet

- ✓ Do not use in a large amount of ponding and similar environments

- ✓ There should be no densely placed thin-legged chairs in the marching area

- ✓ Do not use in an environment above 50°C and below 0°C

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✓ Do not use on uneven and sloped roads

✓ There are a lot of transparent glass and thin-legged tables and chairs, the

possibility to be used or not depends on the construction of the map and

the test situation.

Hardware parameters

Hardware parameters	Index performance
Product Size	Length 684mm * Width 500mm * Height 600mm
product weight	85kg
Product color	white
product material	metal plate+ABS
Environmental requirements	Storage temperature: -15°C~55°C; Working temperature: 0°C ~ +50°C Humidity; (RH): 10%~90%
Android specifications	
operating system	Android 5.1
language support	Chinese, English
Processor type	RK3128

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Memory LPDDR3	1G
Built-in NAND FLASH	8GB
USB Debug port	Micro USB interface
Display screen	7 inch, IPS screen (16:9) resolution 1024X600
External I/O port	1 USB 2.0 (MICROUSB), RJ45 network port
speaker	4Ω/3W Mono speaker
Wireless technology AP6255	Support dual frequency 2.4&5G WIFI 802.11b/g/n non-domain network cable office 11ac 5.15GHz-5.825GHz
ROS Navigation specifications	
operating system	LINUX
Lidar	Laser wavelength 905 nm, working area 270°
Single axis gyroscope sensor	Yaw angle measurement
hard disk	32G high-speed solid state drive
motor driven	6.5 inch hub motor
Infrared sensor	Communicate with charging piles within 1 meter
512AN_HMW module Intel WIFI	Support dual frequency 2.4&5G WIFI&BT4.1 802.11b/g/n wireless LAN 11ac 5.15GHz-5.825GHz
Moving speed	Min 0.1 m/s, max0.5 m/s
Navigation board	Intel Core I5 motherboard
Remote function	Support remote navigation status monitoring, remote online update navigation system
Light tube	
UV lamp	16W

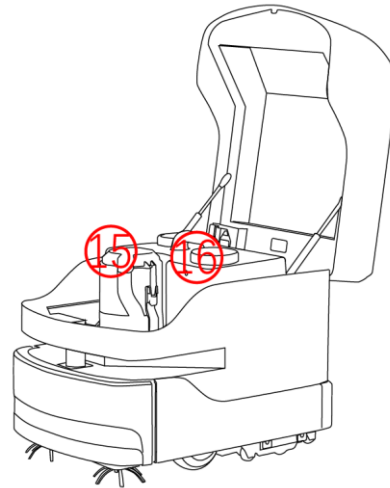
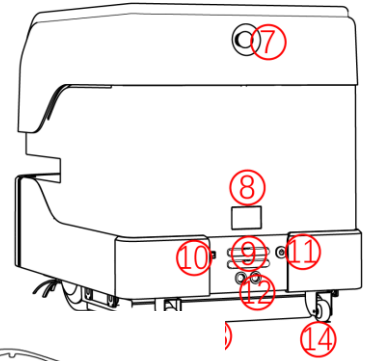
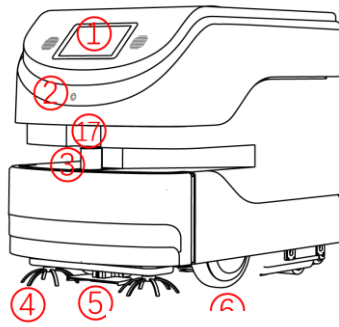
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Water tank	
cubage	15L
Power system	
24V Rectifier	LPS-425-40A24U DC24V output power 48W rectifier
Motor	Vacuum cleaner, solenoid water valve switch, suction pump motor, roller motor
charging method	Automatic recharge, DC direct charge
adapter	enter : AC110-240V.50-60HZ Output : DC43.2V-5A
Robot input power	42V--5A
battery	25AH lithium iron phosphate, 38.4V/960W
Charging pile parameters	Overcurrent protection, intelligent power off, output rated voltage: 43.2VDC, output rated current: 5A
Charging time	5.5-6 hour
Battery life	5-6 hour

Meet your robot

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1. 7 inch display
2. RGB camera
3. Lidar
4. Side Brush
5. Dust suction port
6. drive sprocket
7. Emergency stop switch
8. Infrared sensor
9. Automatic charging shrapnel
10. Absorbent sponge
11. Direct charging port
12. Ultrasound
13. Clean the sponge
14. Omni-directional wheel
15. Garbage box
16. Water tank
17. 3D camera



Cleaning precautions: ① Touch screen ③ Lidar. Do not wipe with a wet towel to avoid water ingress!

Precautions for use: ③ Lidar: Do not block the laser with objects

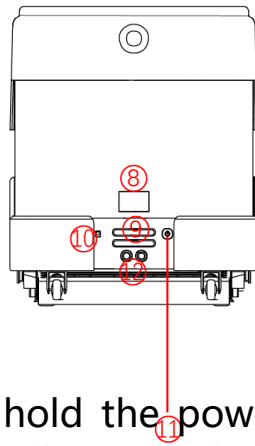
⑦ Emergency stop switch: The emergency stop switch can only be rotated to the right, do not rotate to the left

2、 Use your robot

A、 Boot

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The power button is located on the base 11 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 turn off the screen first, and then the motor will be powered off, and finally the chassis light will go out!

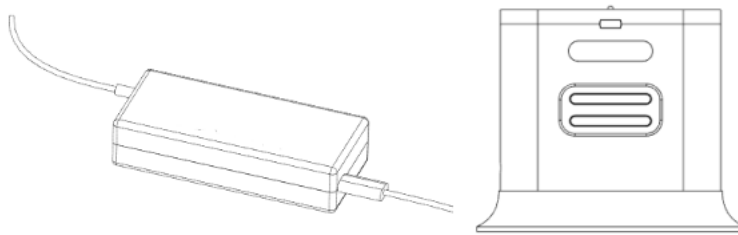
B. Charging

Get to know your charger

The adapter plug needs to be plugged into the 110-220 V voltage, and the

DC head 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 to charge.

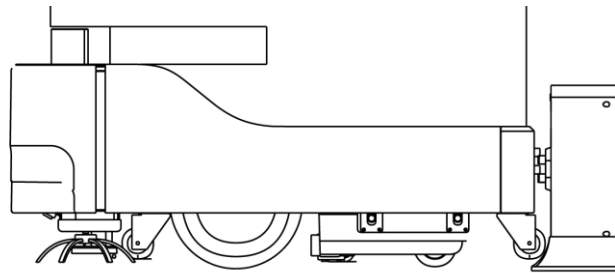


Automatic charging : the robot can automatically detect the power and

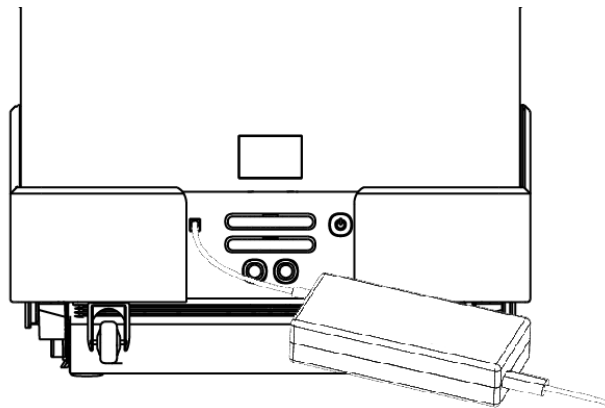
charge automatically when the power is lower than the set threshold

(prerequisite: it is necessary to build a good map to mark the point of the

charging pile, the calibration method is as follows)

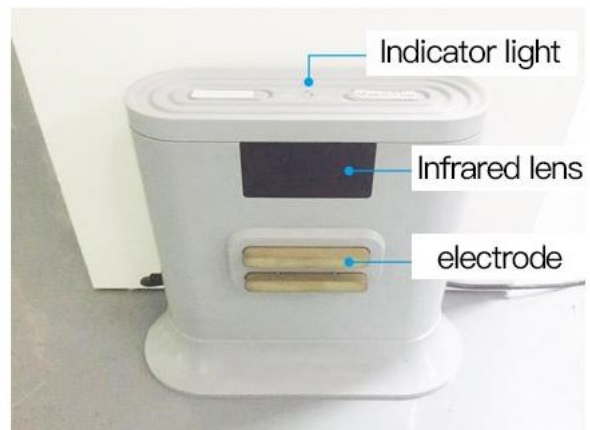
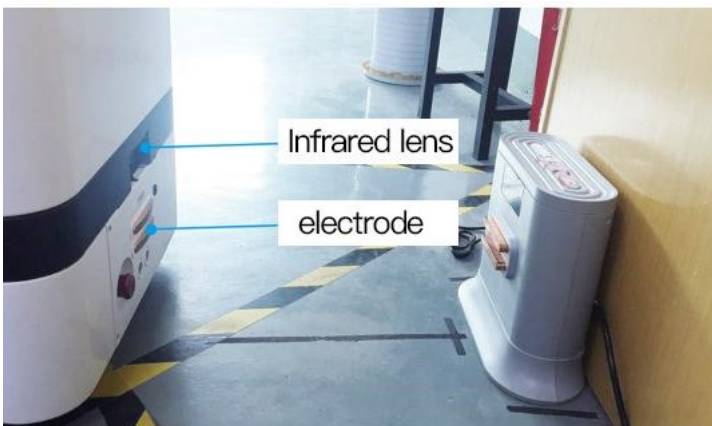


Direct charging : plug the power adapter cable into the power supply on the back of the robot



Automatic hardware description

charging



Placement of charging pile

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charging pile location

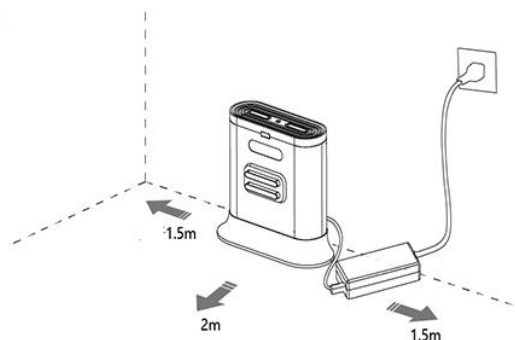


× charging pile location

✓ charging pile location

Notes on the selection of charging pile location

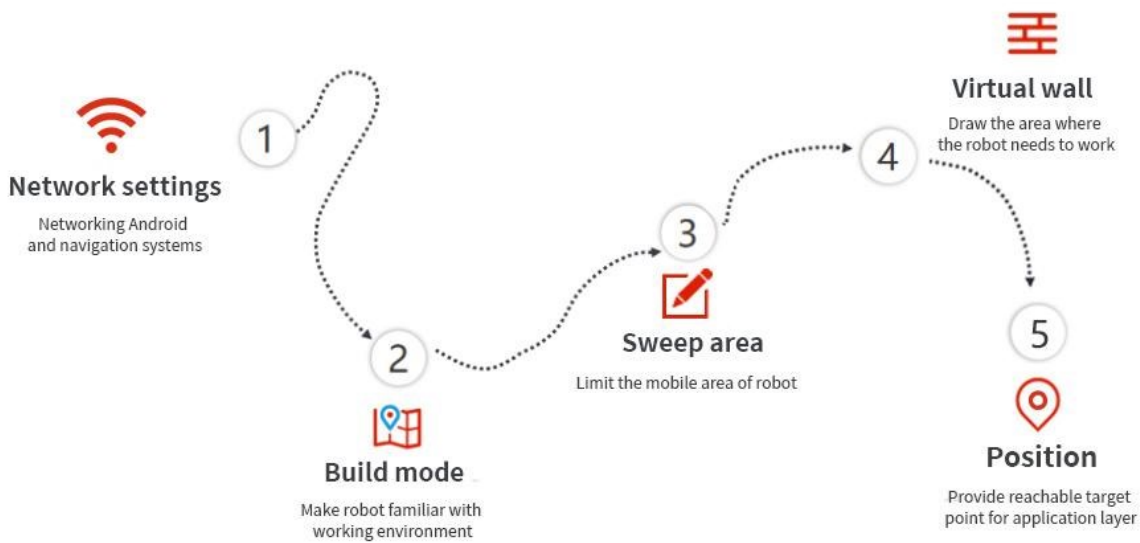
- The location of the charging pile must be selected within the map and placed against the wall;
- Obstacles within 2 meters in front of the charging pile and within 1.5 meters on both sides;
- Place the charging pile to avoid moisture, dripping, high temperature environment;
- When multiple charging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



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C. Navigation deployment

Note : The following content is an introduction to all the functions of the robot deployment background. The functions that must be operated are as shown in the points 1, 2, 3, 4 and 5 in the following figure. Other functions depend on the specific scenarios and usage condition



The step 1 [Network Settings]

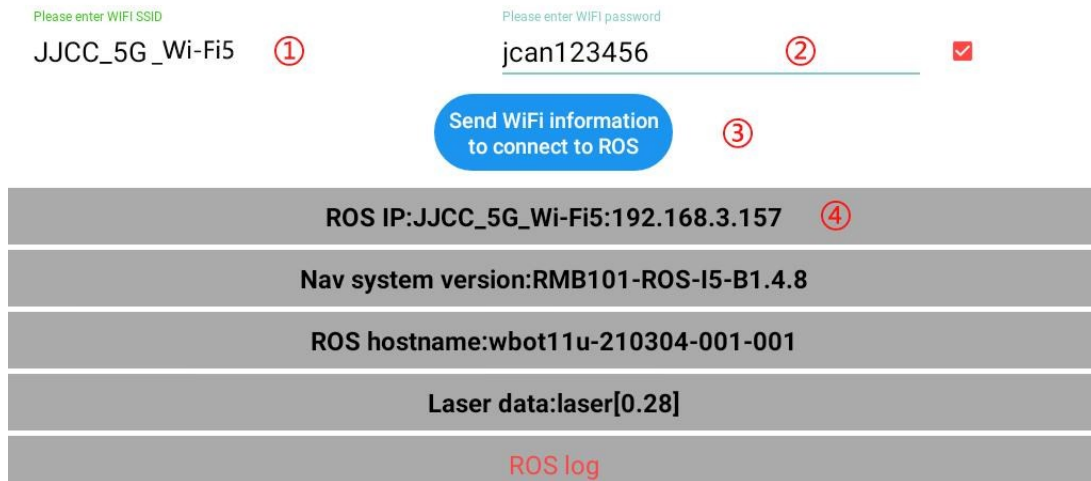
Note: The router network segment cannot be the 192.168.10.x network segment

1. Open the [Settings]-[WLAN] on the Android screen of the robot to connect

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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".



- 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 Show IP for connection success (show 127.0.0.1 Is connection fail)

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3. The scanning device should be connected to the same LAN as the robot.

Open the browser and input the IP address of the robot (Chrome browser is recommended)

If the Wi-Fi connection fails, you can click ③ again to reconnect. If it still fails, you can connect to another network.

The step 2 [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 construct an "original map". During the navigation process, the robot can compare with the

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original map based on the real-time scanning situation and find its own position.



Actual environment

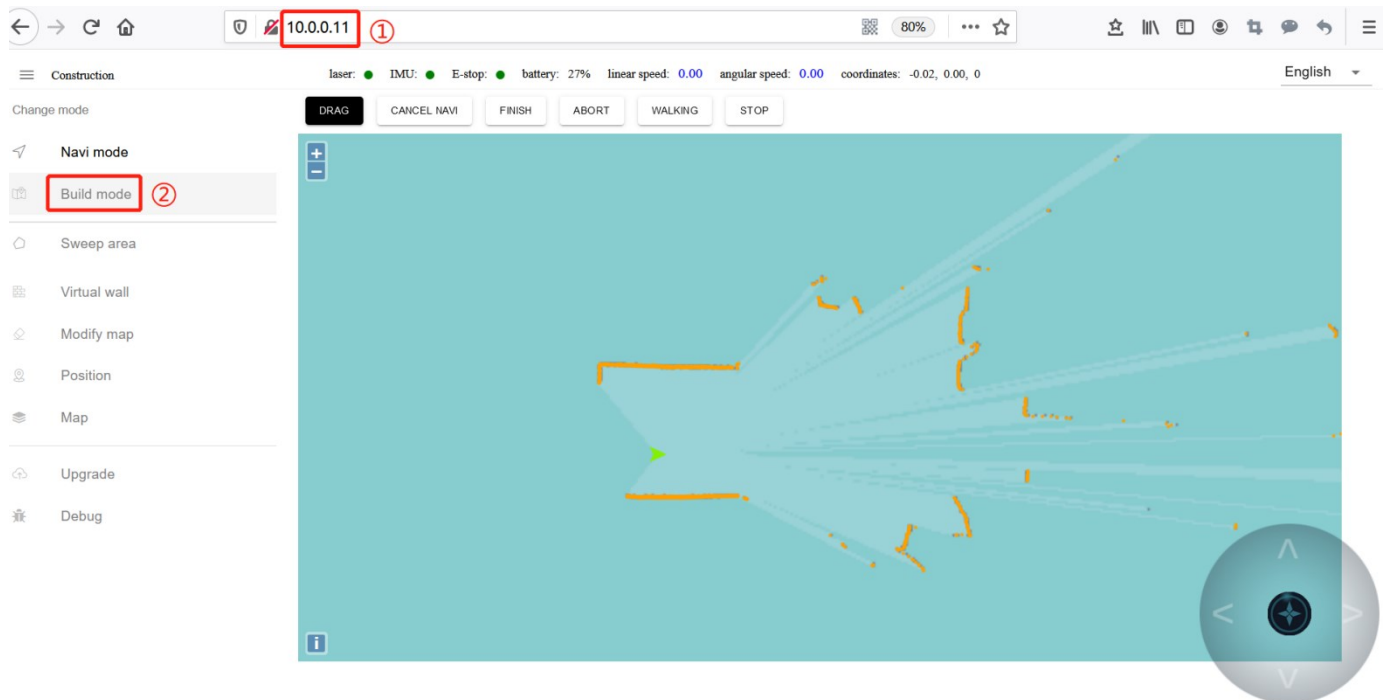


The map scanned by
the robot's laser

- It is required to turn right to open the emergency stop switch of the robot, and use the direction keys on the keyboard to control the machine to build a map.
- The viewing angle of the Lidar is 270°, 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", click to switch to "Build Mode" and select "Laser Mapping" to enter the state as shown below to start scanning.

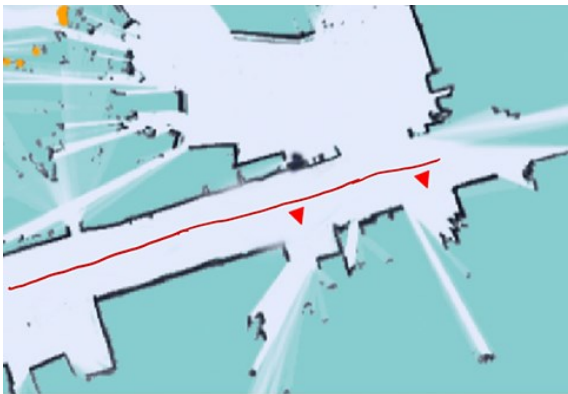


① Get IP from FTP software

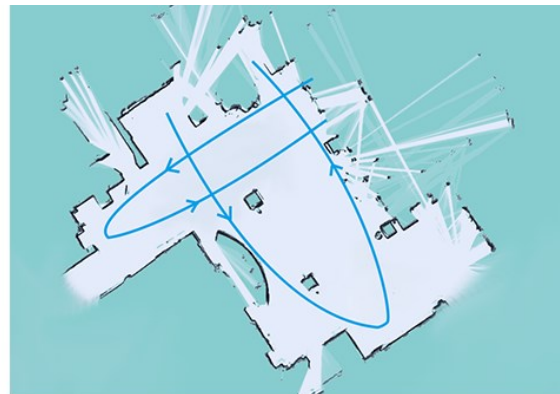
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② Switch to mapping mode and select "Laser Mapping"

2, After entering "Build mode", the machine first turns around to clear the surrounding feature points. And don't turn it too fast. You can push(control) the robot after one turn. You can walk straight in narrow areas. Pay attention to the gaps during walking. Slowly turn the robot 90° facing the gaps to clear 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 controlling the machine to go, pay attention to whether the laser matches the actual terrain. If it does not match, stop and wait for a while, wait until the laser matches the actual terrain before continuing. As shown below:

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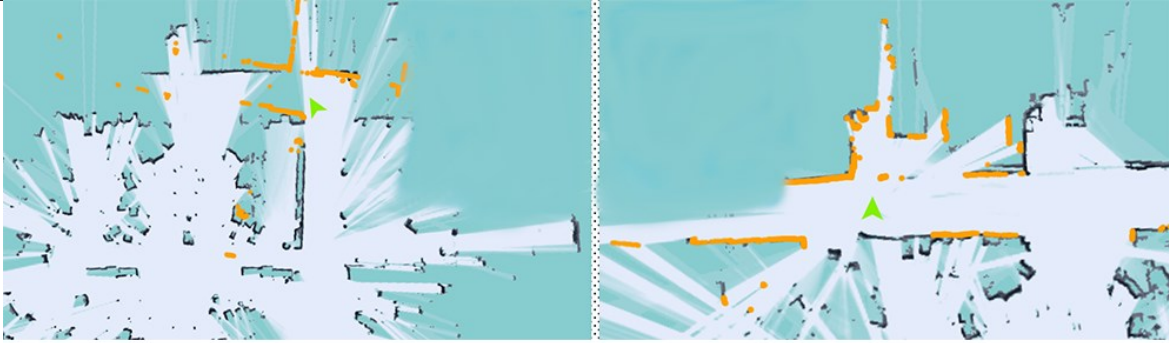


figure 1

figure 2

Figure 1: Laser does not match 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: The laser matches the terrain (some areas require the robot to turn around 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 "Finish". 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:

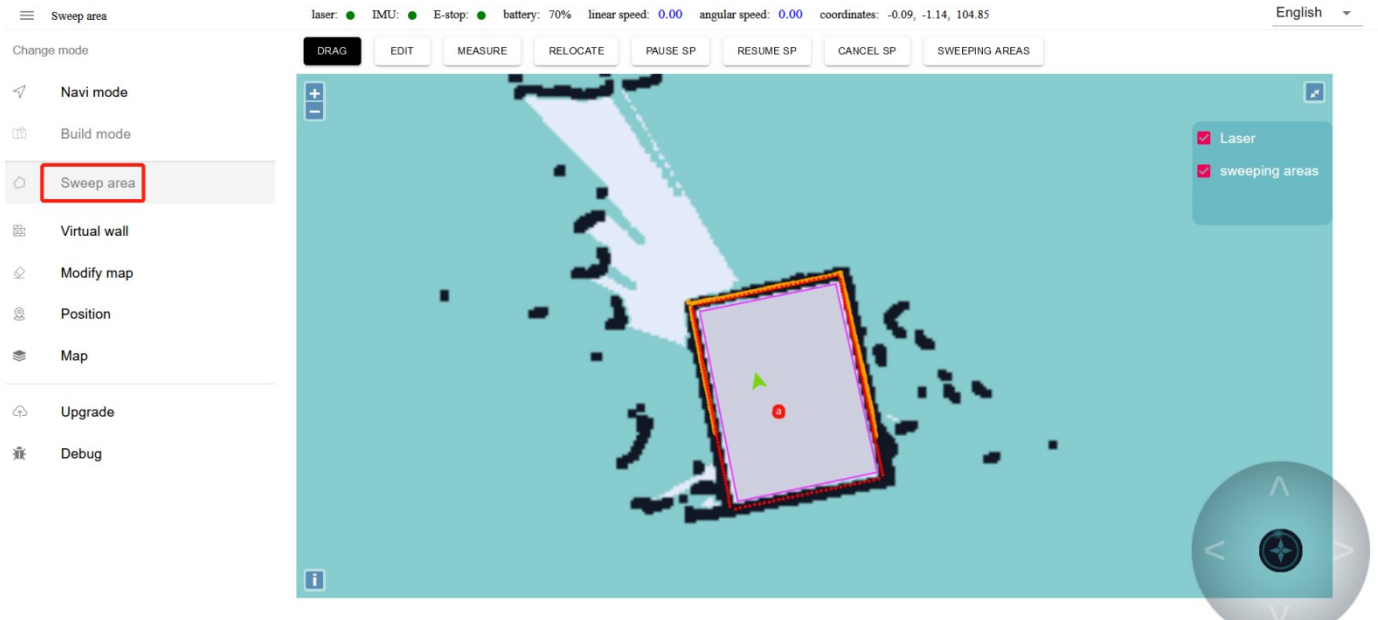
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1. When pushing or controlling the robot, walk slowly and observe whether the laser matches the terrain. If there is a mismatch, stop and wait for the laser to match the current terrain.

2. 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 "Finish" . 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.

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The Step 3 [Sweep area]



EDIT: Use polygons to draw the area that needs to be cleaned

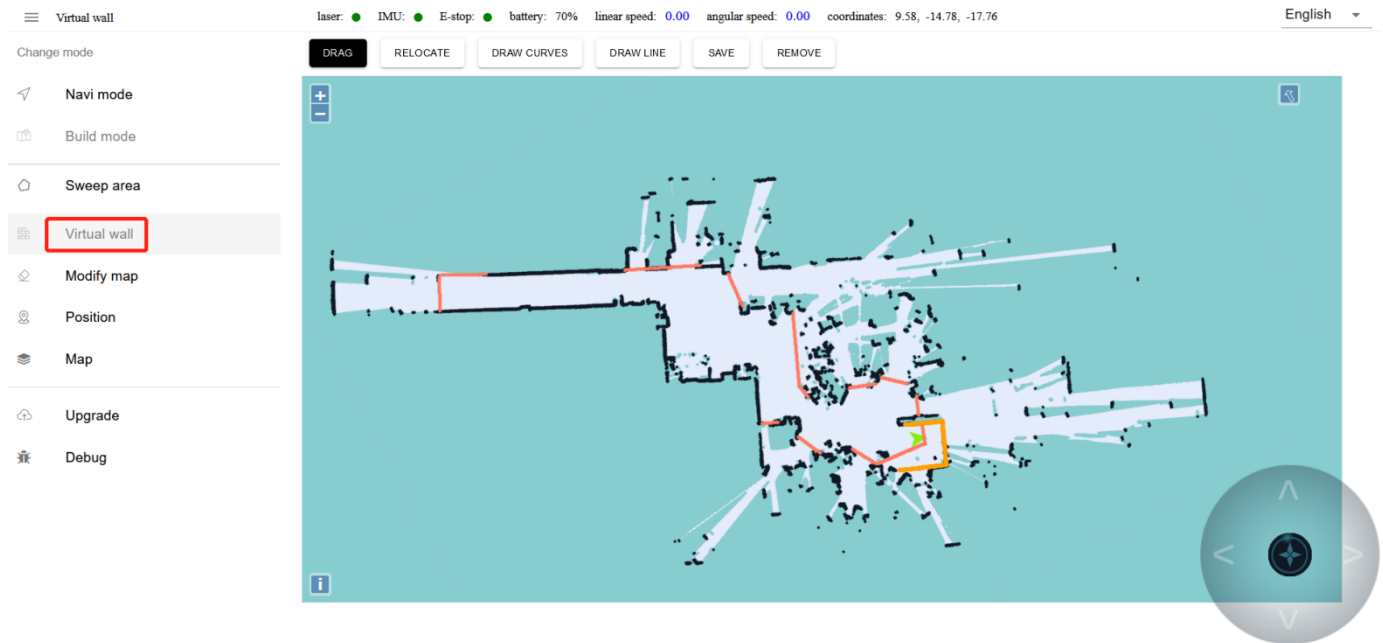
MEASURE: measuring distance

SWEEPING AREAS: Click to pop up all clean areas for editing

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The step 4 [Virtual wall]

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



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

DRAW CURVES : often used to draw irregular terrain

DRAW LINES: connect two points to form a straight line, which is often used for regular terrain or rough drawing of an area

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SAVE: Only click save to save the drawn virtual wall

REMOVE: Remove all virtual walls (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

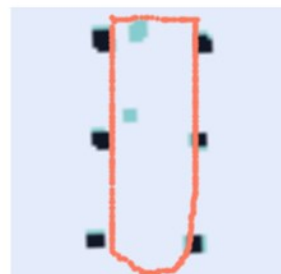


figure 3

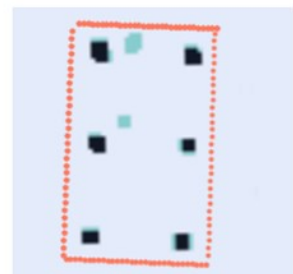


figure 4

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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 1.5m, 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.)

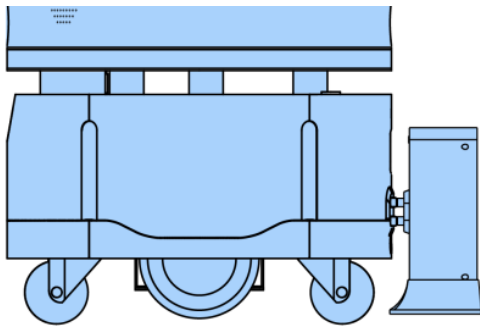
please make sure to build virtual walls.

The Step 5 [Position]

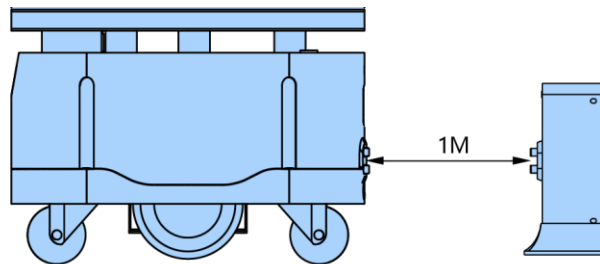
The function of calibrate location: provide reachable target points for business layer applications (Note: The calibrated position must be at least 50 cm away from surrounding obstacles and virtual walls; it must mark "charging_pile" on the map, and the machine must be turned on within 2m of the charging pile for subsequent use.)

Schematic diagram of charging pile calibration method:

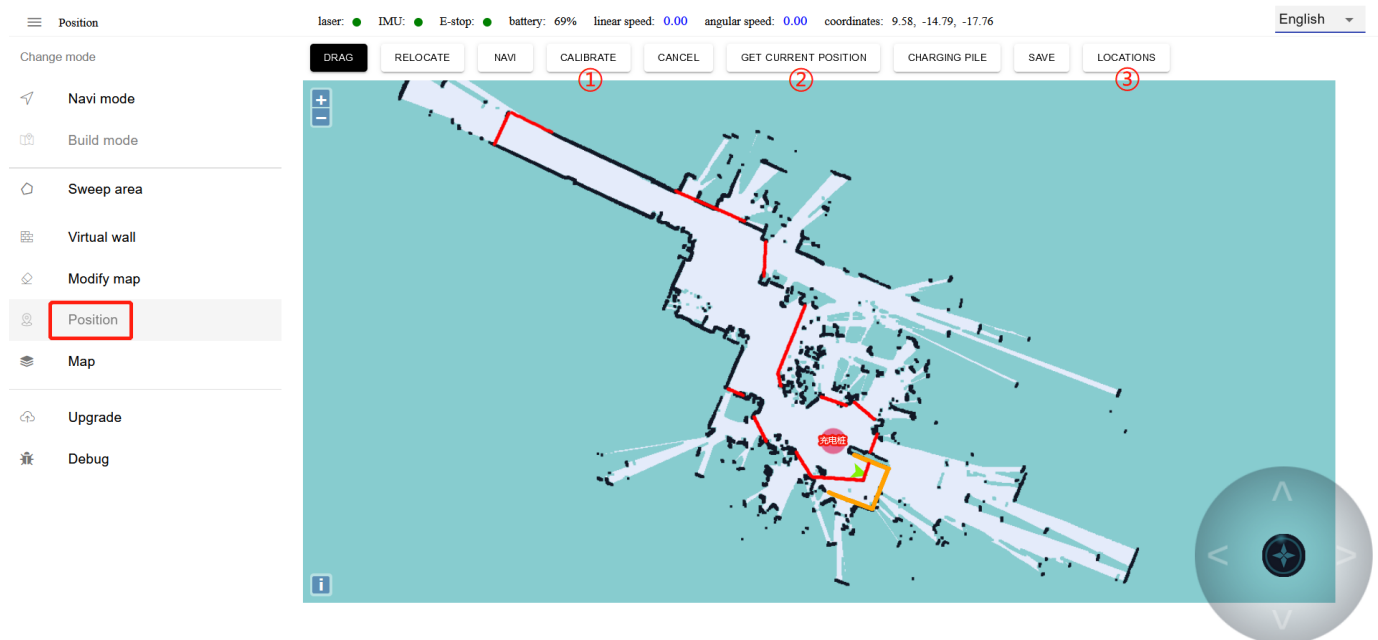
Method 1: First allow the machine to successfully dock with the charging pile, and then observe whether the current positioning of the machine on the map is correct (the orange laser and the black obstacle are completely overlapped, that is, the positioning is correct), and finally use the [Charging PILE] button to name the point, The name is fixed, click "YES".



Method 2: First move the machine so that the charging shrapnel of the machine is facing the position about 1m directly in front of the charging shrapnel of the charging pile, and then observe whether the current positioning of the machine on the map is correct (the orange laser and the black obstacle are completely overlapped, that is, the positioning is correct), and finally use the [GET CURRENT LOCATION] button to name the point.



(Note: It must be "charging_pile". If the naming is wrong, it will affect the automatic recharging of the machine)



① You can drag on the map to get the coordinates of the specified location

for calibration

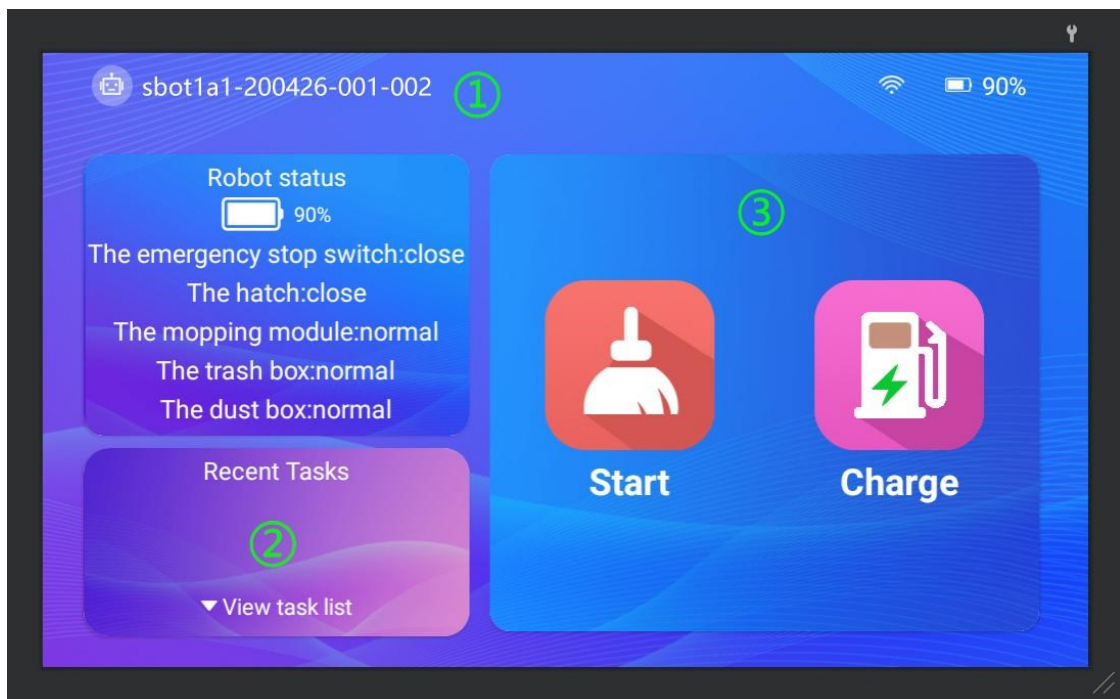
② You can also get the current position of the robot for calibration

③ Click on the right side to pop up the toolbar

D、 Perform cleaning tasks

Note: Before using this function, you need to deploy the map according to the previous steps

Open the "Clean Robot" APP on the Android screen and you will enter the following interface. The following figure shows the interface description:



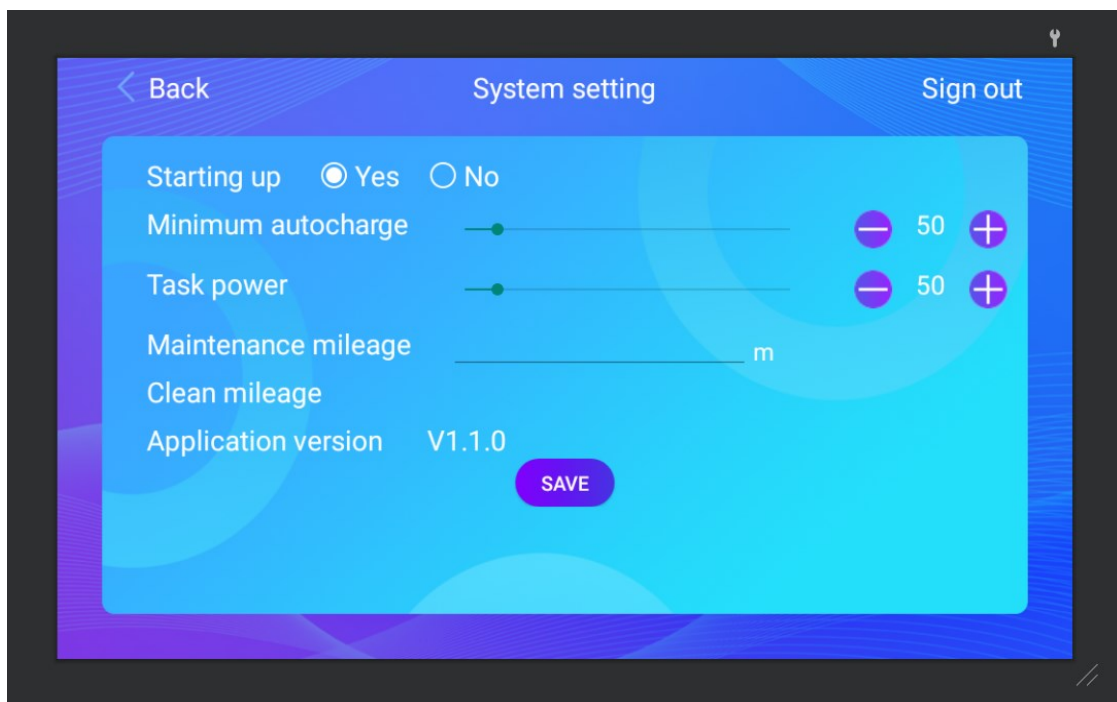
① Click the machine number to enter the "System Setting" interface

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② Click to enter the "sweep plan setting" interface

③ Click to start manual cleaning mode

1. System Settings



Starting up: Whether to start the application automatically when booting up

Minimum autocharge: when the power is lower than the set value, trigger

the robot to automatically recharge

Task power: When the robot triggers "automatic charging" during the

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execution of a task, the robot will return to charging. When the set "task

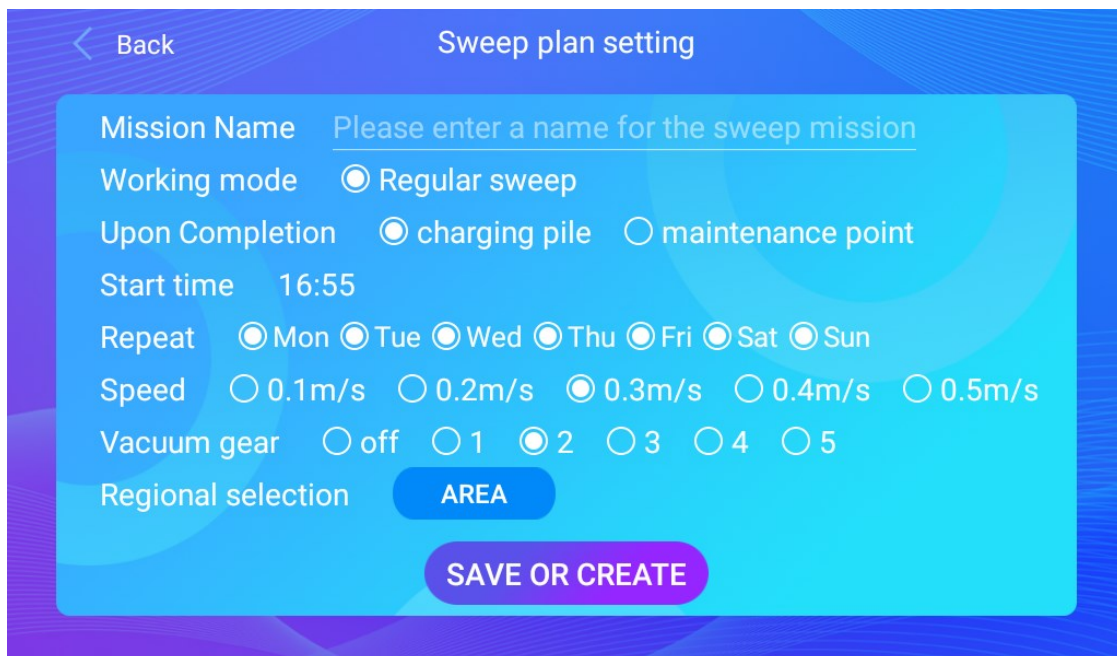
power" is reached, the robot will continue to perform unfinished tasks

Maintenance mileage: a prompt box will pop up when the robot reaches the

set maintenance mileage

Application version: the APP version currently in use

2. Sweep plan setting



Mission name : Give the plan a name

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Upon completion : After the work is completed, go back to the charging

station or the maintenance station (the maintenance station refers to the

cleaning point of the machine trash can)

Start time : The start time of the plan

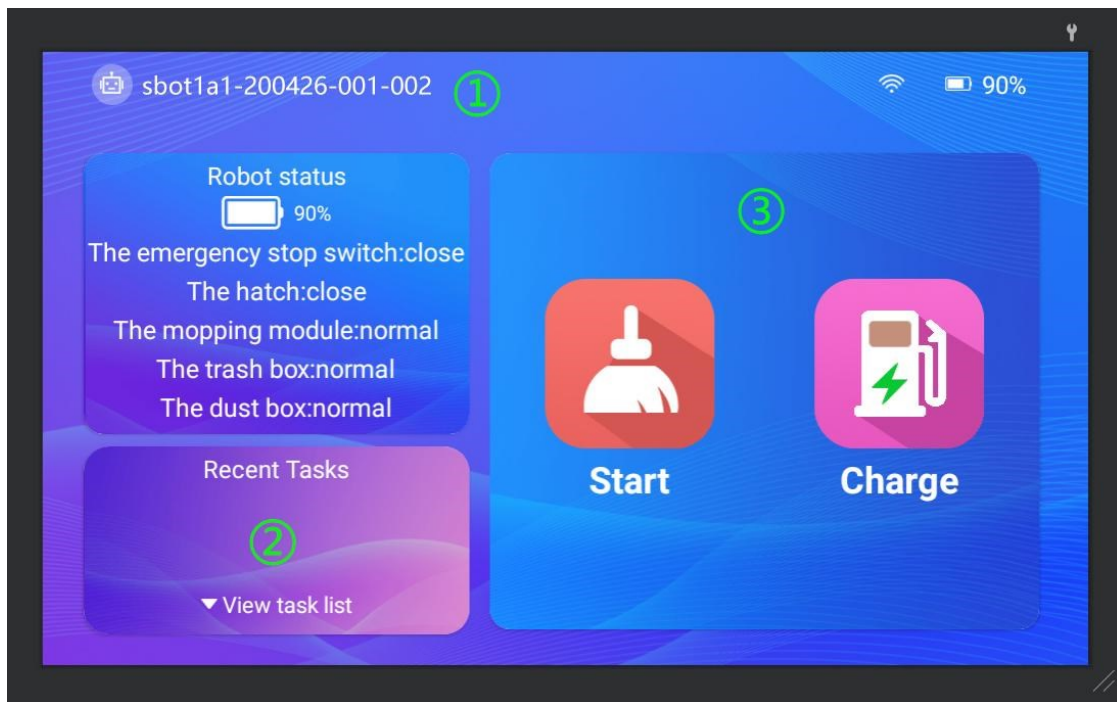
Speed : Driving speed

Vacuum gear : Vacuum cleaner gear adjustment

Regional selection : click to select the area to be cleaned

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3. Hand clean



Start : Click "Start " to pop up a cleaning area selection box, select the area to be cleaned and click OK to start cleaning

Charge: Click on "Charge" and the robot will immediately return to the charging station for charging

3、 Other functions explained

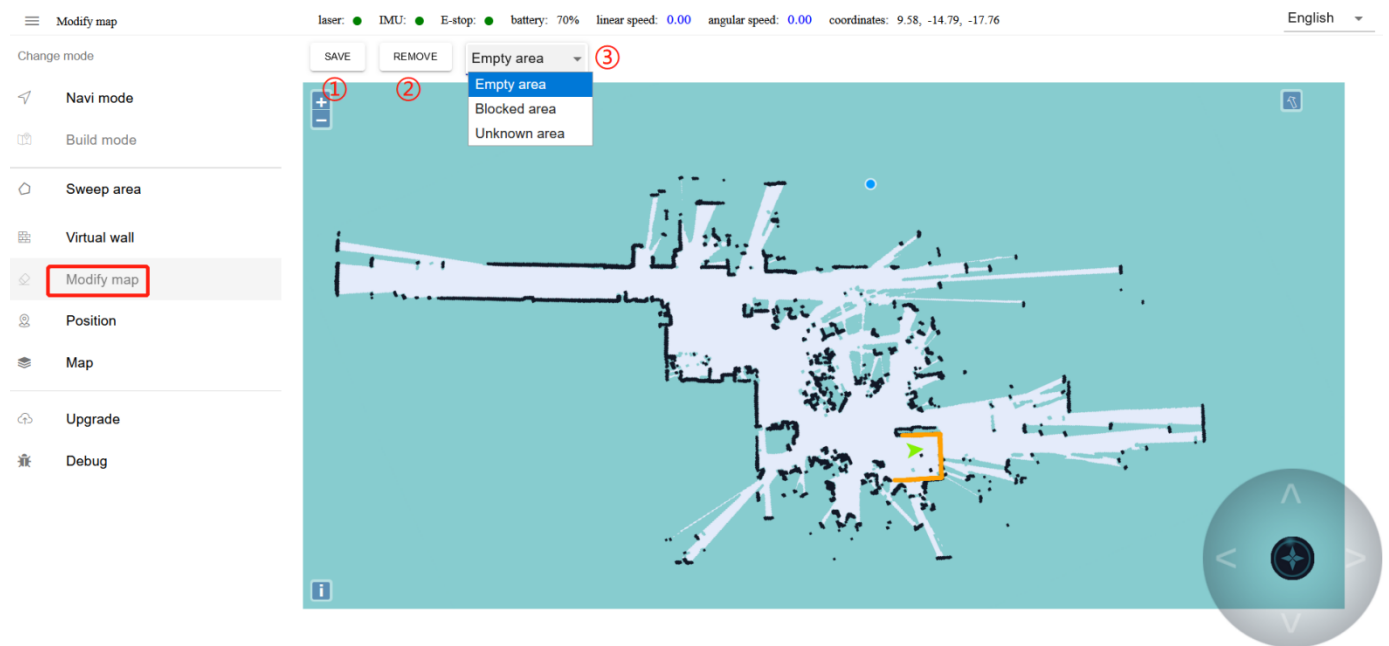
a [Modify map]

Note: Please skip it if there is no necessary to do this step

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

Modify premise: 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 modify function to modify the map properly.If the map is too different from the actual environment, it is recommended to scan again.

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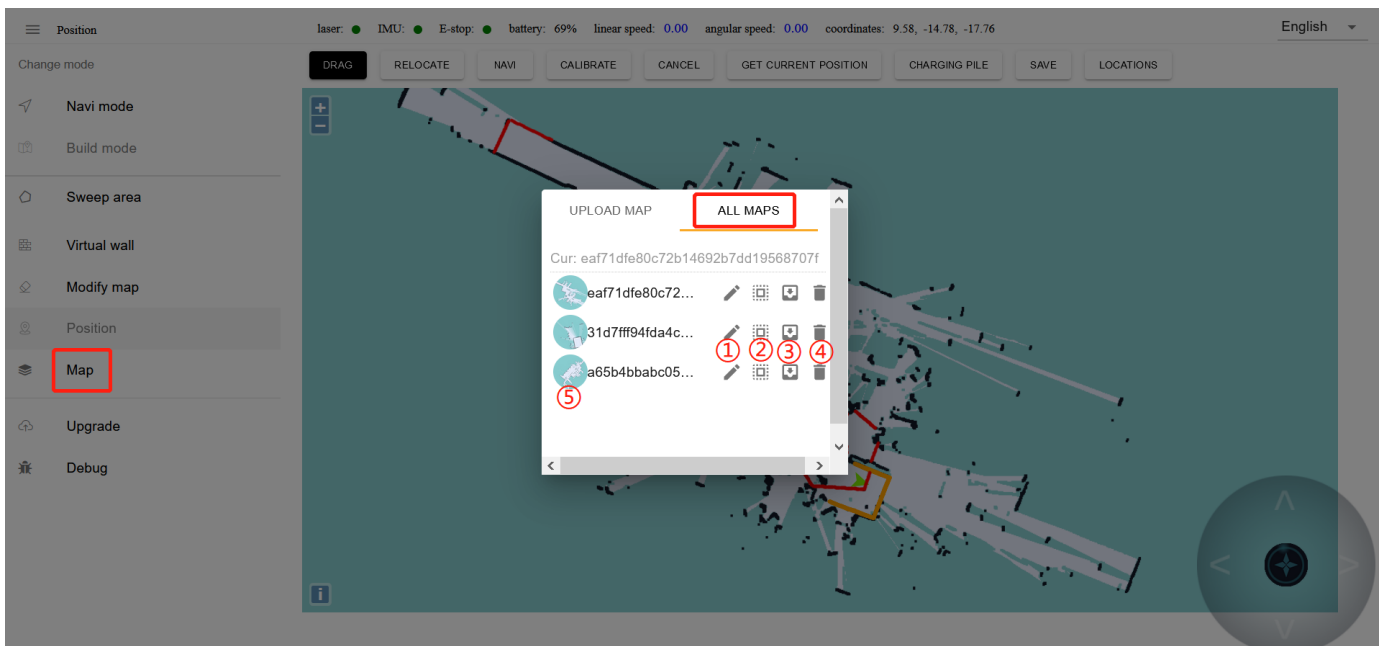
- ① Click "**SAVE**" to apply the map modification
- ② Clear "**REMOVE**" polygons
- ③ Here is the drop-down menu. You can select different amount map area types
 - "**Empty area**": Remove some temporary obstacles in the map(such as temporary people, etc.) during the process of scanning the map. Do not remove the real obstacles.
 - "**Blocked 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

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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.

b [Map]



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

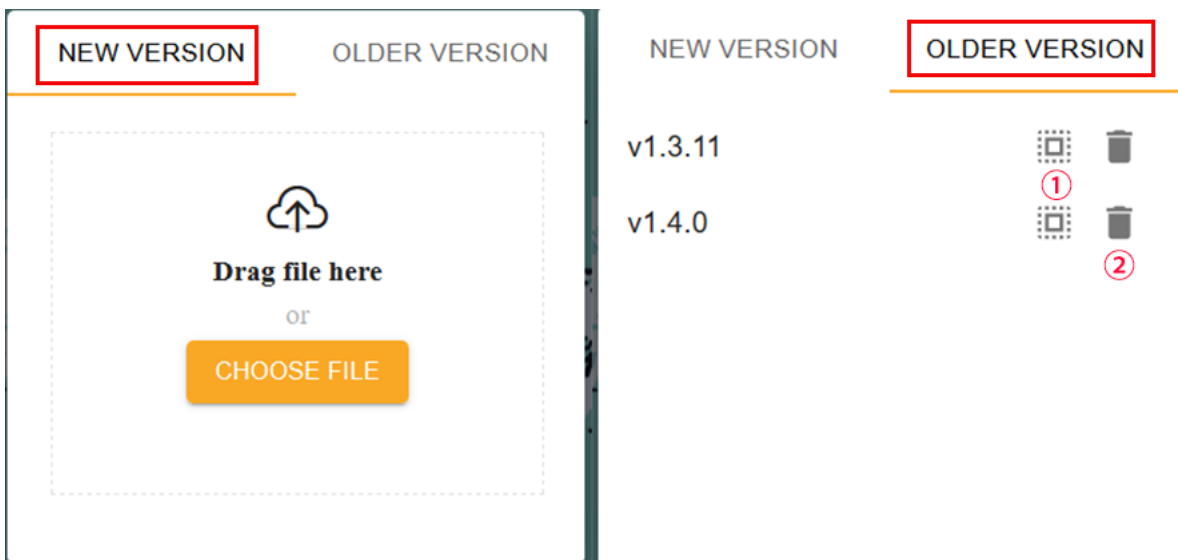
Note: The map will not be applied immediately after uploading, you need to

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find the row of the map in "All MAPS" and click the "Apply" icon

c [Upgrade]

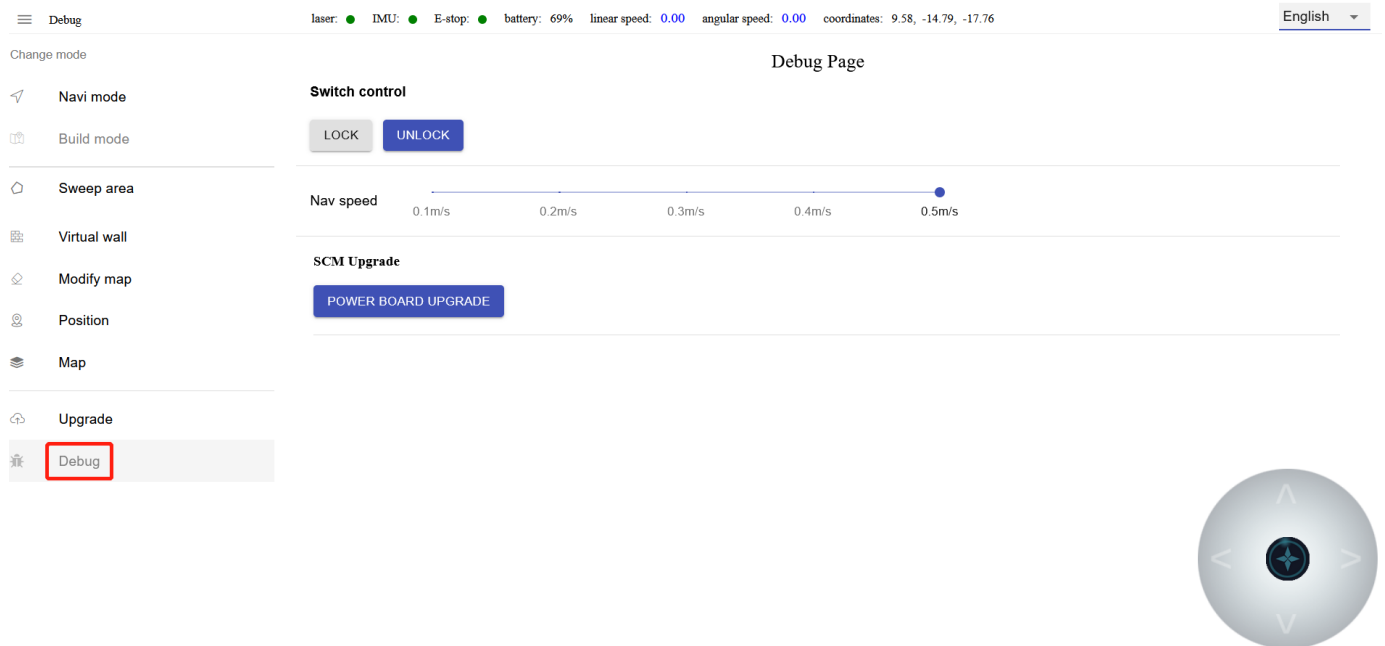
Tip: We will upgrade the machine to the latest version before leaving the factory. you can operate according to the following method If need to update the version later.



① Apply this version ② Delete this version

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d [Debug]

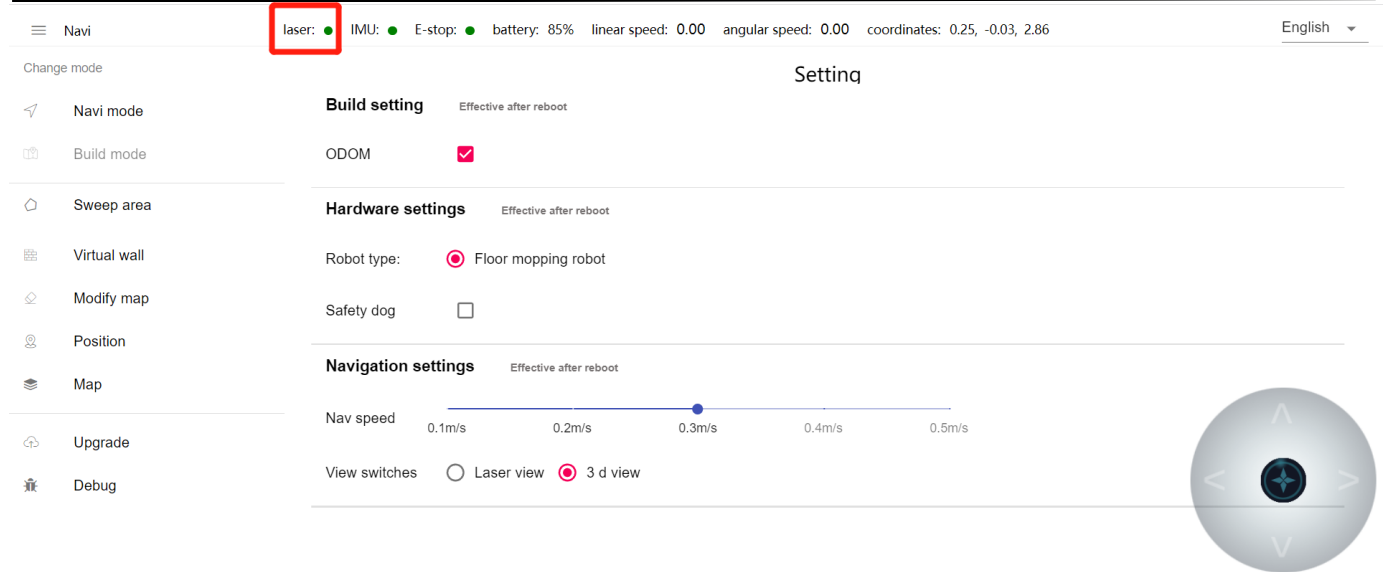


Navi speed: adjust the travel speed of the robot (m/s)

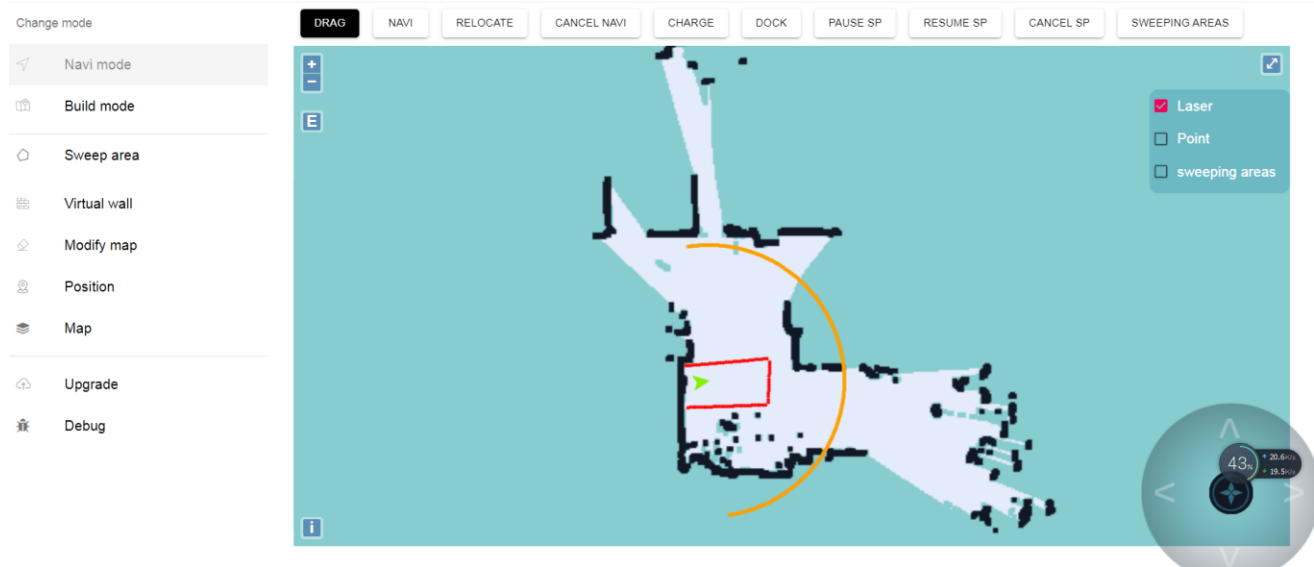
e [3D camera]

Function: Obstacle avoidance and anti drop function. When robot detecting that the front side is suspended in the air, the robot automatically start the anti drop function.

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Check whether the 3D camera is working normally: double-click the left mouse button "laser" to enter the setting interface. Select "3D View" in "View Switches" and return to the main page of the web page after selecting it. At this time, the map will display a semicircular yellow arc icon; when an object is recognized in 3D, you can see a yellow obstacle in front of the green icon on the map. The obstacle shows that the 3D camera is working normally.



4、 Daily maintenance of the robot

Each robot has a certain life span, and if improperly maintained during use, may shorten the life span and bring the bad influence on use experience. and even cause hardware damage. The following steps describes how to use and maintain cleaning robots in their daily work.

➤ **Open the top cover of the cleaning robot**

Open method: People standing in front of the right side of the robot are shown in the figure below. Pull the upper handle, the robot cover will automatically open.



1. **garbage mesh bag cleaning and installation**

Step 1: open the vacuum cleaner box to take out the mesh bag, and pour out

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the garbage

Open the top cover of the robot, pull open the vacuum suction box buckle, as shown in Figure ① below, remove the dust bag in Figure ②, and pour out the garbages

(the dust bag can be washed to dry for reuse)

Step 2: Install back mesh bag:

Put the mesh bag into

vacuum box and buckle the vacuum box snap, you can install back

Note: if the environmental garbage is too much, it is best to clean the dust bag once a day, to avoid too much garbage in it



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2. Water tank cleaning and installation

Step 1: Take out the water tank:
unscrew the tank cover ①, hold the water tank handle ②, lift up and take the tank.



Step 2: Water tank cleaning :

1. Pour out the dirty water from the water tank
2. Pour in clean water into the water tank
3. Clean the inner wall of the water tank with a hair brush and remove the sewage
4. Wash it out with clear water again



Step 3: Add water to tank:

Add clear water according to the outside water line of the water tank.



Step 4: Water tank installation:

Place the water tank in position, tighten the water tank cover.

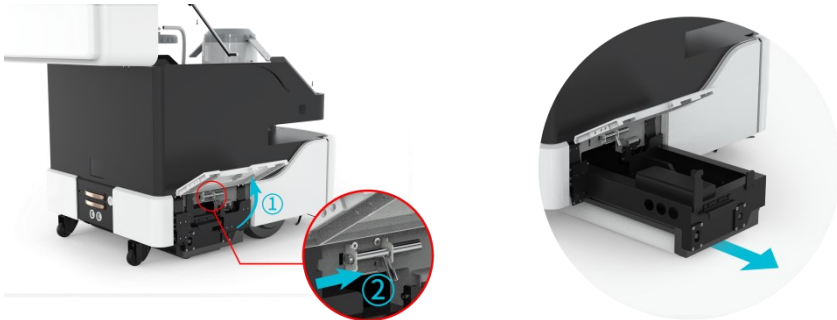
Note: The vacuum cleaner box and water tank should be cleaned regularly. When the robot reaches the setted level , the state will be reported, the vacuum cleaner box and water tank should be cleaned at this time.

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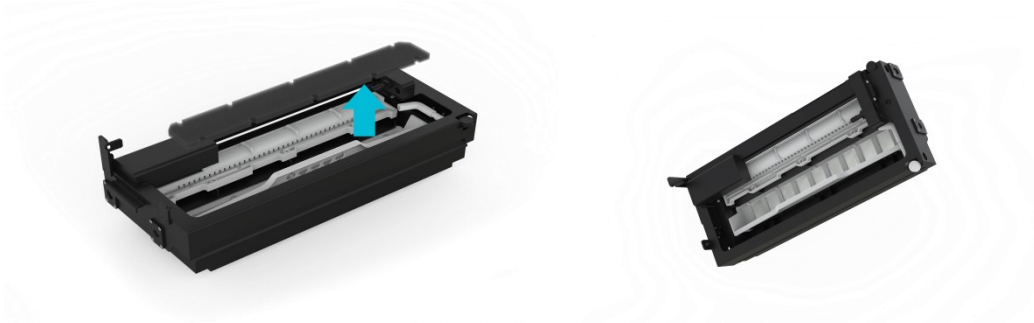
3. Mopping module cleaning and installation

Note: Press the emergency stop switch when taking the mopping module, and then take out mopping module

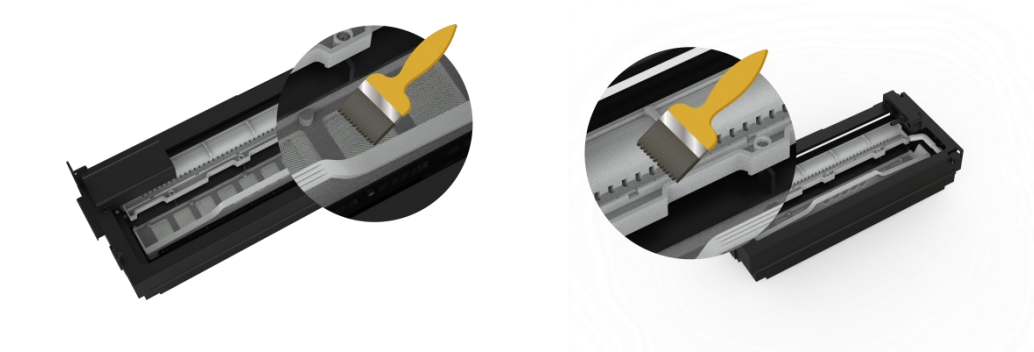
Step 1: Open the buckle ① and bolt ②, and take out mopping module



Step 2: Take out the filter box and filter foam in mop module, and clean the filter foam (clean with detergent)



Step 3: Clean the filter, clean the filter stains with a hair brush (please don't detergent, will corrode the metal filter)



Cleaning Robot Manual

Step 4: Clean the mopping module with a brush, Pour out sewage from the cleaning module (Note: Do not get the motor part wet)



Step 5: Pour out the residual sewage along this corner



Step 6: Put the filter cotton and filter box in the original position, install the mopping module, close the lock bolt, Just buckle it

