

GS-Ecobot Scrubber

50

OPERATIONS MANUAL



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INTRODUCTION

The Cleaning Robot Scrubber 50 by Gausium (alias "Gaussian Robotics"), Singapore, is a fully autonomous cleaning robot that can automatically charge, dispense, and refill all by itself.

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1. GENERAL

1.1. Product Overview

Scrubber 50 Pro is an AI-powered floor-cleaning robot that goes beyond the scope of “automation”. Deep-learning algorithms are integrated within a sensor fusion of 2D LiDAR, 3D, and RGB cameras, which grant the robot high-accuracy environmental perception and the ability to make advanced operation decisions according to the real-time situation.

**NOTE:**

- Additional requirements shall be specified in the Appendixes to this document which form an integral part thereof.

1.2. Product Introduction

Scrubber 50 Pro is an AI-powered floor-cleaning robot that goes beyond the scope of “automation”. Deep-learning algorithms are integrated within a sensor fusion of 2D LiDAR, 3D, and RGB cameras, which grant the robot high-accuracy environmental perception and the ability to make advanced operation decisions according to the real-time situation.

**Minimal Human Intervention**

Scrubber 50 cleans on schedule, requiring no human intervention in its cleaning operations.

Fleet Management System

Operators can monitor the Scrubber 50's performance and access cleaning reports through a user-friendly and interactive dashboard.

Zone Cleaning

Scrubber 50 can be deployed into pre-selected areas for zone cleaning. Lift integration is an option that allows the robot to clean multiple levels of a building autonomously.

Integrated Working Station

Automatically docks itself, charges the batteries, empties, and rinses the dirty water tank. It also automatically refills the clean water tank so that it is ready for its next cleaning task.

1.3. Component Checklist



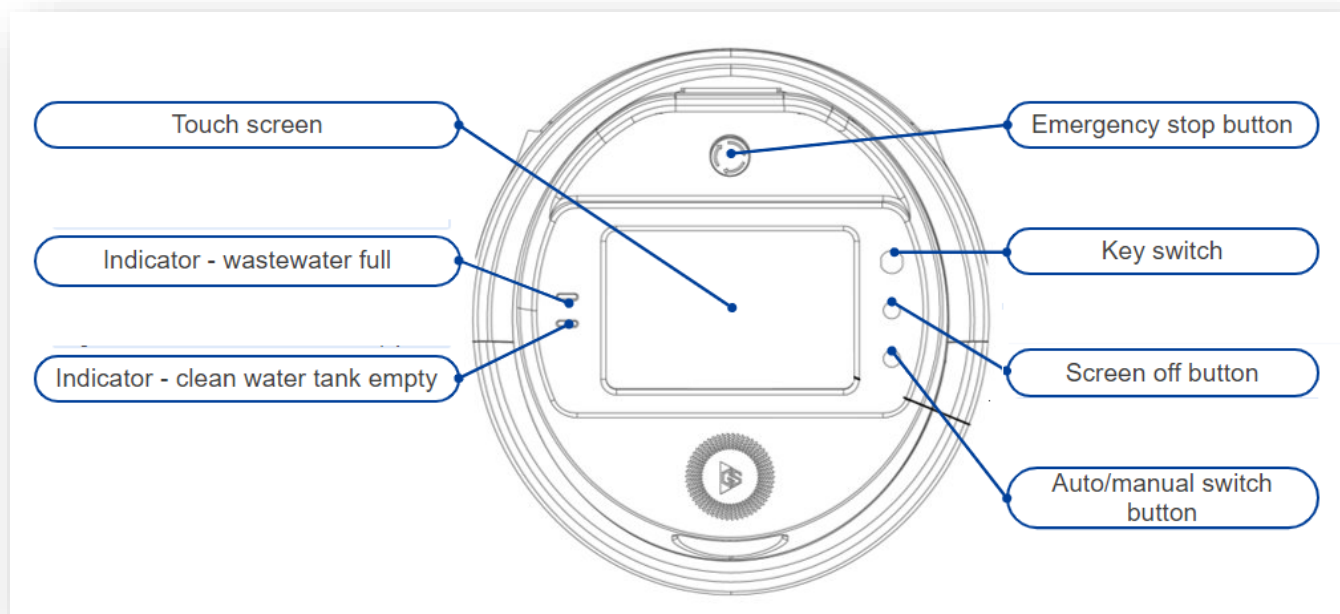
| Name | Description |
|-------------------|--|
| Front Cameras | Obstacle avoidance and obtaining real-time colored pictures. |
| Tile Camera | Obstacle avoidance and obtaining real-time colored pictures. |
| Horizontal Camera | Obstacle avoidance and obtaining real-time colored pictures. |
| Bumper | Buffer from a crash, avoiding secondary damage. |



| Name | Description |
|----------------------|--|
| Ultrasonic Radar | Detect obstacles in the back and avoid them. |
| Manual Charging Port | For manual charging the robot. |



| Name | Description |
|-------------------------------|--|
| Push-handrail | Push the robot to move |
| Water inlet - auto water-fill | Fill the water tank with clean water. |
| Wastewater drainage pipe | Drain wastewater |
| Charging port | Contact with workstation for auto charging |



| Name | Description |
|------------------------------------|--|
| Touch screen | Robot operation and configuration。 |
| Indicator - wastewater tank full | Light ON when the wastewater tank is full. |
| Indicator - clean water tank empty | Light ON when the clean water tank is empty. |
| Emergency STOP button | To stop the robot immediately after pressing it. |
| Key switch | Turn the robot ON/OFF. |
| Screen OFF button | Press the button to turn the display OFF. |
| Auto/manual switch button | Long press it for 3 seconds to do the mode switch. |

1.4. Technical Specification

| Parameter Type | Parameter | Value |
|-------------------------------|--|---|
| ROBOTICS | Navigation Technology | Integrated Lidar-Visual SLAM |
| | 3D LIDAR | No |
| | Primary Laser detection distance | 25 m |
| | Laser scanning angle | 270° |
| | Secondary Laser detection distance (level) | No |
| | Secondary Laser detection distance (inclined) | No |
| | Depth Cameras | 3* Real sense camera |
| | Ultrasonic Sensors | Yes |
| | Anti-drop Sensor | by using an inclined laser |
| | Collision sensor | Yes |
| | Mapping Process | Easy onsite mapping (off-line, on-screen) |
| | Mapping Efficiency (e.g., 3,000 sqm) | 1 hour |
| | Map Editing | On-site, Off-line, On-Screen |
| | Single map coverage | Max. 30,000 m ² |
| | Dynamic Map updating | Yes, a maximum of 30% |
| | Minimum distance close to the wall | 7-10 cm |
| | Ability to detect thin poles and hanging obstacles | Able |
| | Dynamic path planning | Yes |
| | Obstacle avoidance strategy | slow down-stop-wait-bypass-replan path |
| | Start the task anywhere on the map | Yes |
| | Continue the previous task after interrupting/switching to manual mode | Continue from where it stopped |
| | Ability to work in complicated and dynamic scenes | Able |
| | Can detect obstacles higher than N cm | 10 cm |
| SOFTWARE & DIGITAL | Cloud Platform to check the statistics and monitor | Yes |
| | Task Reports and Alerts | Auto-generated and comprehensive email |
| | Mobile App | Yes |
| | Account with different access levels | Yes |
| | Scheduling function | Yes |
| | OTA | Yes |
| | Ability to work offline | Yes |

| | | |
|----------------------------------|--|------------------------------|
| CLEANING PERFORMANCE | Manual mode | Yes, Push behind |
| | Adjustable cleaning mode | Yes |
| | Working width | 50 cm |
| | Water absorption width | 72 cm |
| | Disc Brush RPM | 270 |
| | Cleaning down-pressure | 12,5/15 kg |
| | Number of main brushes | 2 pcs |
| | Optional Rolling brush | Yes |
| | Clean Water Tank Capacity | 24 l |
| | Recovery Tank Capacity | 18 l |
| | Filtration function | 4-stage filtration system |
| | Cleaning speed | 1.1 m/s |
| | Charging time | 1-2 hours |
| | Is employed Operation time | 2.5 hours |
| | Cleaning efficiency | 800-1200m ² /h |
| | Max. cleaning area/Charge | 2,000 m ² |
| KEY COMPONENTS AND OTHERS | Battery capacity | 24V / 40Ah Li-ion |
| | The weight of the body (including the battery) | 150 kg |
| | Warning lights | Yes |
| | Dimensions (mm) | 860 (L) X 700 (W) X 1030 (H) |

1.5. Structural Parameters

| Parameter | Value | Remarks |
|-----------------------|--|---|
| Length | 0.86 m | |
| Width | 0.70 m | |
| Height | 1.03 m | |
| GVW | Disc brush: 150kg Roller brush: 140kg | It indicates the weight of the scrubber in a no-load state, that is, the state in which both the freshwater tank and the recovery tank are empty. The weight includes the battery weight. |
| Transportation Weight | Disc brush: 150kg Roller brush: 140kg | |
| Battery weight | 15 kg | |
| Water tank capacity | 42 L | Recovery Tank: 18L Clean Water Tank: 24L |
| Vibration | ah ≤ 2.5 m/s ² | |
| Noise | LpA ≤ 70dB(A) | |

LwA ≤82dB(A)

1.5.1. Electrical Parameters

| Parameter | Value |
|--|--|
| Battery type | Lithium-ion battery |
| Maximum operating time | <ul style="list-style-type: none"> ➤ Floor washing mode: 2h ➤ Dust pushing mode: 6h ➤ Standby mode: 16h (Equipped with Charging Dock to realize unlimited endurance.) |
| Maximum power | 1200W |
| Rated voltage | 24 V |
| Rated power of drive motor | 300 W |
| Rated power of brush motor | 2 X 150 W |
| The rotational speed of the roller brush | Up to 270 RPM |
| The rotational speed of the disk brush | Up to 1000 RPM |
| Rated power of pumping motor | 280 W |
| Maximum pumping pressure | 18 kPa |

| | Frequency band | Maximum output power |
|------------|---------------------------|----------------------|
| 2.4G Wi-Fi | 2400-2483.5MHz | EIRP=18.01dBm |
| 433MHz | 433.03-434.79MHz | EIRP=9.35dBm |
| 4G | LTE Band 1/3/7/8/20/28/40 | EIRP=32.5dBm |

| Charging Dock | Value |
|---|--|
| Input: <ul style="list-style-type: none"> ➤ 100-240V~ ➤ 50-60Hz ➤ 8.1A | Output: <ul style="list-style-type: none"> ➤ 23A |
| Battery Charge | IC0650-024 |
| Input: <ul style="list-style-type: none"> ➤ 100-240V~ ➤ 50-60Hz ➤ 720W | Output: <ul style="list-style-type: none"> ➤ 24V ➤ 27, 1A ➤ 650 W |

1.5.2. Cleaning Parameters

| Parameter | Value |
|----------------|----------------------|
| Cleaning width | 460mm (Roller brush) |

| | |
|---------------------|--|
| | 500mm(Disc brush) |
| Cleaning efficiency | Up to 1656 m ² /h |
| Safety system | <ul style="list-style-type: none"> ➤ Laser radar*1 ➤ depth camera*3 ➤ ultrasonic sensor*6 ➤ fender wheel ➤ anti-collision sensor ➤ foot guard sensor |
| Traveling speed | 0-1 m/s |

1.5.3. Atomization Disinfection Parameters

| Parameter | Value |
|-----------------------------------|--|
| Quantity of Atomization Cartridge | 8 PCS |
| Min. Atomization Rate | 1.5L/h |
| Max. Atomization Rate | 1.8L/h |
| Battery Life | 6h-Disinfection Mode 3h-Scrub & Disinfection Mode |
| Atomization Particles | 1~5μm |
| Atomization Distance | 1m |
| Atomizer Gasket Life Span | ≥5000h |
| Recommended Disinfectant | Hypochlorous Acid |
| Requirement of Water Quality | Purified Water/Distilled Water |
| Disinfectant PH Value | 4~12 |
| Water Tank Capacity | 5L (Water Added Shall Not Exceed 3L) |

1.5.4. Other Specifications

| Parameter | Value |
|-----------------------|--|
| Operating Temperature | 0°C ~ +45°C |
| Operating Humidity | 20% ~ 75% RH |
| Storage Temperature | -20°C ~ +45°C (Note: if it is necessary to store at a low temperature (lower than 0°C), the water tank and all water pipes shall be drained to ensure the storage without water.) |
| Storage Humidity | 20% ~ 93% RH |
| Operation Noise | 55 ~ 70 dB(a) |
| Operating Slope | Less than 8 degrees (Note: The scrubber is not recommended to climb a slope under the automatic mode. It can climb a slope ≤8 degrees when it is pushed manually.) |

2. SAFETY INSTRUCTIONS

For safety reasons, please operate Scrubber 50 (Sprayer) as per the following provisions:

1. Do not operate the scrubber:

- ✓ until you have received formal training or authorization
- ✓ until have carefully read and fully understand the user manual
- ✓ if you are drunk or unconscious under the influence of drugs
- ✓ if you are not physically and mentally able to operate the scrubber according to the user manual
- ✓ if no filter is installed or the filter is blocked
- ✓ if the scrubber is under conditions not suitable for work, such as charging, filling, or draining the water tanks
- ✓ if the accessories or consumables installed are not authorized by AROS as risks may arise if unauthorized consumables or accessories are installed
- ✓ if the environment in which the scrubber is placed is not suitable for operation. For example, the material of the ground does not meet the requirements, the state of the ground does not meet the cleaning standards, or objects may fall from a high altitude.
- ✓ This machine is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge.
- ✓ Children should be supervised to ensure that they do not play with the appliance. Cleaning and user maintenance shall not be done by children without supervision.
- ✓ Do not use this machine at altitudes exceeding 2 000 m.

2. Before starting up the scrubber, make sure:

- ✓ the scrubber has been charged
- ✓ all parts of the scrubber are kept in good conditions
- ✓ the water tank level meets the requirements
- ✓ the emergency stop button is released
- ✓ there is no abnormal warning.

3. In the process of manual operation:

- ✓ raise the brush and squeegee blade of the scrubber
- ✓ when adding water, please pay attention not to exceed the floating ball on the top of the water tank to prevent the robot from entering the water and causing failure
- ✓ when moving the machine manually, pay attention to the remainder of the full sewage. When prompted, please stop cleaning, and discharge the sewage
- ✓ move and operate the scrubber in strict accordance with the user manual
- ✓ press the red emergency stop button to stop the scrubber in case of emergency
- ✓ on a slope (≤ 8 degrees), at least two people are required to move the machine in cooperation to avoid danger

- ✓ operate the scrubber at a slower speed if the ground is slippery
- ✓ check the rear of the machine is safe when moving the scrubber backward
- ✓ report for repair in time when the scrubber is faulty.

4. When the cleaning task is finished:

- ✓ cut off the power completely unless it is charging
- ✓ drain the recovery tank and clean the filters effectively
- ✓ clean the water tanks regularly
- ✓ park the machine at the designated location, the parking area must be flat ground.

5. When maintaining the scrubber, please make sure the power is cut off:

- ✓ use accessories and consumables specified by the manufacturer for replacement
- ✓ do not disassemble the scrubber without permission. If it needs maintenance, please contact professional maintenance personnel designated by the manufacturer
- ✓ do not change the original design or configuration of the scrubber without authorization.

6. Manual duty during robot operation:

- ✓ when the robot performs cleaning tasks, the operator does not need to accompany or follow the robot all the time. However, some designated staff should be ready to receive any warning messages from the robot to deal with some potential problems. It is required that this role should be trained through AROS so that the staff in this role can know how to deal with any potential problems.



WARNING:

- The machine must be disconnected from its power source during cleaning or maintenance and when replacing parts or converting the machine to another function.


2.1. Description of Non-applicable Scenarios

Scrubber 50 (Sprayer) is only suitable for working in standard-compliant scenarios. To maximize the efficiency of the Scrubber 50 (Sprayer) and ensure it is functioning well, please do not use the product on non-applicable grounds, such as on soil surfaces, grassland, artificial turf, and carpeted floors. Also, do not use the product in scenes with poor ground conditions, such as uneven floors, floors with holes, leaves, paper scraps, and others. Please clean the floor first and then the Scrubber 50 (Sprayer) can be used to start cleaning.

The sensors of Scrubber 50 (Sprayer) will not function properly if the floor is surrounded by glass walls or other high-transparency materials. Therefore, we do not recommend Scrubber 50 (Sprayer) to be used in the above environments to avoid unnecessary dangers.

If the floor is on a slope with an angle greater than 8 degrees, please do not use the scrubber. Scrubber 50 (Sprayer) can only automatically work on flat floors.



If you are not sure whether the scrubber can be used in your scenario, please contact AROS Technical Support for more information.

| | |
|---|---|
|  | <p>WARNING:</p> <ul style="list-style-type: none"> Do not use for cleaning purposes on surfaces having a gradient exceeding that marked on the machine. |
|---|---|

To satisfy RF exposure requirements, a separation distance of 20cm or more should be maintained between this device and persons during device operation.

2.2. Usage Precautions

- ✓ Do not pour liquid into the battery connector; otherwise, it will cause a short circuit.
- ✓ If there is a place or object less than 10cm from the ground in the working environment of the robot, please remove or draw a virtual wall to isolate it.
- ✓ It is recommended that after a single continuous use of the machine for 3 hours, let the machine stop moving and get enough rest to ensure the best work effect. Long-term use will affect the overall life of the machine.
- ✓ The scrubber is not waterproof, so it is prohibited to directly splash water on the machine or wash the machine.
- ✓ Please charge the scrubber in time after the cleaning task is finished.
- ✓ The cleaning effect of warm water is better. If warm water is used for cleaning, please note that the water temperature should not be higher than 70 °C, otherwise, it will cause irreversible damage to the filter element.
- ✓ Machines left unattended shall be secured against unintentional movement.

| | |
|---|--|
|  | <p>WARNING:</p> <ul style="list-style-type: none"> Always ensure that the safety support is installed before working beneath the hopper. Operators shall be adequately instructed on the use of these machines. |
|  | <p>CAUTION:</p> <ul style="list-style-type: none"> This machine is for indoor use only. This machine shall be stored indoors only. |

2.3. Machine Transport

If you need to transport the scrubber to other places, please pay attention to the following:

1. Ensure that the scrubber is powered off.
2. To reduce weight and avoid spilling or leakage during transport, please be sure to empty the water tanks before transporting the scrubber.
3. Before packing, please wrap the important sensors, such as the LiDAR sensor and camera, and the cover of Scrubber 50 (Sprayer) with a sponge, to avoid scratches and bruises that may affect their functions.
4. If the scrubber is to be transported by vehicle, please pack and protect the scrubber with the packing strap, carton, wooden pallet, sponge, etc. to avoid unnecessary damage that may happen during transportation. Place a wooden board between the front and rear wheels to avoid damage caused by excessive inertia during transport. When fixing the scrubber with packing straps, do not directly touch the surface of the scrubber to avoid rubbing off the paint and affecting the appearance. Angle boards or other soft materials can be used to protect the product.
5. When loading and unloading the robot, please do not move the machine lying flat.

2.4. Machine Storage

After each use of the scrubber, please empty the water tanks of the scrubber in time and park the scrubber in a dry and ventilated place with a proper temperature and humidity. Do not store the scrubber in a humid and unventilated place to avoid its service life from being affected.

When you do not use the scrubber for a long time, in addition to meeting the above requirements, please fully charge the battery and unplug the power supply plug. After that, be sure to charge it every 1 month to ensure sufficient power to avoid long-term non-use of the battery. If the machine is used without unpacking (and the air switch is turned off), it must be fully charged once every 3 months.

2.5. Anti-freezing Protection

If the scrubber is used in areas or seasons in which frost may occur, the scrubber shall be protected from being damaged.

When the scrubber is not working, the water tanks must be emptied in time, to avoid freezing or cracking of the water pipe. The scrubber shall be stored in a dry and warm place.

2.6. Maintenance Precautions

It is prohibited to dismantle the scrubber without authorization. Once found, users will no longer have the services in the warranty policy.

If the scrubber cannot work properly and the problem cannot be solved by routine troubleshooting, please contact local distributors or Gaussian Robotics' technical support team in time for warranty issues.

2.7. Safety Tips

The following figure shows the scrubber components that need to be noticed and the corresponding safety tips. Please fully understand the following matters before use.

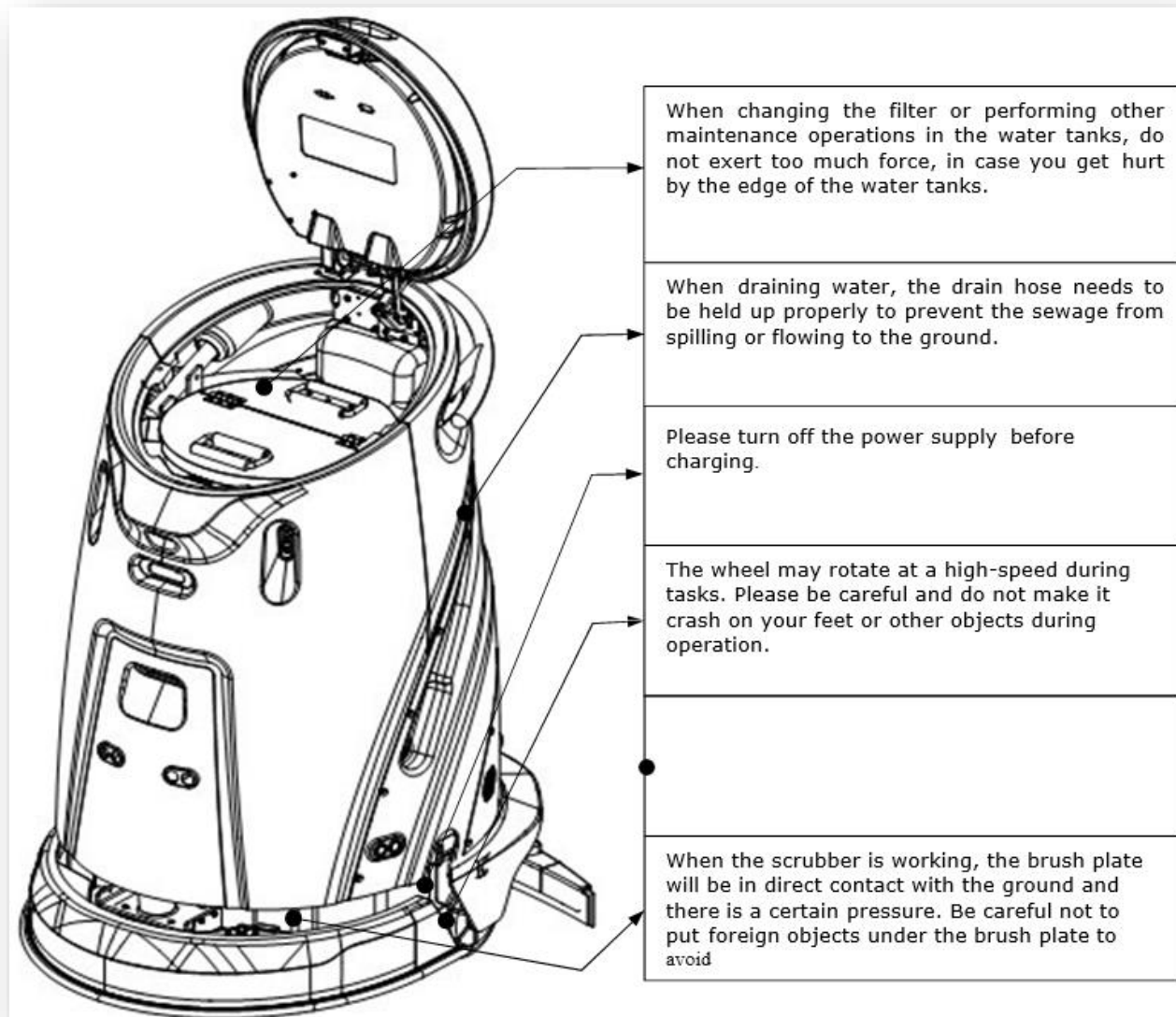








Figure: Safety Tips for Scrubber 50 (Sprayer)

2.8. Safety Signs

The table below displays the safety signs of Vacuum 50. Please refer to it and comply with safety specifications to avoid dangers. If the robot vacuum is not operated according to the warning, you shall bear the losses and risks brought to your company or individual.

| Safety Sign | Description |
|---|--|
|  WATCH YOUR HAND | Watch your hand: Do not put your hand in the place where the sign is attached to avoid dangers. |
|  WARNING AUTOMATIC START-UP | The robot is automatic and intelligent. Please stay away from it before it automatically starts to work. |
|  NO PUSHING | Pushing the robot manually is prohibited. It is only allowed to move the robot manually during task operation. |
|  WARNING NO STEPPING ON SURFACE | It is prohibited to step on any part or surface of the robot to avoid dangers. |
|  WARNING PLEASE PARK THE MACHINE AT FLAT PLACE AFTER POWER OFF | This robot must be stored on flat ground. |
|  8 % | The max climbing angle is 8 degrees. |

3. OPERATION INSTRUCTIONS

The content of this chapter is for the person who directly operates the Scrubber 50 (Sprayer) cleaning robot or manages the Scrubber. People who directly operate the Scrubber 50 (Sprayer) need to know how to control the scrubber movement, perform cleaning tasks, add water to the clean water tank, drain the sewage tank, and charge. The management staff of Scrubber 50 (Sprayer) needs to understand the above information. Furthermore, you also need to understand how to create a map, create a cleaning path, deploy cleaning tasks, view the task report of the scrubber cleaning task, and view a series of advanced operations such as the health status of the scrubber. The above operations will be introduced in the sequence below.

3.1. Starting and Moving the Scrubber

1. Scrubber 50 (Sprayer) cleaning robot is small in size and can be moved by hand when it is shut down.
2. The auto mode of Scrubber 50 (Sprayer) is enabled by default after the scrubber is started. In auto mode, the scrubber cannot be moved manually or pushed forcefully to avoid damage to the motor.
3. Press and hold the manual/automatic button for 3 seconds, then the scrubber is switched to manual mode.

3.2. Adding Water

When the empty-tank indicator of the freshwater tank turns red, it means that the water in the freshwater tank has not been added or has been used up. If the ground cleaning work needs to be continued, please add fresh water.

**NOTE:**

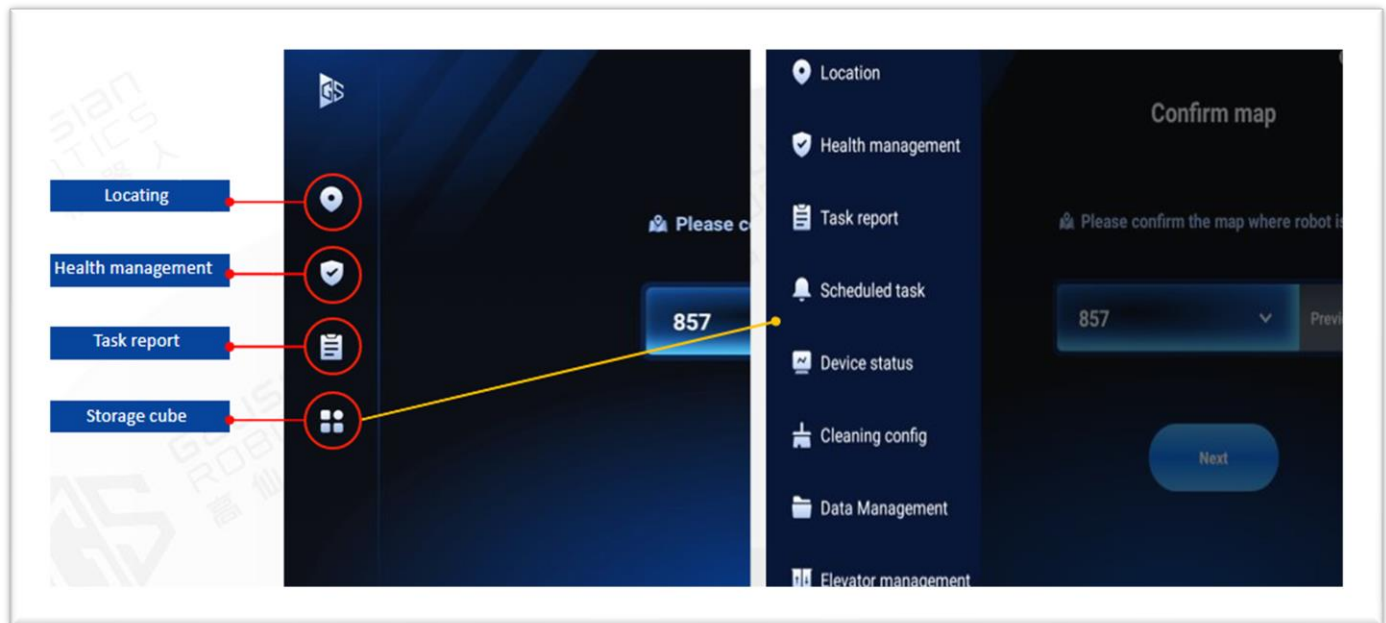
- Before adding water, please control and move the scrubber to the designated location. Ensure that the scrubber is parked on the flat ground and the start-up key is inserted into the start-up keyhole on the control panel and turned from On to Off to turn off the power.

1. Please open the upper cover of the scrubber, and then open the tank cover of the freshwater tank.
2. Put the water hose into the freshwater tank, turn on the switch or tap to start adding clean water into the freshwater tank, and stop adding water when the water reaches 90% or the float above the clean water tank floats.
3. After filling, remove the water hose, cover the water tank cover and the upper cover plate, and ensure that the water tank cover is pressed tightly, then move the scrubber to the area to be cleaned and start the operation.

3.3. Function Bar

There are 4 buttons on the left column:

- [Locating](#),
- [Health management](#),
- [Task report](#), and
- [Storage cube](#) (clicking the “cube” will pop up other function buttons).

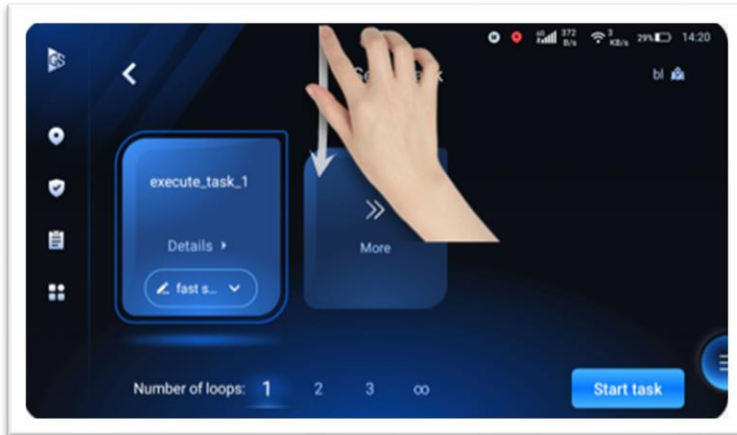


There are 11 options in the Storage cube:

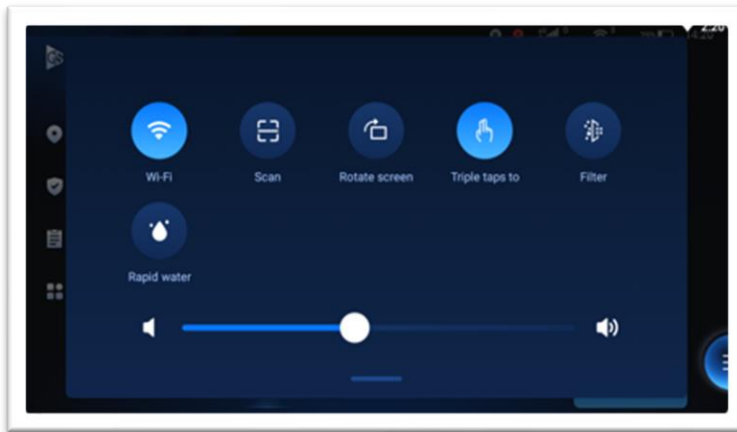
- [Location](#)
- [Health management](#)
- [Task report](#)
- [Scheduled task](#)
- [Device status](#)
- [Cleaning configuration](#)
- [Data management](#)
- [Elevator control management](#)
- [System setting](#)
- [Network management](#)
- [Logout](#)
- [Login](#).

3.4. Pull-Down Menu

1. In the interface, slide your finger from top to bottom to display the “**pull-down menu bar**”.



2. There are 7 functions available:



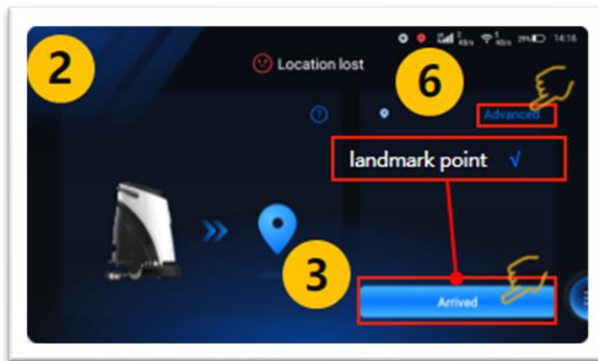
1. **Wi-Fi**: Button to connect to Wi-Fi.
2. **Scan**: Open by default, scan the QR code to locate and trigger tasks.
3. **Rotate screen**: Flip the APP display orientation (180°).
4. **Triple taps to**: On by default, 3 consecutive taps on the screen during a task can pause the task.
5. **Filter**: On by default, whether to enable the filtering function.
6. **Rapid water**: Off by default; after opening, the water spray function can be activated independently.
7. **Speaker**: speaker volume.

3.5. Robot Locating

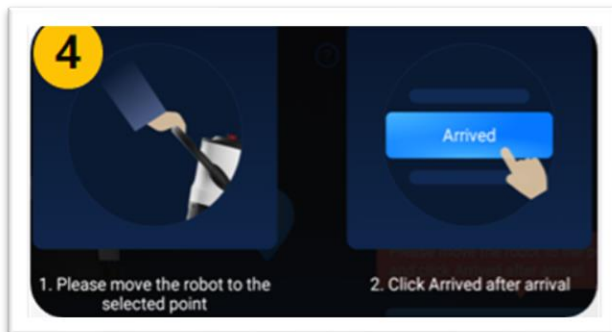
1. Click the “**Locating**” button.



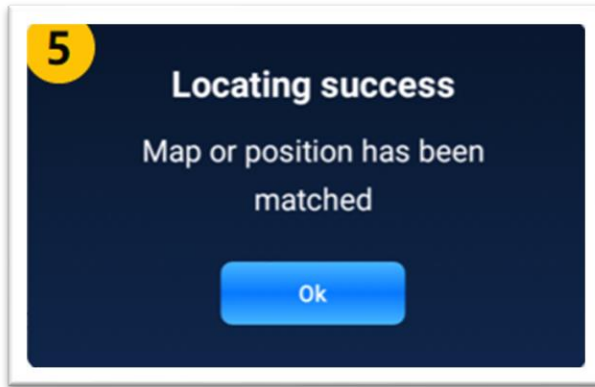
2. Move the machine within 2 meters of the locating point.



3. Select the locating point and click “**Arrived.**”



4. The robot will turn 360 degrees in place or stay still.



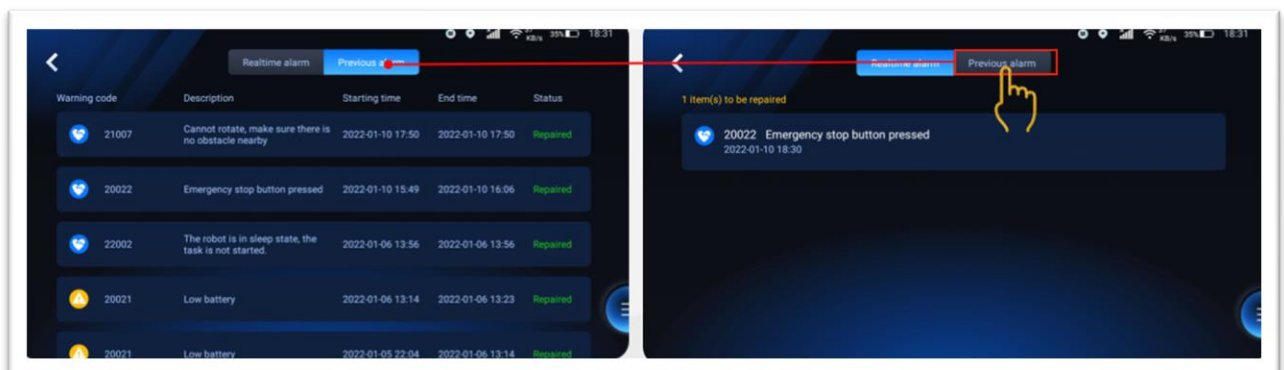
5. After the locating succeeded, a window pops up with a voice message. The sequence is 12345.
6. You can also click "**Advanced**," move the cursor to the current position of the machine and click "**OK**".
7. The robot will turn 360 degrees or stand still, and a window will pop up with a voice message when positioning succeeds. The sequence is 12678.

3.6. Health Management

1. Click the "**Health Management**" button.



2. Switch the screen to the Health Management interface. Alarms are displayed here.



3. You can see the error code, descriptions, reporting time, and status.

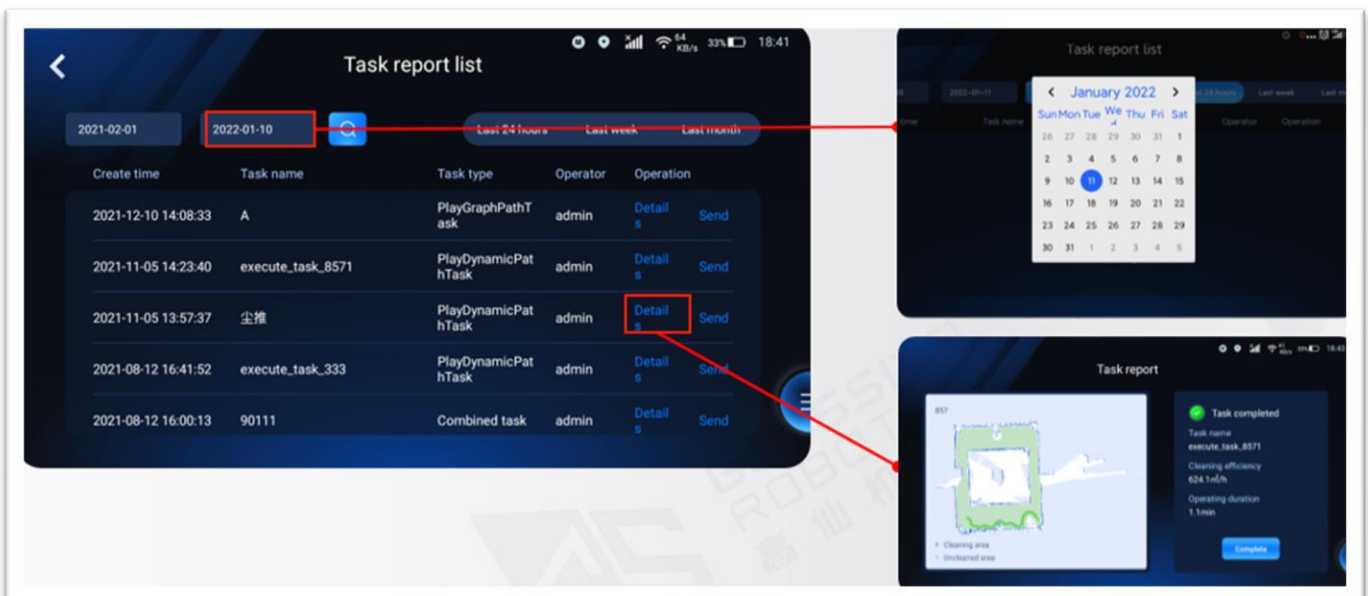
- The error that has been fixed will be recorded as well.

3.7. Task Report

- Click the “**Task Report**” button.



- You can instantly view the task report executed in the “last 24 hours”, “last week”, and “last month” through 3 buttons.
- You can also manually filter the period to view the task report.
- View task report details via the “**Details**” button.



3.8. Storage Cube

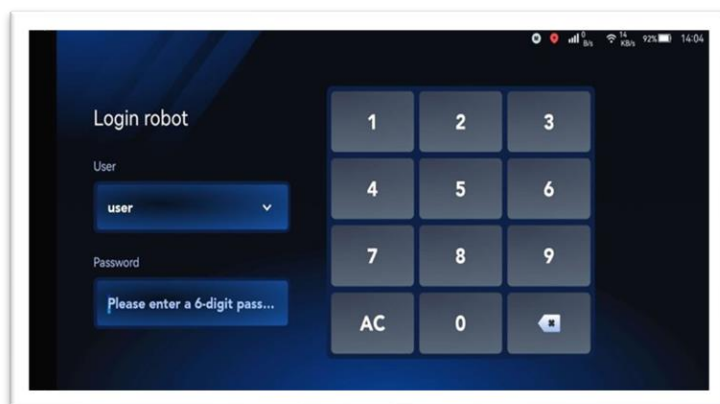
There are 11 options in the Storage cube:

- Location,
- Health management,
- Task report,
- Scheduled task,
- Device status,
- Cleaning configuration,
- Data management,
- Elevator control management,
- System setting,
- Network management,
- Logout, and
- Login.

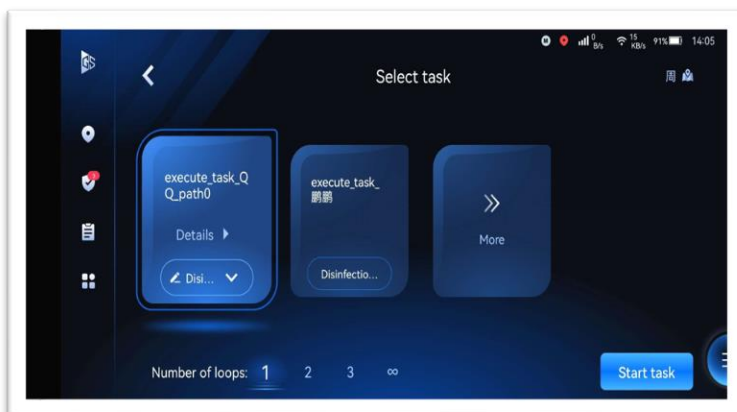
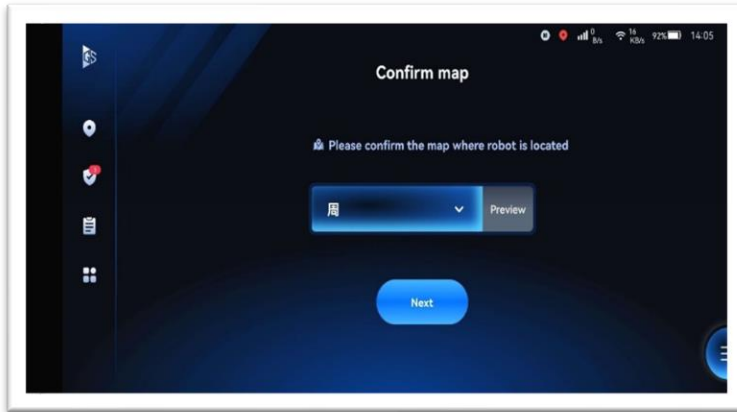
3.9. Manual Driving Operation

The scrubber retains the manual operation function that traditional scrubber has and supports the manual execution of cleaning tasks. To manually operate the scrubber, cleaners can control the movement and steering of the intelligent scrubber by the pedal and steering wheel. The operation steps are as follows:

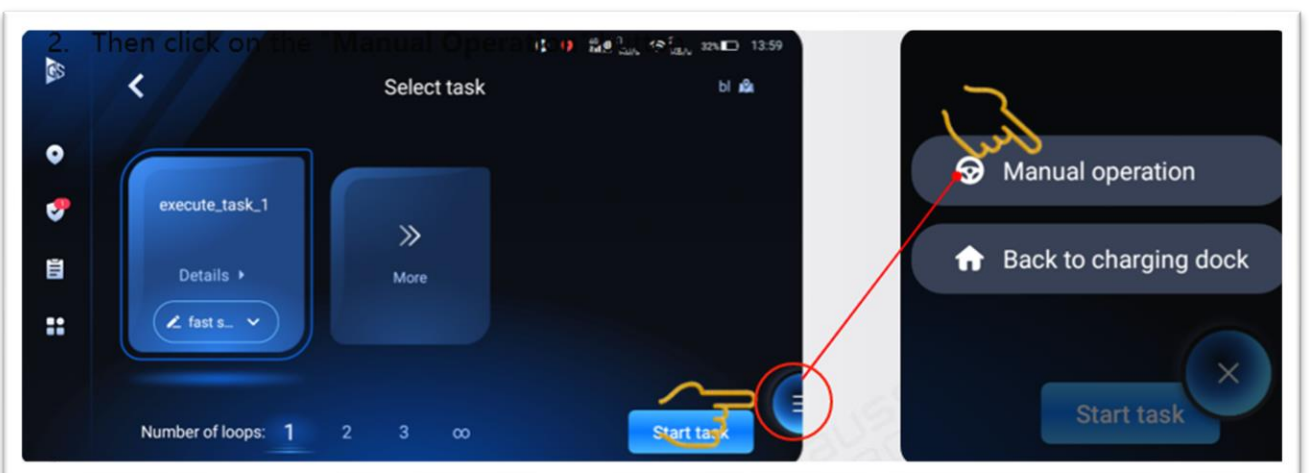
1. Switch the robot to manual mode.
2. Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off.
3. Wait for about 30 seconds after the scrubber is started with a key, then enter the GS User App.
4. As shown in the figure below, the login interface will appear on the screen. Select the corresponding username in the login option and enter the password to enter the GS User App.



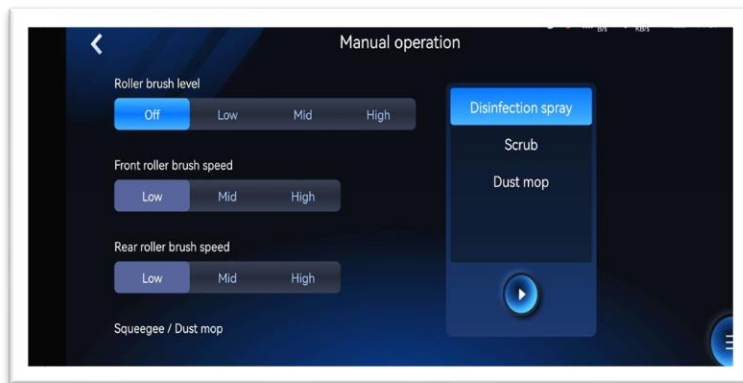
5. After a successful login, the device status screen will pop up like the following figure shows displaying the current water level of tanks, residual life of consumables, and other information. Click **"OK"** in the lower right corner.
6. First, you need to confirm the current map of the machine. Click the content of the input box, drop-down to select the corresponding map, and click **"Preview"** to enter the map page for viewing.



7. Click the floating ball in the lower right corner, and then click **once** after the floating ball pops up. It will show the **"Manual operation"** and **"Back to charging dock"** buttons.



8. Enter the manual operation interface, as shown below:



9. During manual operation, you can select or switch the cleaning mode, and adjust the water spray level, suction level, cleaning speed, etc. as required.

10. Click the **Start** button and push the robot to do the cleaning task manually.

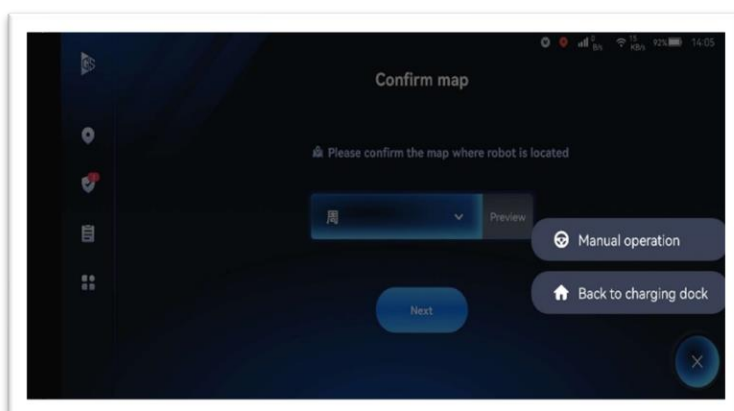
11. When the cleaning task is completed, click the **End** icon.



12. After the end of the manual task, push the robot forward for one meter to clean the residual water on the ground.

13. After residual water is cleaned, the squeegee is lifted.

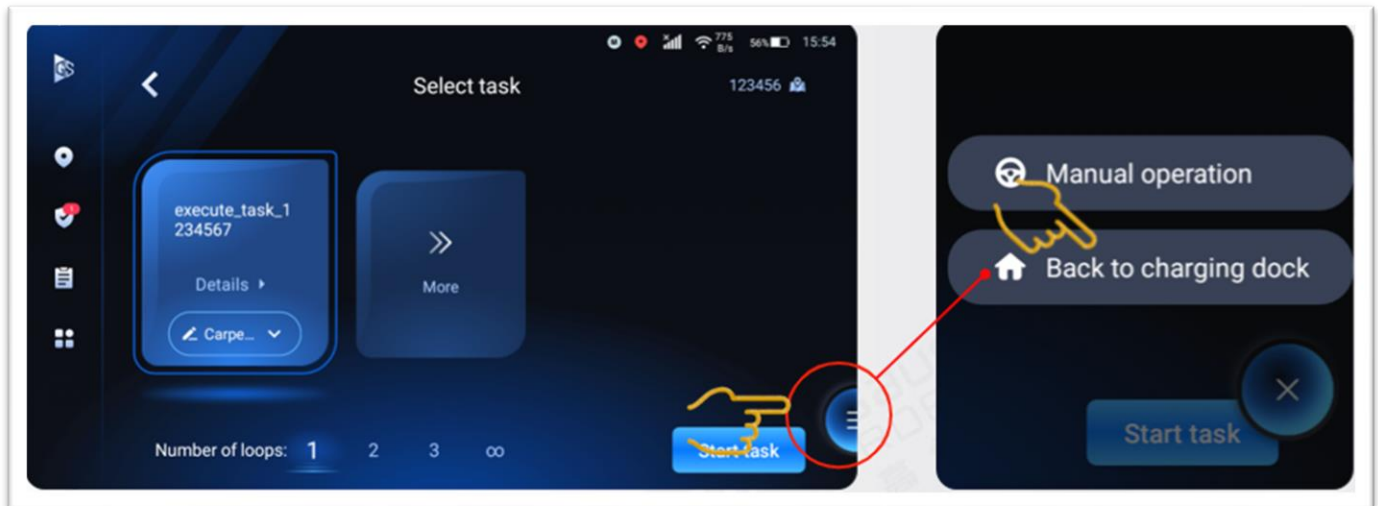
14. Click the screen to go back to the main UI.



- 15.If the charging pile/workstation is configured, click home and recharge with one button.
If the charging point/workstation is not configured, you can select a target location, and the machine can go to it automatically.

3.9.1. Moving Back to Charging Dock

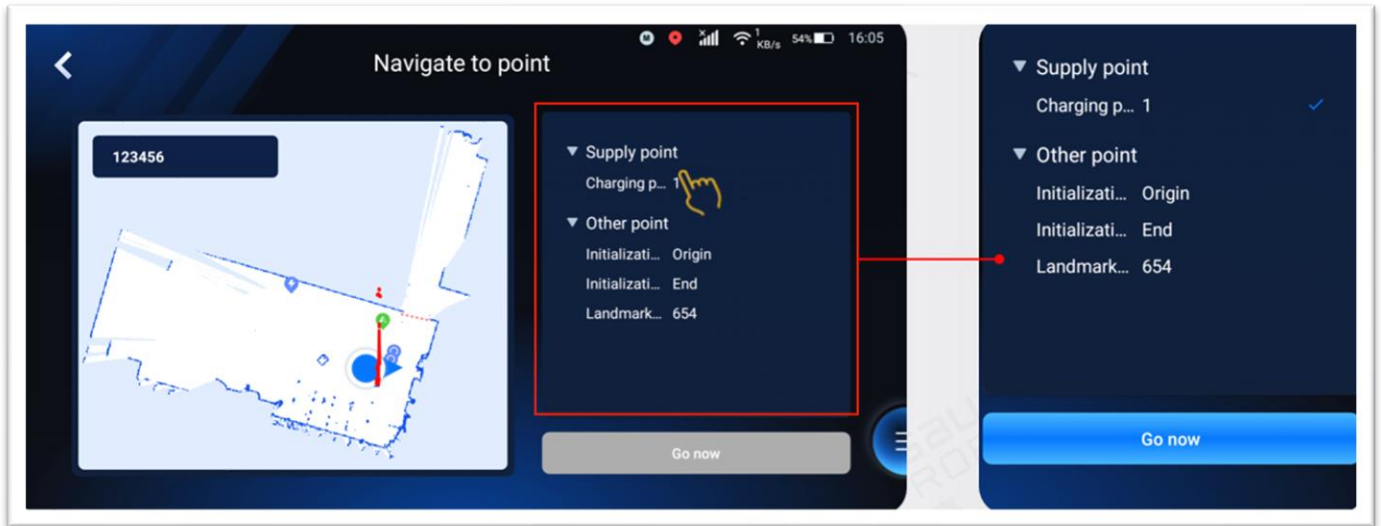
1. Click the floating window in the lower right corner, when the floating window pops up and then click once, and the **"Manual Operation"** and **"Back to charging dock"** buttons will be displayed.



2. Then click the **"Go Now"** button.

The premise of "back to charging dock"

- There is a scanned map, and the positioning is normal.
- There are manually created points: charging points, workstations, navigation points, landmark points, maintenance points, etc.
- In most cases, using a charging point or workstation.



3. After clicking the "**Back to charging dock**" button, it will switch to the interface shown on the right.
4. Then click the point you want to go back to, at this time, "✓" will be displayed behind the name of the point, and the "**Go Now**" button will change from **gray** to **blue**.
5. Then click the "**Go Now**" button, and the robot will automatically navigate to the target location.

3.9.2. Power OFF & Storage

1. Switch the robot to manual mode. Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off.



2. Push the robot to the maintenance point and conduct [daily maintenance](#).



3. Push the robot to the storage place.



4. Turn the key to power the robot off and wait for the screen to turn off.

3.10. Auto Driving Operation

First, we need to move the scrubber to the "**Mark**" position, click the "**Automatic Operation**" icon on the main interface of the APP, and then enter the automatic operation interface shown in the following figure. In the interface, you can select specific tasks, set task areas and the number of execution times, and start to execute tasks.

After the setup is completed, the robot will complete the task autonomously according to the selected task and the set circulation time.

The operation steps are as follows:

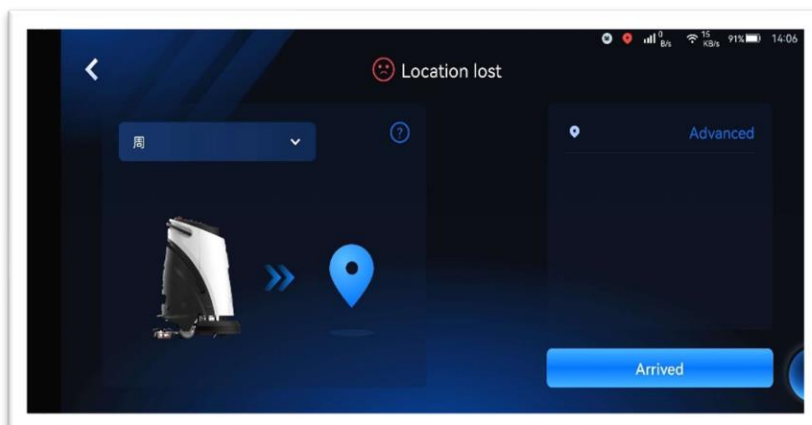
1. Select the Task

In the Select Task interface, slide left and right to select a task. It supports modifying the cleaning mode of the task, setting the number of cycles, and viewing the task details. Click "**More**" to jump to the page.



2. Initialize Location

Then click **"Mark"** on the screen, and the robot will automatically initialize its location. When the **"Positioning State"** in the upper right corner turns **green** and the **red** laser line coincides with the edge of the obstacle, it indicates successful positioning. If not, manual initialization is required.



3. Set the Number of Circulation Times

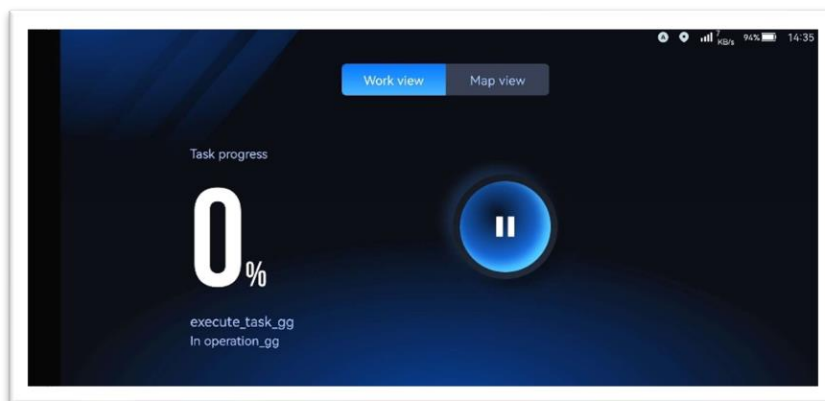
Click the **"Cycle Times"** button on the right to select the number of task cycles. Enter the number of times you want the robot to repeat the selected task. Click the **OK** button to save, and the robot will repeat the task you have selected until the number of times reaches the required value.

- If you only need to perform a task once, just click **"Start Task"** in the lower right corner.



4. Start the Task

Click the **"Start Task"** button in the lower right corner to enter the Automatic Operation interface. After clicking the **"Start Task"** button, it counts down 5 seconds and starts automatic operation after the countdown.



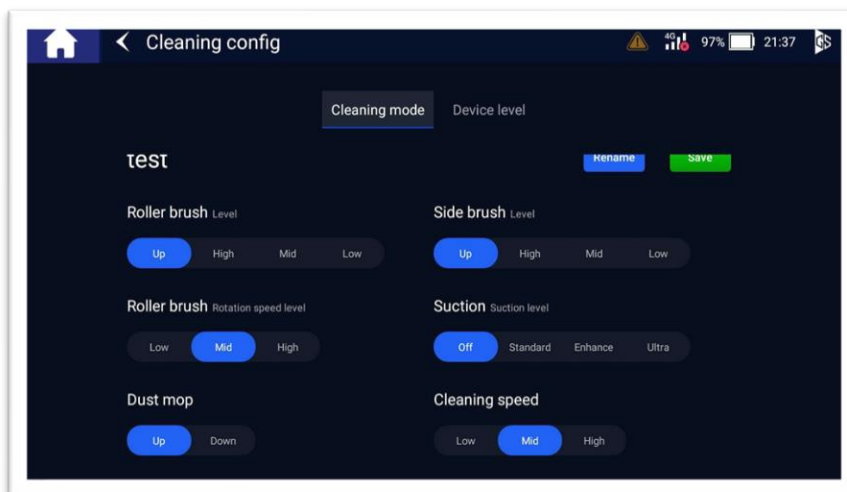
5. Pause the Task

- The task can be paused at any time during the working process by pressing the **Pause** button, and the task will continue by clicking the **Start** button again. The current cleaning task will be terminated by clicking the **End the Task** button in the lower right corner.
- Click the **Skip Current Task** button to skip the current task and perform the next task.
- Click the **Control Panel** button in the upper right corner to enter the same page as the home page control panel to control the brush, water spraying grade, etc.
- The current cleaning task will be terminated by clicking the **End the Task** button in the lower right corner.



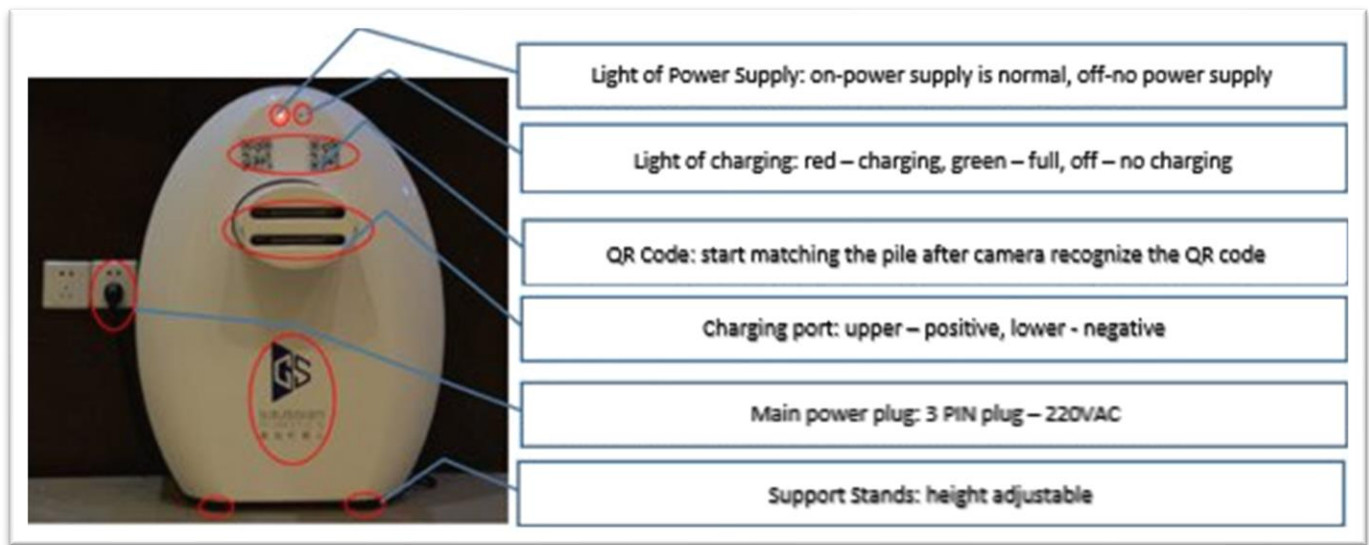
6. Disinfection Start/Stop And Adjustment

- The task can be paused at any time during the working process by pressing the **Pause** button and entering the cleaning allocation task interface. The current disinfection task will be terminated by clicking the **Atomization** button in the lower right corner.
- After selecting the Atomization task, **Atomization Rate** and **Atomization Distance** could be set following the task requirements.



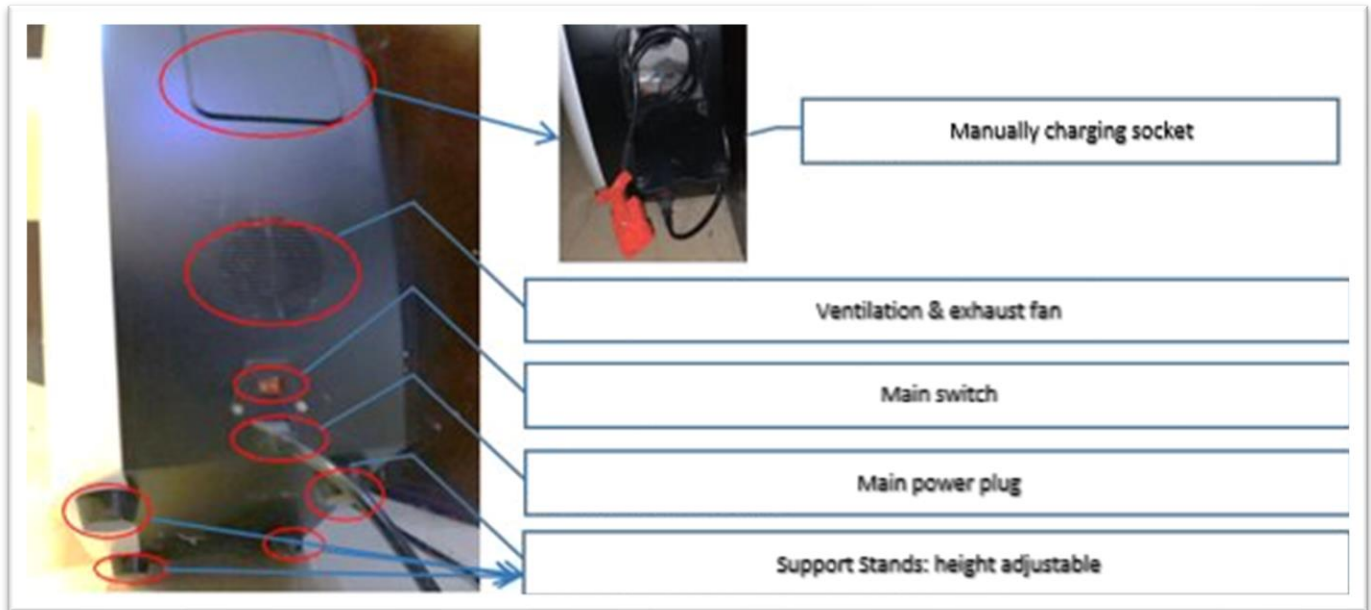
3.11. Auto-Docking

Auto-Charging Triggering



Scenario A

1. When the power of the robot drops to **20%**, the robot will go to the charging pile and do auto-docking for charging.
2. The robot recognizes the charging pile. When the charging task is triggered, the robot autonomously navigates to the front of the charging pile and uses the laser to identify the shape (length and width) of the charging pile.
3. The robot moves backward to identify the QR code for docking.
4. After the robot recognizes the charging pile, it turns around 180 degrees, retreats about 40cm away from the charging pile, and will use the rear camera of the robot to identify the position of the QR code and prepare to locate the position of the charging pile. After the precise position of the QR code is accurately recognized, the robot adjusts the angle and continues to retreat to dock itself.



Scenario B

1. A charging point is added to the combined task, and the robot will go to the pile and dock itself for charging.
2. If the charging pile position recognized by the robot deviates, the robot will adjust the position left and right.

3.12. Stopping the Scrubber

There are several ways to stop the scrubber from moving.

1. To stop the robot from moving in an emergency, you can press the **red** emergency stop button on the control panel. The scrubber will keep the power on but will stop moving and operating at this time (**note**: the vacuum motor will not stop working).
2. When you stand on the scrubber and control the scrubber, you can move the joystick to the middle to stop the scrubber from moving. At this point, the front wheel brake will be automatically put down.
3. Turn the power-on key inserted in the power-on keyhole under the head cover from On to Off to turn off the power of the cleaning robot.

3.13. Draining Water

In the process of cleaning the ground, if the full-tank indicator of the recovery tank turns **red**, it means the sewage in the recovery tank of the scrubber has reached the limit capacity. At this time, the scrubber cannot continue cleaning, and the operator should manually control the scrubber to drain sewage at the designated drainage place before continuing the operation.

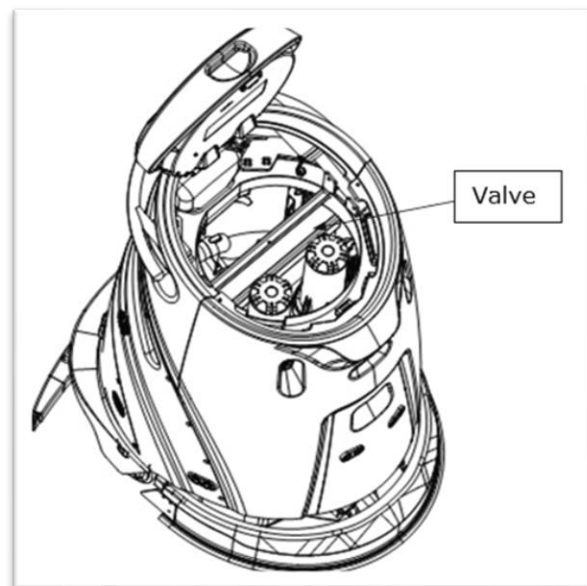
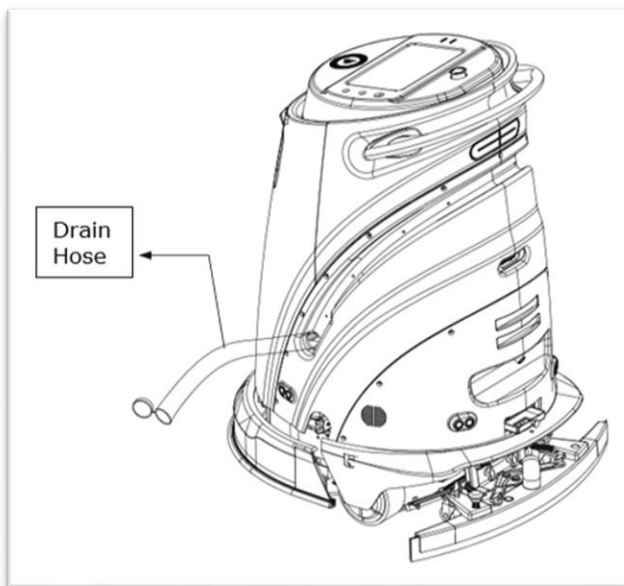
The operation steps are as follows:

1. Control the movement of the scrubber to the designated sewage discharge point (it is recommended to be consistent with the water addition point to facilitate the cleaning and maintenance of the sewage tank).
2. Take out the drain hose, remove the plug, and start draining sewage into the sewer.
3. After the sewage is drained, plug in the plug tightly (please make sure the plug is plugged tightly, otherwise, it may affect the scrubbing effect). The scrubber returns to normal. Meantime, put the drain hose away, and then move the scrubber to the area to be cleaned to start working.
4. Also, if you want to drain the water from the clean water tank, you can turn the valve 90 degrees anticlockwise to form a horizontal state. The water from the clean water tank will automatically flow into the sewage tank and then be discharged through the sewage pipe.



NOTE:

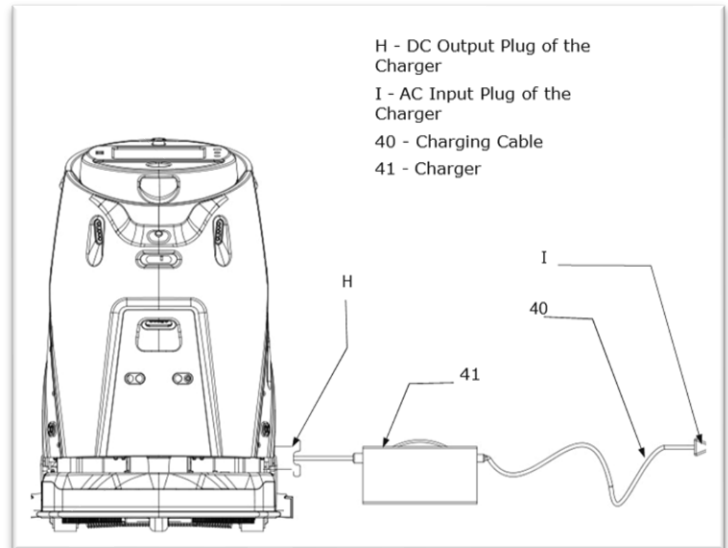
- After the use of the scrubber, all the water in the freshwater tank and recovery tank shall be drained off before the scrubber is stored in the storeroom.



3.14. Charging the Scrubber

In the upper right corner of the GS App application interface on the control panel display, you can view the current remaining battery of the scrubber. When the battery level is lower than 20%, the scrubber will prompt that the battery level is low. At this time, the scrubber shall be returned to the charging place to be fully charged before proceeding to the next step.

1. You can manually drive the scrubber to the known charging place or select a certain charging place in **Execute Task** of the GS User App to let the scrubber automatically go there. The charging point is recommended to be in a flat and dry place, and the area must be protected to prevent dangerous accidents from being touched by children.
2. After the scrubber moves to the designated charging place, please park the robot on flat ground, insert the power-on key into the keyhole and turn the key from On to Off to turn off the power, and then perform the charging operation.
3. Please use the charger dedicated to the Scrubber 50 (Sprayer) and charge it in strict accordance with the following order:



Charging: plug in the DC output plug of the charger → plug in the AC input plug of the charger.

4. The screen of the charger will show the corresponding current and voltage values and there is a charging indicator that will show the charging status. A steady **red** light indicates that the scrubber is charging. And the red light turns to **green** to indicate a full charge.
5. After the scrubber is fully charged, carry out operations in strict accordance with the following order:

Fully charged: Unplug the AC input plug of the charger → unplug the DC output plug of the charger → plug in the power plug.

Then start the scrubber and manually drive it to return to the designated place to continue cleaning or store the scrubber in the storeroom for use next time.

3.15. Physical Fence Function

There are often temporary construction areas at the robot working site, and if the robot incidentally enters such construction area, it may lead to perilous consequences.

If the customized physical fences are placed around the restricted area (the distance between two physical fences should not exceed 4m), once the robot manages to recognize physical fences, a virtual wall between the fences will be generated automatically and the robot will continue to carry out the task by avoiding such restricted area(s). Such a virtual wall will be erased automatically after the robot is powered off.



Figure: Illustration of a physical fence

3.16. Anti-Falling Function

Cleaning robots at the working site often encounter areas such as escalators, stairs, platforms, and other areas, where there exists a risk of falling, which may cause it to fall. When the robot is performing a task, after detecting an area with a risk of falling, it will initiatively avoid the risk area to perform the task to evade the falling situation.

At present, the robot is mainly furnished with the following anti-falling solutions, including front-slant camera detection, virtual wall drawing, RFID sensor recognition, infrared sticker solutions, etc. The specific anti-falling deployment plan requires AROS professional service engineer's on-site deployment.

3.17. Device Status | Adjusting the Lifespan of Consumables

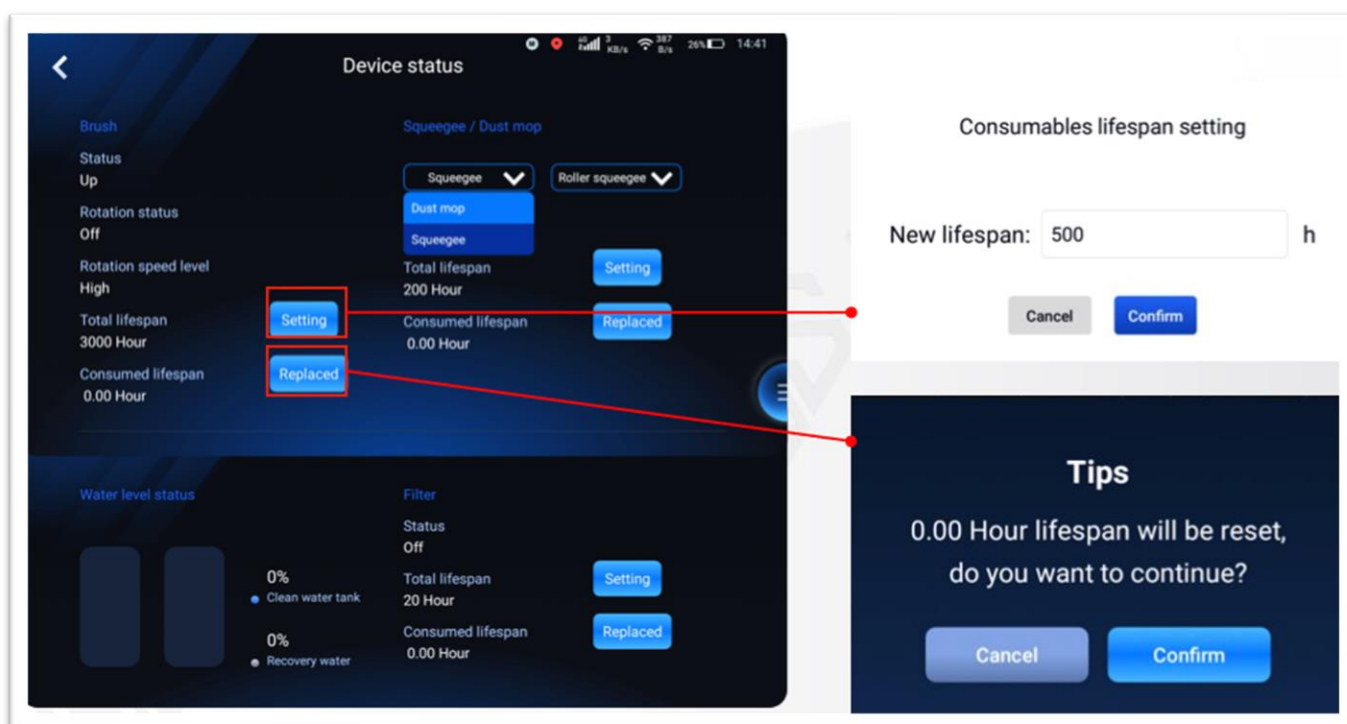
Set up the upper limit of the lifespan of the roller brush, squeegee/dust mopper, and filter.



NOTE:

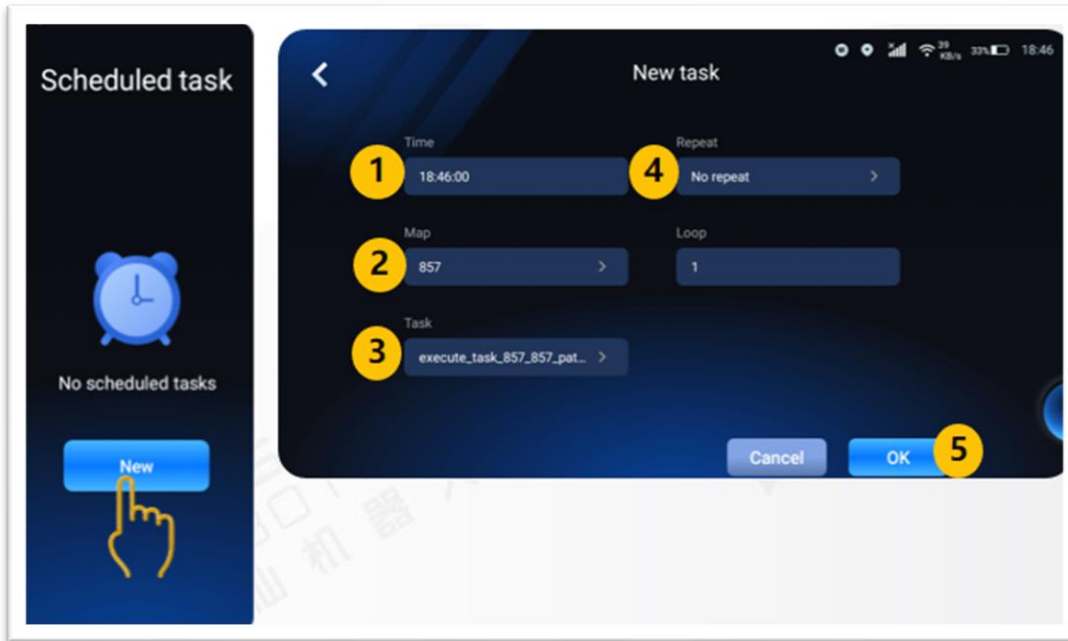
- The data here is for reference only and is the default value for:
 - Disc brush/roller brush/roller cloth: 500h is recommended.
 - Dust mop/squeegee: 300h
 - Filter: 20h

1. If there is a large deviation between the data and the actual situation, set it up accordingly.
2. If the related consumables are replaced, you need to click the "**Replaced**" button, the data will be cleared and reset.

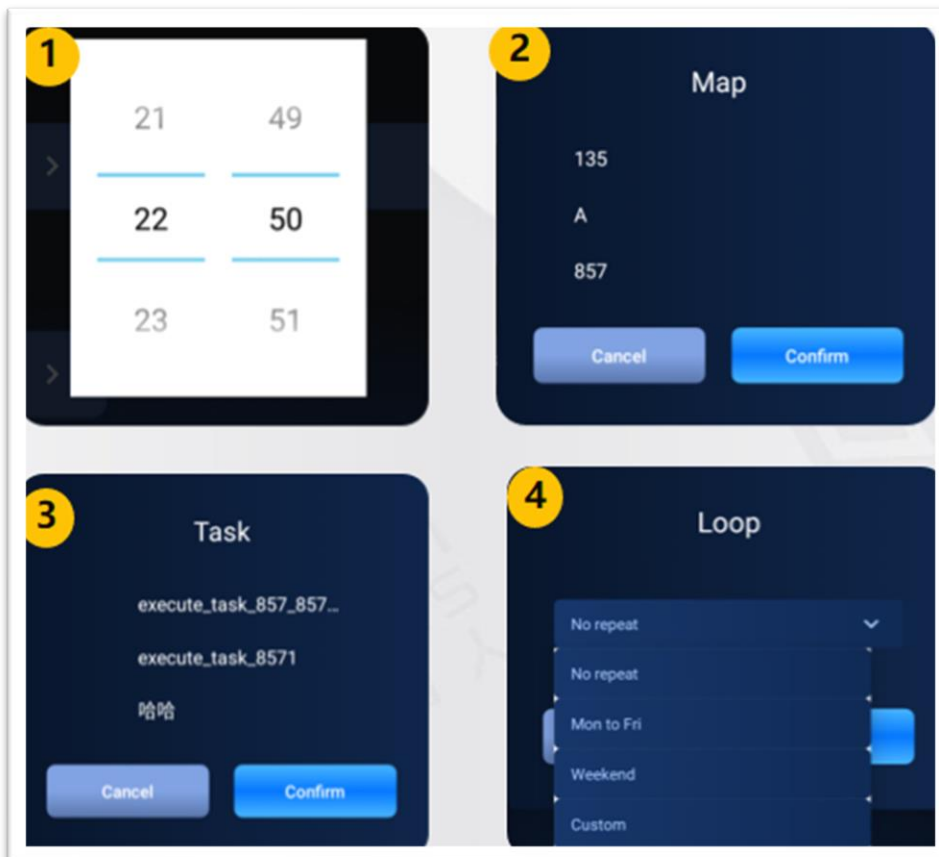


3.18. Scheduling Tasks

1. Click "**Scheduled Task**" to enter the interface of the scheduled task setting as shown in the figure:



2. Click the **"New"** button to switch to the **"New Task"** interface.
3. You can now set the start time, select the map, execute a task, repeat, and determine cycle times (up to 99).



3.19. Switching Map and Operation

1. Push the robot to the landmark point.
2. Click the "**Locating**" icon in the sidebar, select the landmark point, and click "**Arrived.**"
3. Then the robot will be initialized.
4. A message will pop up if locating is successful.
5. Click "**Start**" on the screen to start the operation.

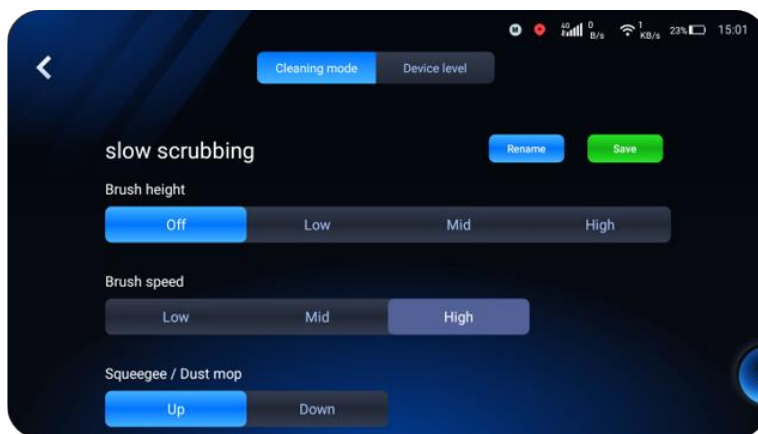
3.20. Clean configuration

3.20.1. Clean Mode

A total of 4 cleaning modes can be configured, such as:

1. dust cleaning,
2. run only,
3. land cleaning, and
4. heavy cleaning.

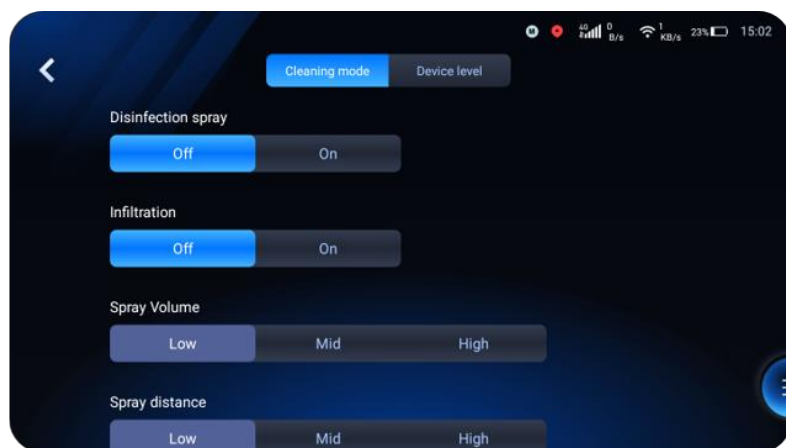
Select the mode accordingly to meet an actual situation.



- **Brush height:** the height from the ground
- **Speed of front roller brush speed:** grade selection
- **Rear brush speed:** grade selection



- **Squeegee/dust mop:** state selection
- **Water spray level:** level selection
- **Suction level:** level selection
- **Cleaning speed:** level selection



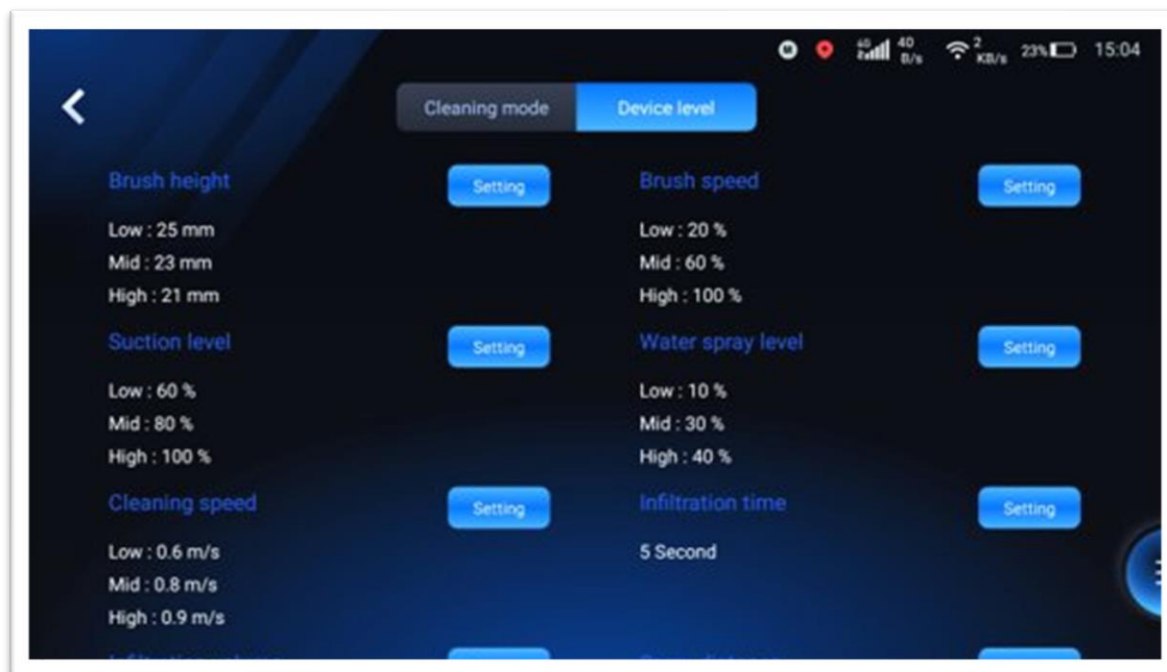
- **Disinfection Spray:** state selection
- **Infiltration:** state selection
- **Spray volume:** can be set only when the spray button is turned on.
- **Spray distance:** can only be set when the spray button is turned on.

3.20.2. Device Level

The speed range of each device is as follows. For the recommended values in different scenarios, please refer to the data on the next page.

- Roller brush height: 10~40
- Front roller brush speed: 0~100%
- Rear brush speed: 0~100%
- Suction level: 0~100%
- Water spray level: 0~100%

- Cleaning speed: 0~1.0
- Infiltration time: N seconds
- Infiltration water volume: 0~100%
- Spray distance: 0~100%

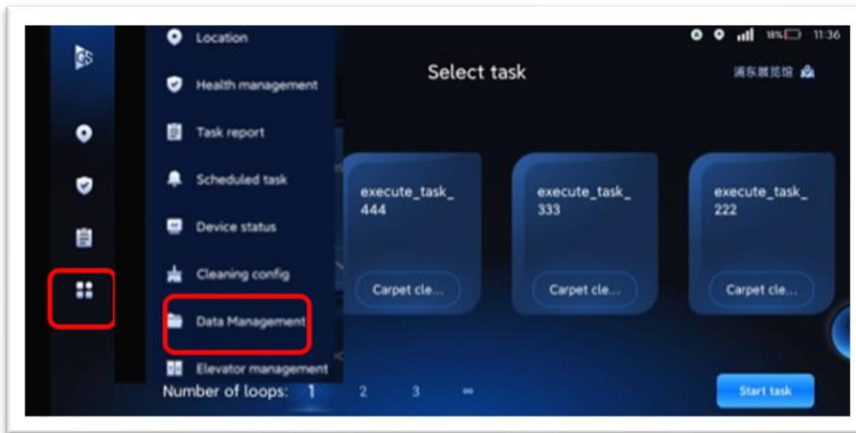


Recommendations for different grounds

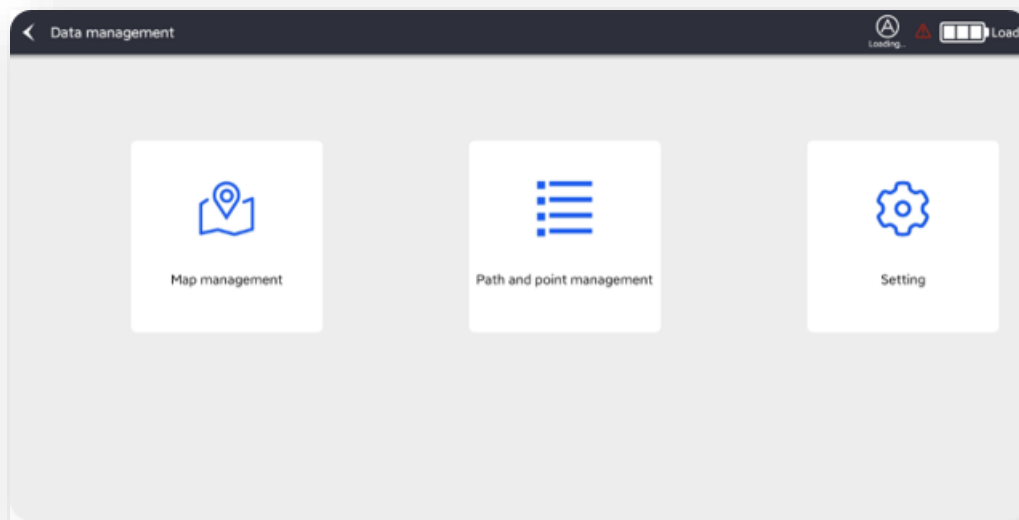
| Floor Type | Speed | Brush Rotate Speed | Water Level | Suction | Brush | Cleaning Pad |
|---------------------------|-------------|--------------------|-------------|---------|--------------------|--------------|
| PVC | Medium/High | Middle | Low 15~25 | 80~95 | white fur (0.25mm) | x |
| Epoxy floor | Medium/High | Middle | Low 15~25 | 80~95 | white fur (0.25mm) | x |
| Marble | Medium/High | Middle/High | Low 15~25 | 80~95 | white (0.35mm) | |
| Terrazzo | Medium/High | Middle/High | Low 15~25 | 80~95 | white (0.35mm) | |
| Small square brick | Medium/High | Middle/High | Low 15~25 | 90~100 | white (0.35mm) | |
| Concrete floor | Medium/High | Middle/High | Low 25~35 | 90~100 | white (0.35mm) | x |
| Wooden floor | Medium/High | Middle/High | Low 15~20 | 80~100 | white fur (0.25mm) | x |

4. DATA MANAGEMENT

1. Click the button on the left and select "**Data Management.**"



2. After clicking "**Data Management,**" you will see three blocks: "**Map management,**" "**Path and point management,**" and "**Settings.**"
3. Click "**Map Management**" to enter the scanning interface:

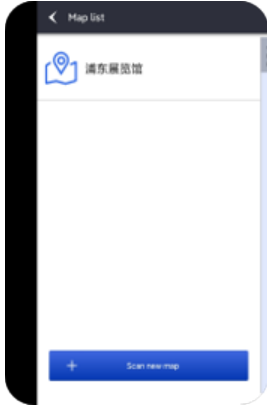


- **Map Management**: scan new maps, edit maps ...
- **Path and Point Management**: create paths, add points, combine paths ...
- **Settings**: customized parameters, manually update the APP, create new accounts, and other functions ...

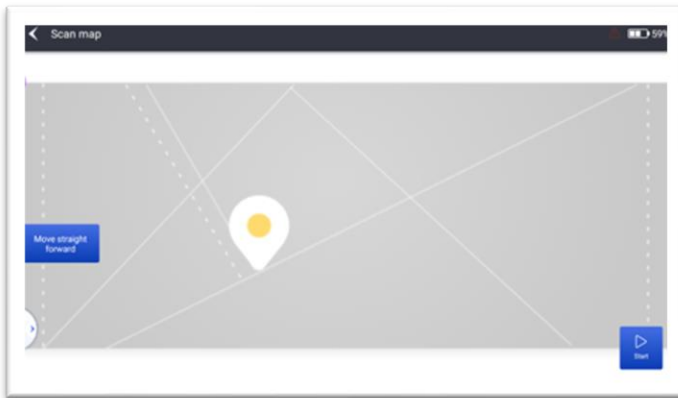
4.1. Map Management

4.1.1. Map Scanning

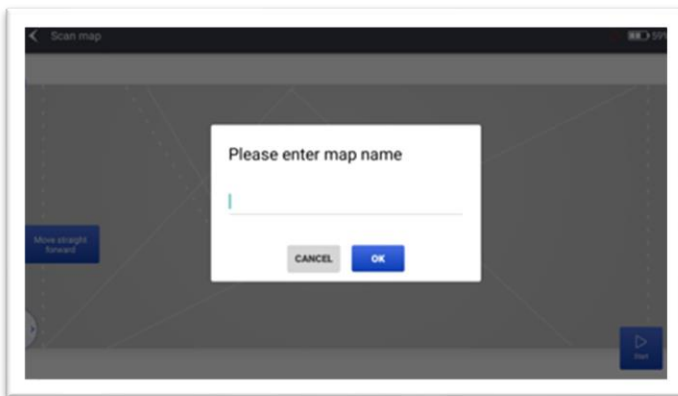
1. Click "**Scan New Map.**"



2. Then click the "**Start**" button.



3. Input the map name.

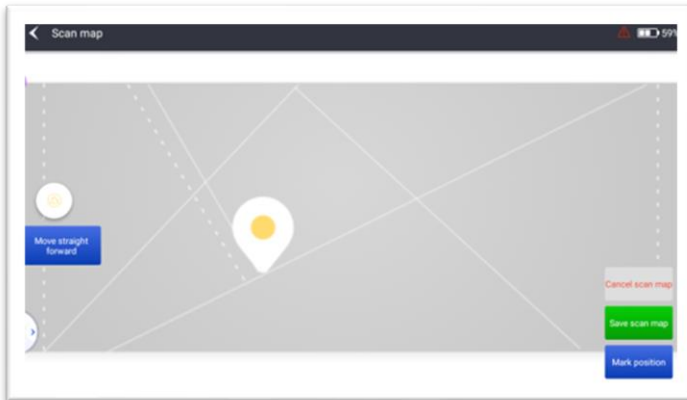




NOTE:

- If there are multiple floors, the floor information needs to be reflected to facilitate customers to find it.
- If it is a single floor, the cleaning area information is needed.
- The map name requires communication with customers and approvals from them are needed.

4. Start moving the robot to scan the map and observe the map status via the screen.



5. Walk around the area to be cleaned and click "**Save Scanned Map.**"

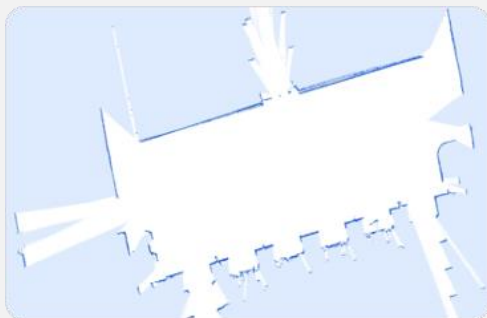


NOTE:

- During the scanning, the status is visible on the LED screen.



- During the scanning, push the robot forward steadily (smooth + straight line), and try to avoid a curved route.



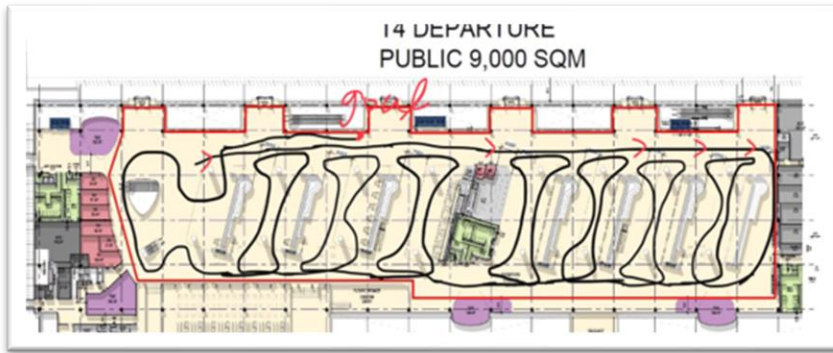
- When rotating or turning, it must be rotated slowly on the spot (less than 20°/sec at angular velocity), and then move straight forward again.



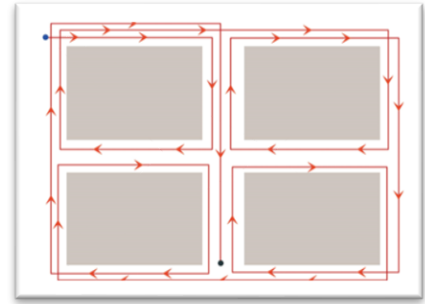
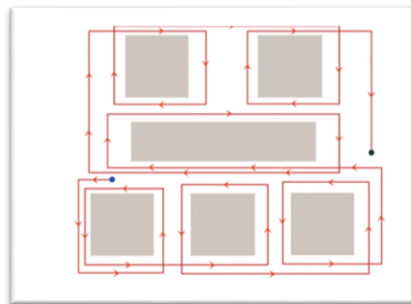
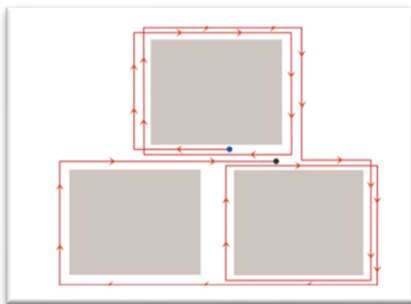
- Forward velocity should be less than 1 m/s.

4.1.2. Scanning Tips

During the scanning process, loop closure is applied. Please proceed as follows:



1. Select a reasonable route for the map scanning (1st - small closed-loop, 2nd - followed by a large closed-loop).
2. All the cleaning areas must be scanned.
3. Avoid repeatedly scanning the same area.

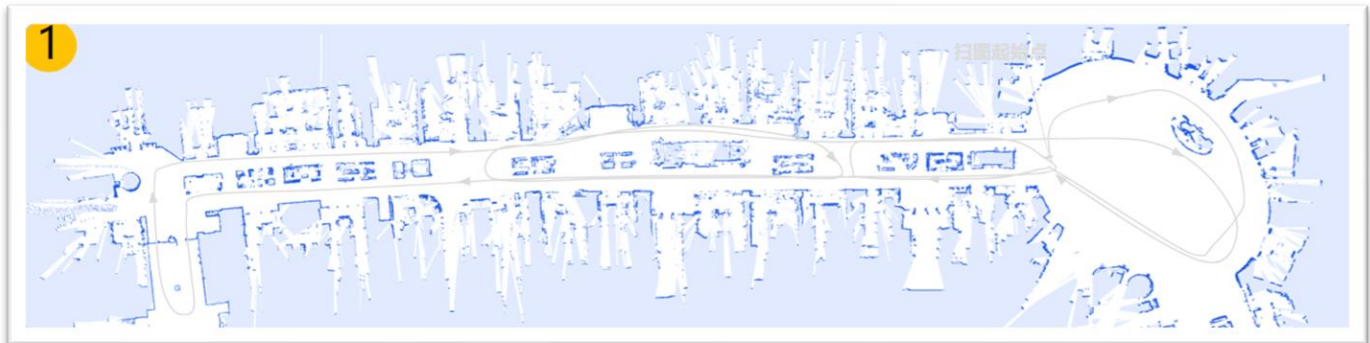


4.1.3. Forced Closed Loop

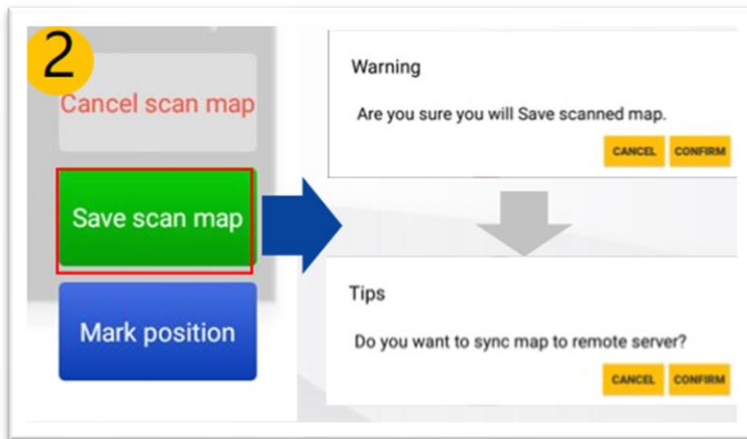
1. After scanning the map according to the closed-loop rules, move the robot to this position.
 - a. If the map status is normal, there is no need to use the forced closed-loop and go to the next page directly.
 - b. If there are still ghosting, distortion, etc., after waiting for 5 minutes, please perform the following operations.
2. Click the **"Forced Closed-loop"** button on the APP.
3. Steps to reproduce:
 - a. Click the **"Forced Closed-loop"** button.
 - b. Click **"OK."**
 - c. Prompt that the closed-loop is successful.



After the map has been scanned (after the forced closed loop), you need to check the following points before clicking "**Save**":



- If there is an obvious distortion or ghosting in the start/end point, try a forced closed loop.
- If there are places that missed scanning, do supplementary scanning.
- If the scanned map has distortion and ghosting due to the wrong closed loop, which cannot be revised, scan the map again.



NOTE:

- The final map you saved could be different from the preview during scanning. It is recommended to save the map and then check the quality.

Please master the scanning skills, understand the precautions, and be able to detect the quality of the map to scan a high-quality map.

4.1.4. Check Map Quality

Carefully check the quality of maps.

If there are issues in the locality, delete the locality with "[map editing](#)" and do a [map extension](#). If the map frame was distorted, please scan the map again.



NOTE:

- The poor map quality would lead to random operation risks. There might be no issues in the test run, but there might be locating lost or jams in daily operation.

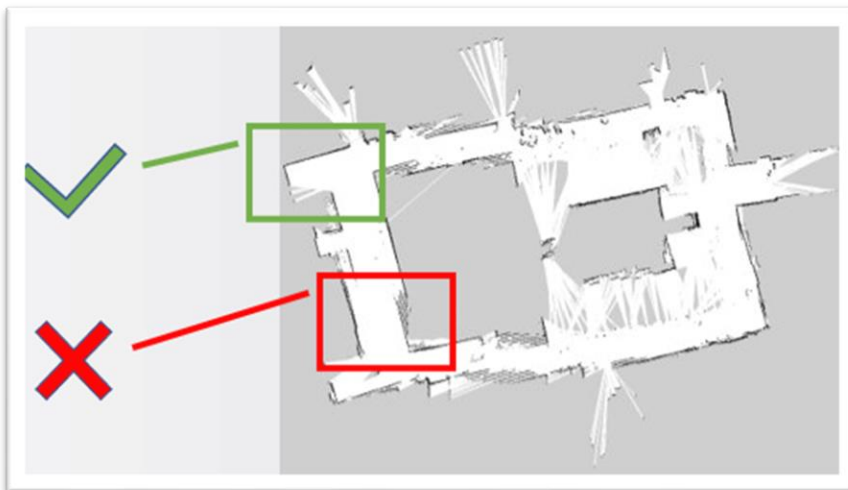
Closed-loop

The closed loop means that the same area scanned by the machine at various times can be overlapped. A false or missing closed loop will lead to inaccurate information on the map, which results in great locating offset or deviation, and finally, the robot loses locating or gets jammed.



Distortion

Distortion or ghosting is not acceptable. A common example is when one wall duplicates and becomes 2 or more parallel walls. Distortion or ghosting will cause a great interference to navigation, such as locating jumping, lost, or jamming.



4.1.5. Map Extension

A map extension is required in one of the following situations:

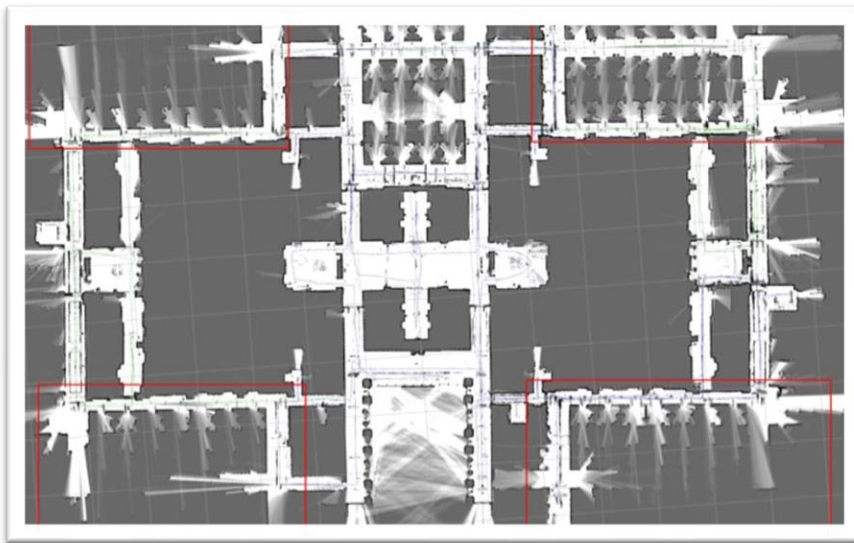
1. The areas need to be extended for new cleaning tasks, and the original scanned map does not cover the new areas to be cleaned. Even if obstacles were scanned, the confirmation that obstacles are completed is necessary.
2. The on-site environment has obvious changes, like decoration, displacement of furniture, etc. For this kind of situation, use "map editing" to delete this area on the map and do a map extension.

3. The area is noticeably big, it is hard to scan it perfectly just one time. It is better to use map extension to increase the success rate of map scanning.



NOTE:

- the map should be less than 20,000 square meters, otherwise, robot operation would be unstable.
 - If the area is over 20,000 square meters, separate it into several maps.
 - If all regions are connected, it is recommended to scan the major frame first, and then extend the map on the details in regions.
- If all regions are connected only in one place, extend the map in turn.



Steps to reproduce:

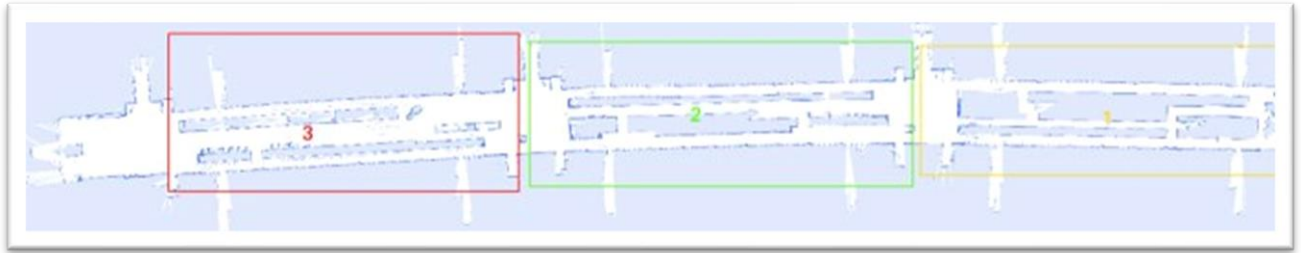
1. Select the map to be extended in the map list and click "**Map extension.**"



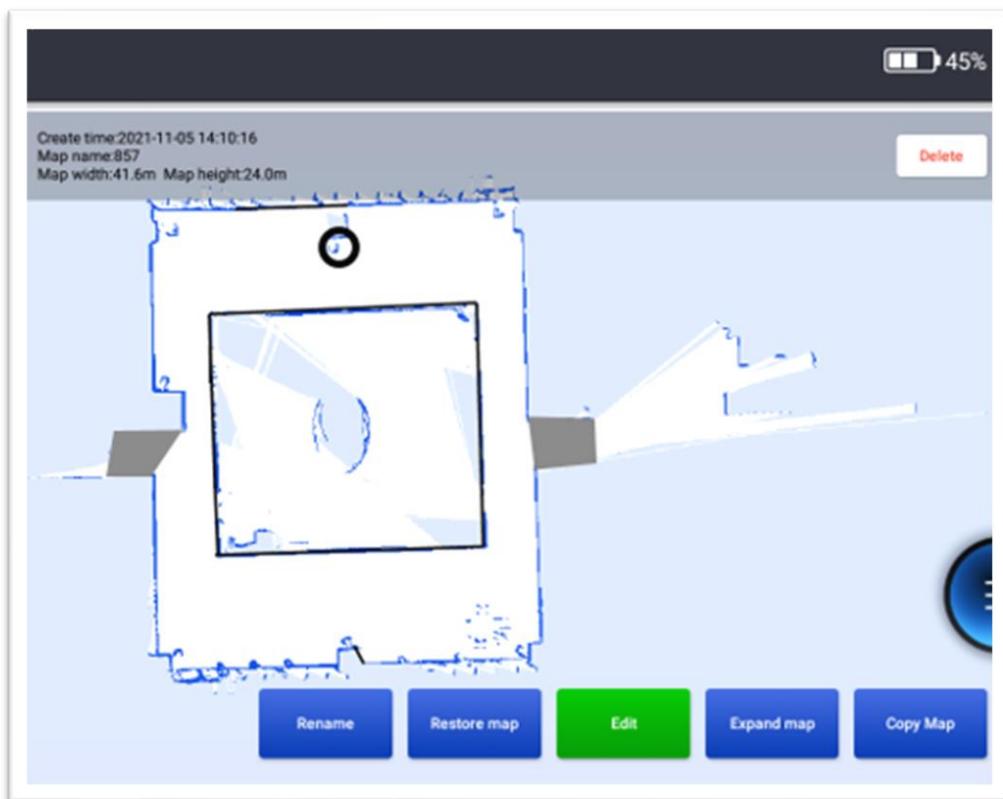
Precautions:

- Expanding a map is the same as scanning a map, and it is necessary to choose a suitable starting point.
- First, extend a small closed-loop and then a large closed-loop, confirm that the map has no ghosting/distortion, and then save the map.
- Locate the robot on the original scanned map, then manually move the robot to the main path, click the APP to start map expansion, drive on the original map for more than 10 meters, and then enter the area that needs to be expanded to expand the map. Map extension also requires following the closed-loop rule.

2. Scan the major frame and the aisles for connections first. Then do a map extension for the red highlighted areas.

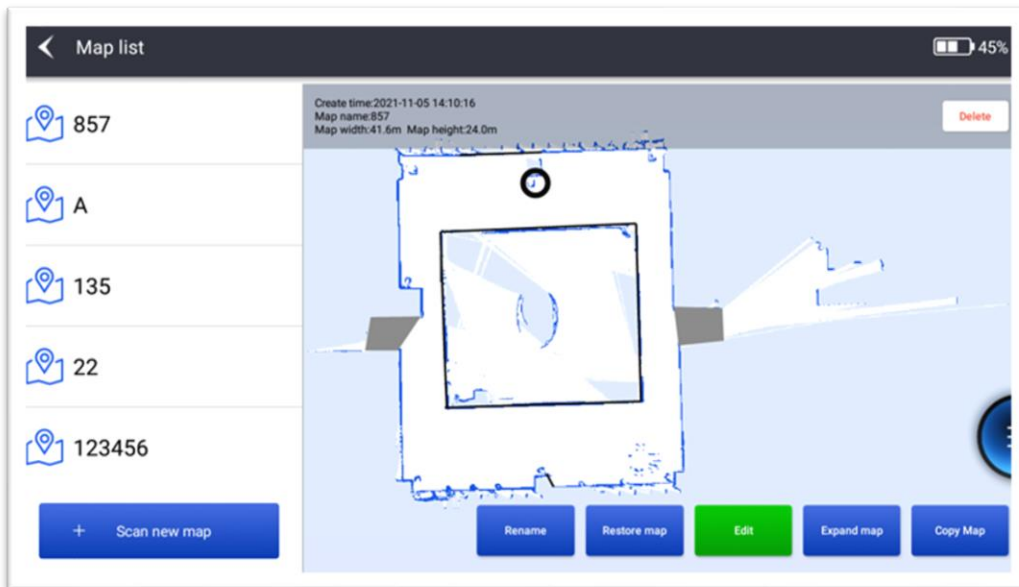


3. Scan the areas from right to left and ensure their decent quality each time. If the quality of the map extension is not good, use "map store" to return to the previous status.



4.1.6. Map Management Editing

After the map is scanned, you can see the preview map on the right.



- Click the “**Edit**” button.

There are 14 editing function buttons in map editing, as shown below:



1. Edit virtual wall
2. Slope mark
3. Edit original map

4. Carpet zone
5. Highlighted area
6. Elevator zone
7. Whistle zone
8. Speed bump zone
9. Non-falling risk area
10. Temporary carpet zone
11. Temporary booth area
12. Glass wall
13. Edit floor
14. Display area

For an explanation of each function, please see the table below:

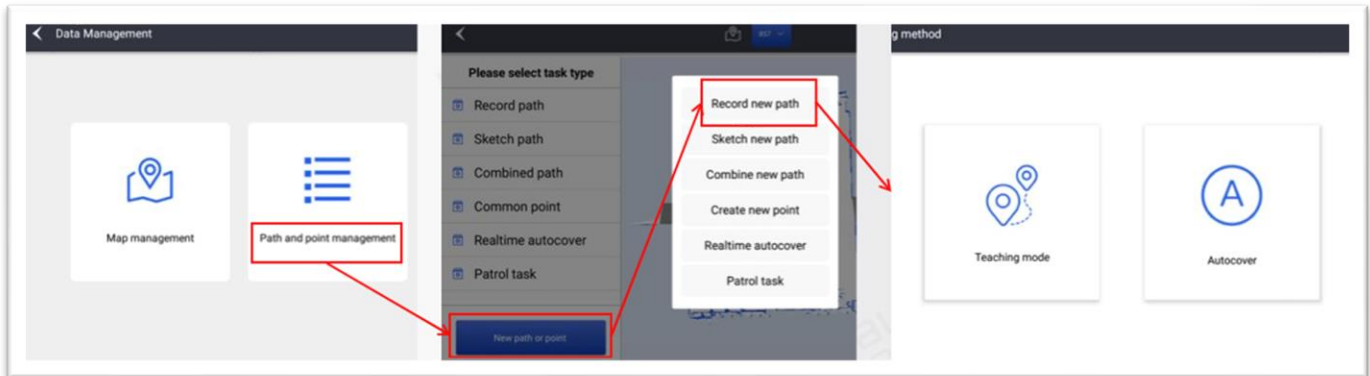
| Edit mode | Description | Available shapes | Remarks |
|-----------------------------|---|---------------------|--|
| Virtual wall editing | It is used to mark the area that cannot be scanned by a laser, to prevent the robot from colliding in the above area and causing danger. For example, shops, fragile goods, etc. | Line/Polygon/Circle | black |
| Slope mark | Amplify/enlarge the recognition threshold of the sensor system for the height of obstacles and broaden the threshold triggered by anti-falling. When passing through this area, the machine will slow down for cleaning, that is, the cleaning equipment is still working. | Polygon | Dark Blue |
| Original map editing | 1. Clear area: modify the noise and obstacles on the original map and clear them by box selection (frame selection). 2. Restore unknown areas: navigation and tasks are prohibited (in progress). | Polygon | An area surrounded by black lines |
| Carpet zone | Give priority to avoiding this area. If there is no way to go, turn off / lift the cleaning equipment to pass through this area. After passing, the robot will turn on the cleaning equipment again. | Polygon/Circle | Green |
| Highlighted area | The highlighted area is the key reference area for the robot to realize independent locating. It is necessary to select the fixed physical features in the map, such as walls, partitions, columns, pillars, etc. Try to make the highlighted area range cover the fixed physical features, and do not exceed too much to prevent the introduction of non-fixed physical features. The robot will give more recognition | Polygon/Circle | Cyan |

| | | | |
|------------------------------|---|---------------------|-------------|
| | weights to the physical features in the highlighted area. reduce the interference of the frequently moving non-fixed physical features to the machine-independent locating. | | |
| Elevator zone | This functional area can only be used on the site where the elevator integration system is installed, which is the elevator car area. | Line/Polygon/Circle | Purple |
| Whistle zone | Not supported now. | Polygon | Light brown |
| Speed bump zone | Turn lift/off the cleaning equipment to go through this area, and then turn on/put down the cleaning equipment again. | Polygon | Black |
| Non-falling risk area | Estimate and define that there is no falling risk in this area and the anti-falling function is not triggered (common environment: Glass Kanban, glass floor, etc.) | Polygon | Grey green |
| Temporary carpet zone | In this area, only robots equipped with carpet ultrasonic detection sensors will work. When the robot moves to the temporary carpet area, it will detect the interior of the area. 1. After the carpet ultrasonic detection sensor detects that there is carpet in this area, it will mark this area as a carpet area and trigger the idler running mechanism, that is, lift/off the cleaning equipment to cross the carpet area. 2. If the carpet ultrasonic detection sensor does not detect a carpet in this area, it will normally perform tasks in this area. | Polygon/Circle | Green |
| Temporary booth zone | When the robot moves to the temporary booth area, the robot will detect the interior of the area. If there is a temporary booth in the detection area, it will automatically avoid it; If there is no temporary booth in the detection area, the robot will perform the cleaning task normally. | Polygon/Circle | Grey |
| Glass wall | It is necessary to draw in the area with a glass wall. The sensor will filter the noise refracted by the glass to reduce the running jam of the robot caused by noise. | Polygon/Circle | Light blue |

4.2. Path and Point Management

After the map is edited, proceed to path planning: "**Path and point management.**"

You will see the interface as shown below:

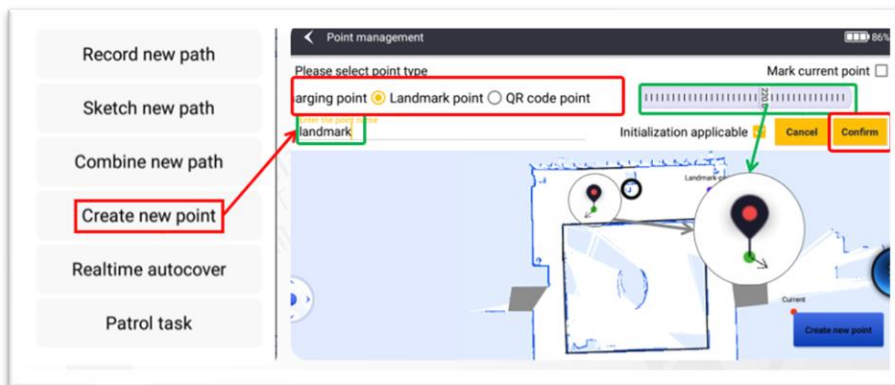


4.2.1. Adding a New Path

1. Click the "**New Path or Point**" button at the bottom left.
2. A window will pop up on the right.
3. Please click "**Record New Path**" to enter another interface – "**Teaching Mode**" & "**Autocover.**"

4.2.2. Adding a New Point

1. Click "**Create New Point.**"



2. Click the point type you want, then enter the point name below.
3. After adjusting the direction with the slide bar, click **OK**, and "**Confirm**".



4. The “**Successfully added**” prompt will display.



NOTE:

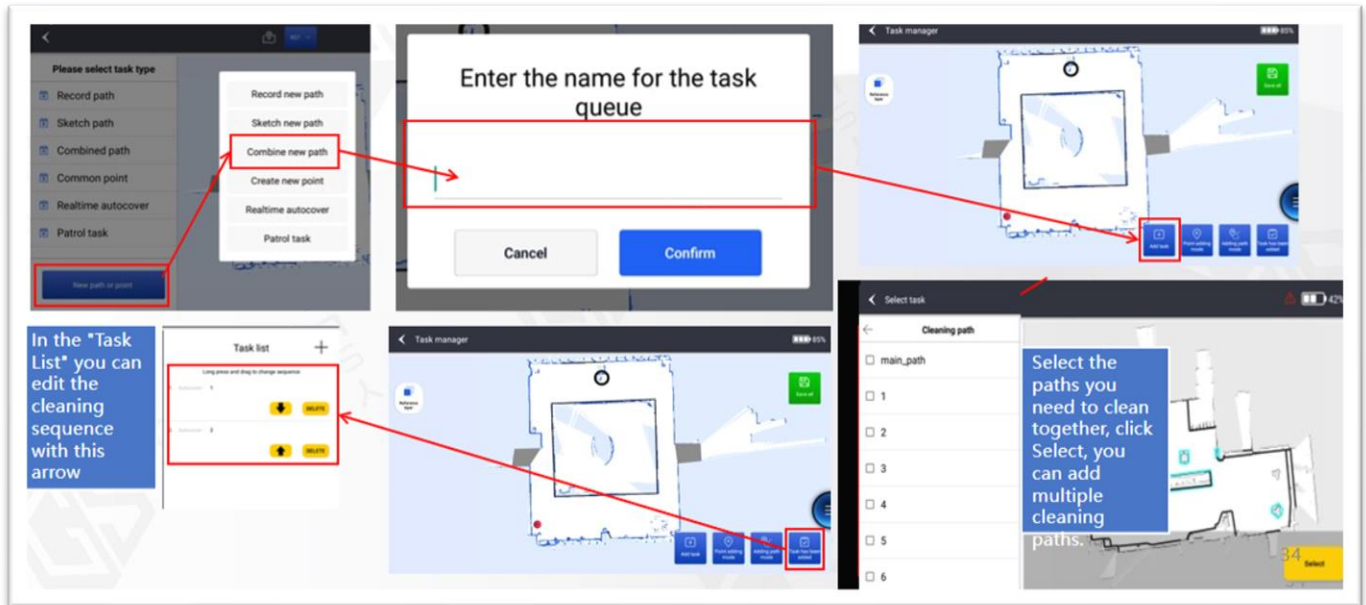
- Each point type has a different color.
- The workstation and charging point cannot be used simultaneously.
- When the support initialization point is checked, the similarity point detection will be conducted (the places where the environment is similar will be detected to avoid mispositioning). The support initialization point needs to be built where the environment has eigenvalues.

| Name of the points | Description | Create method | Remarks |
|--------------------------|---|--|---|
| Landmark point | Point for robot positioning | Mark directly on the map, and pay attention to the direction of the arrow, that is, the front of the robot | *Must create Be sure to communicate with the client the location created (guarantee that the location is stable and reliable, will not change, and is easy to find). |
| Charging point | Points to be created for automatic charging | Put the robot on the charging dock manually, and directly mark the current point as the charging point. | Must be created and equipped with a charging dock. There should be only one charging point |
| Workstation point | Automatic charging, watering, and draining points | Put the robot on the workstation manually, and directly mark the current point as the workstation | Those with workstations must be created. |
| Maintenance point | Triggered back to this point when the battery is low, the clean water tank is | Mark directly on the map, and pay attention to the direction of the arrow, that is, the front | No charging dock and no workstation must be created |

| | | | |
|--|---|--|--|
| | empty, and the recovery tank is full | of the robot. The robot goes to this point and waits for maintenance from an operator. | |
| Navigation point | The point where the robot automatically navigates to the target location. | Mark directly on the map, and pay attention to the direction of the arrow, that is, the front of the robot. | Optional |
| QR code point | Scan the QR code to automatically locate and automatically select tasks | The QR code needs to be printed and fixed on the wall (the same height as the front-facing camera), and the front-facing camera is facing the QR code to create points according to the prompts. | Optional |
| An entry point for the elevator | There is no need to manually create at present, the ladder control area will be automatically generated after drawing | | Sites that require elevator control must be created; no manual creation is required. |
| Initialization point | Not currently in use | | Optional |

4.2.3. Combining New Paths

1. Click the **"Combine new path"** button.
2. Enter the name of the combined path.
3. Add the path to be cleaned.
4. Edit the sequence.
5. Save.



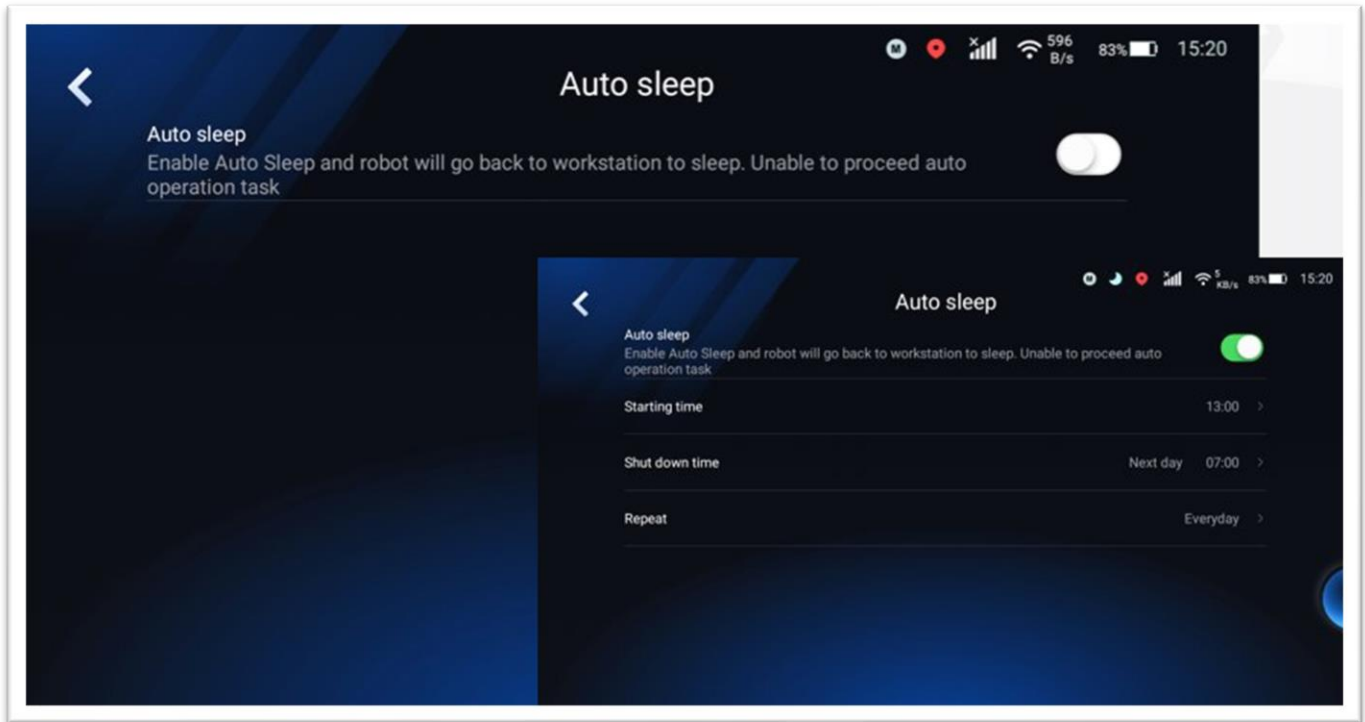
4.3. Settings

The following features are included:

- **Basic settings:** not functional currently
- **Auto Sleep:** Set the sleep time of the robot
- **Robot data operation:** for map backup
- **Advanced setting:** parameter settings, account creation
- **Update:** Manually update the APP version

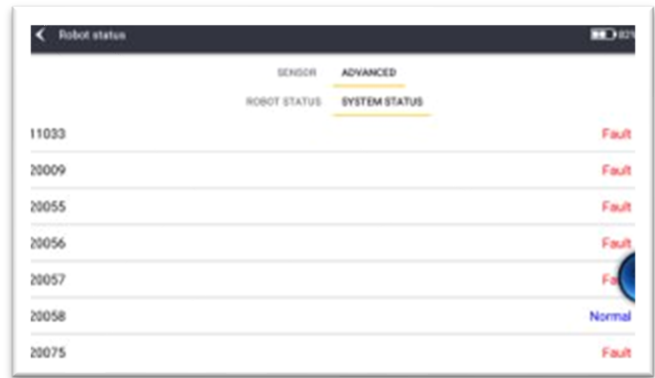
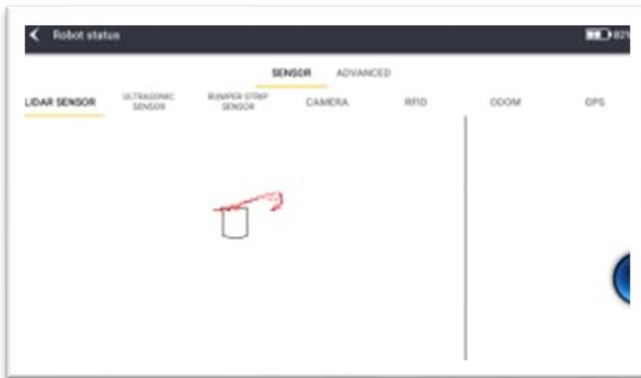
4.3.1. Auto Sleep

If "**Auto Sleep**" is enabled, when the scheduled time arrives, the robot will automatically return to the charging pile/workstation. When the sleep time is over and the robot has unfinished tasks, it will leave the pile to complete the cleaning task.



4.3.2. Robot Status

There are two items in the robot status: SENSOR and ADVANCED.



SENSOR

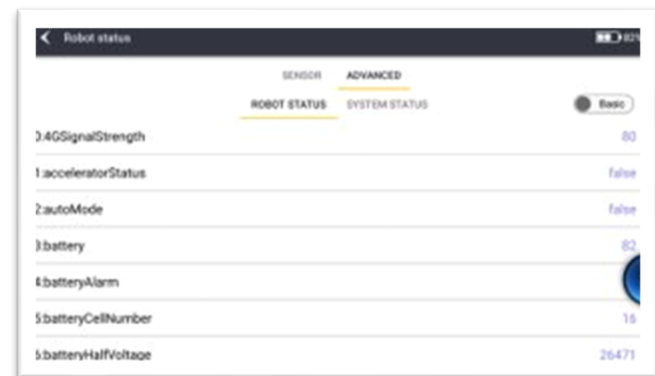
You can see whether each sensor is working normally through the sensor interface:



The laser point needs to be outside the robot. You can see that the green line retracts when the ultrasonic sensor is covered by hand.

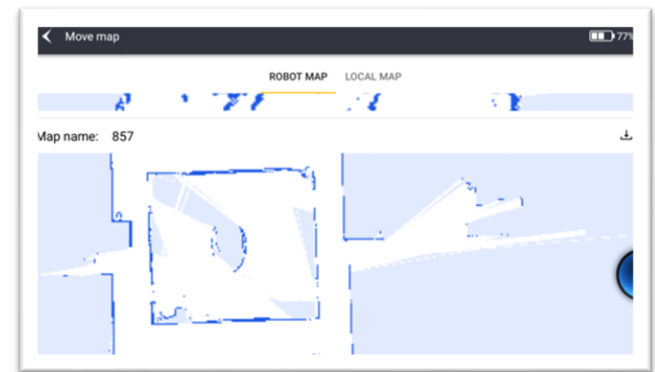
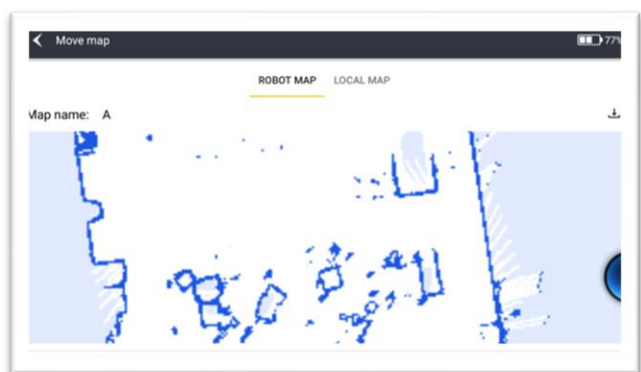
The color of the lights will vary from **green** to **red** when the anti-collision switch is activated.

Orange-yellow clouds are captured by the front and rear cameras.



4.3.3. Moving a Map

The "**ROBOT MAP**" is stored in the hard disk of the upper computer, and the "**LOCAL MAP**" is stored in the tablet.



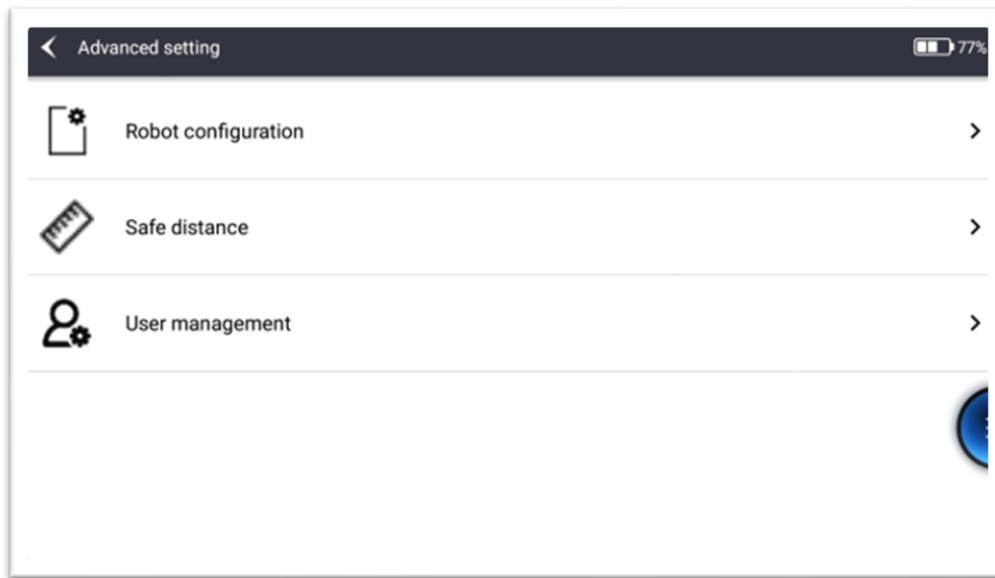


NOTE:

- It is recommended to back up the "ROBOT MAP" to the "LOCAL MAP" after the deployment is completed, to prevent the operator from deleting it by mistake. If the control box is suddenly damaged and the robot cannot be started, this backup can avoid the loss of the map.

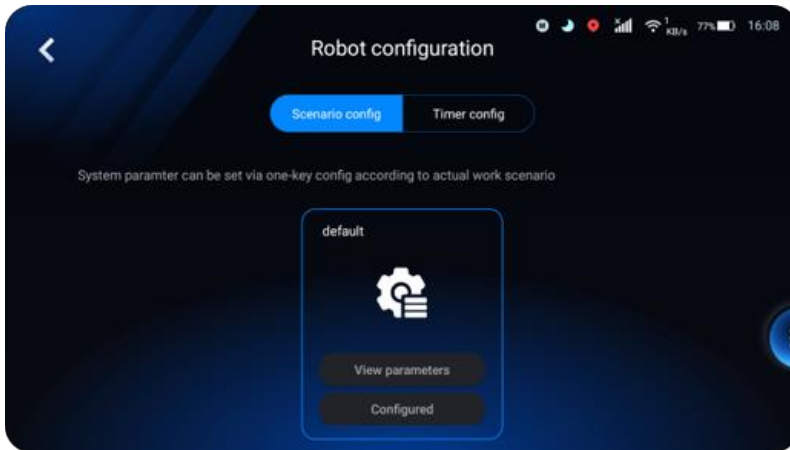
4.3.4. Advanced Settings

Advanced settings include the following features:

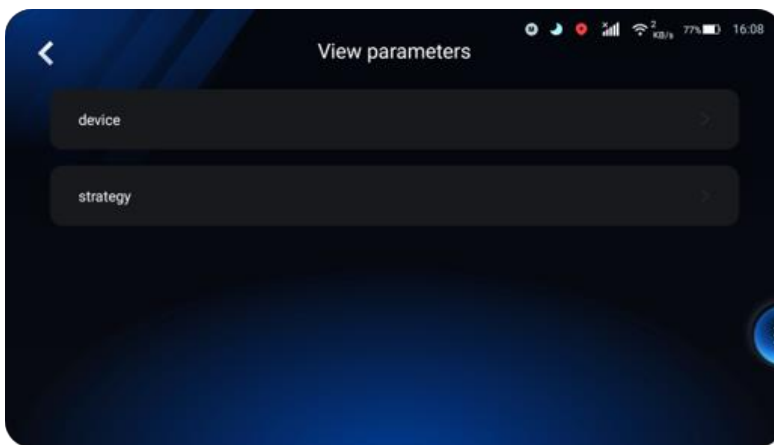


1. **Robot configuration:** various parameters.
2. **Safe distance:** do not need to use temporarily, do not modify.
3. **User management:** create new accounts, delete accounts, view passwords.

Robot configuration: scene configuration, timer config.

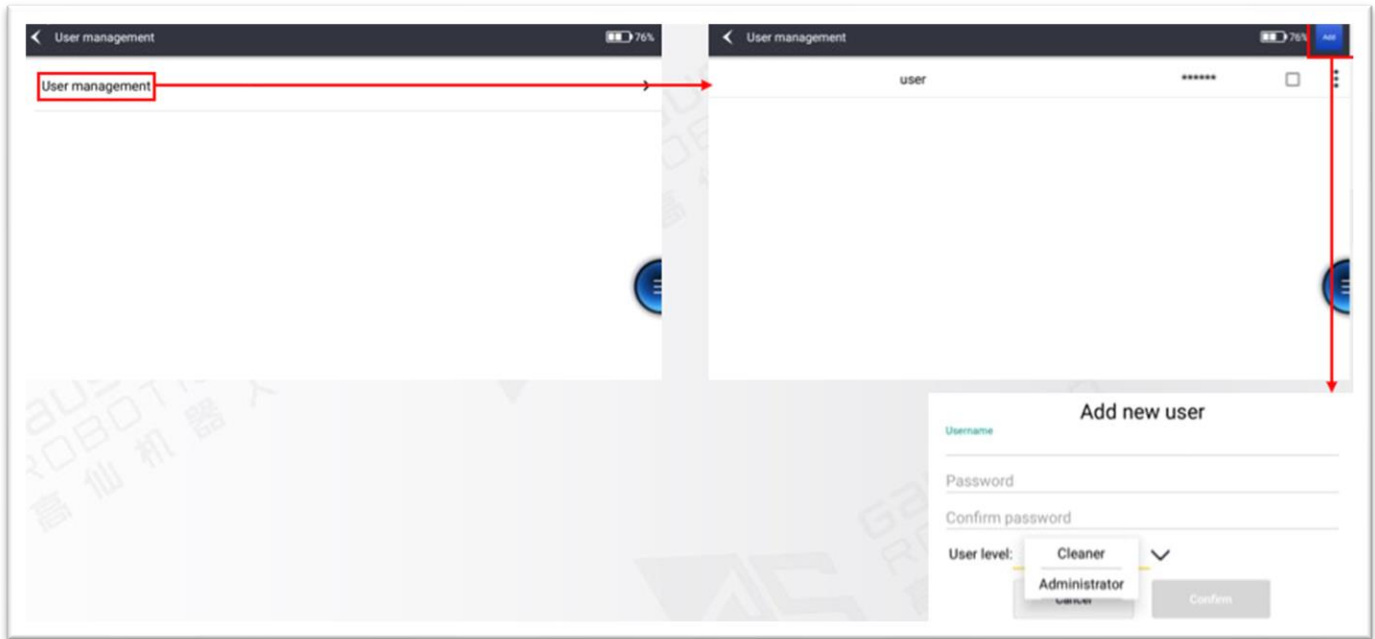


The scene configuration is mainly “**View parameters.**”



Deleting and creating accounts in “User Management”

1. Click the “**Add**” button.
2. Enter “**Username**” and “**Password.**”
3. Select “**User level.**”
4. Click **OK** to create a new account.

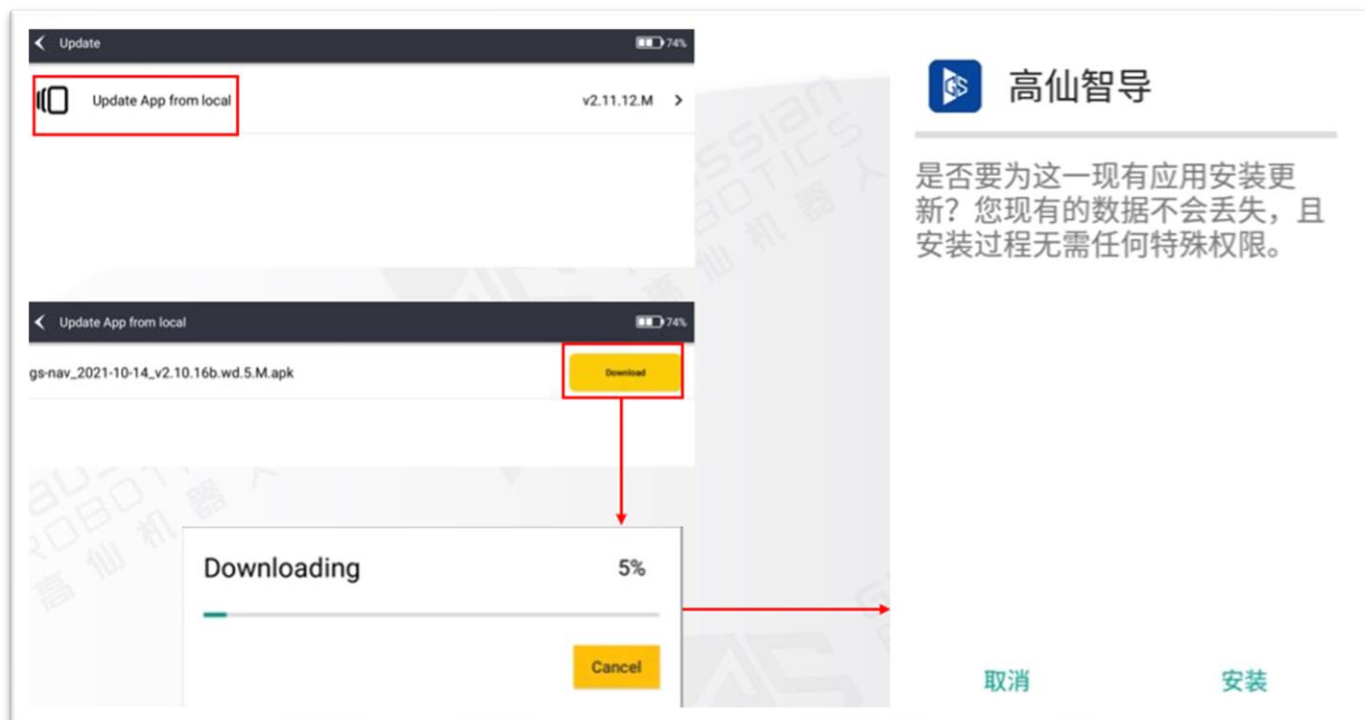


NOTE:

- Permission for a specific account can be customized as per a given situation.

4.3.5. System Updates

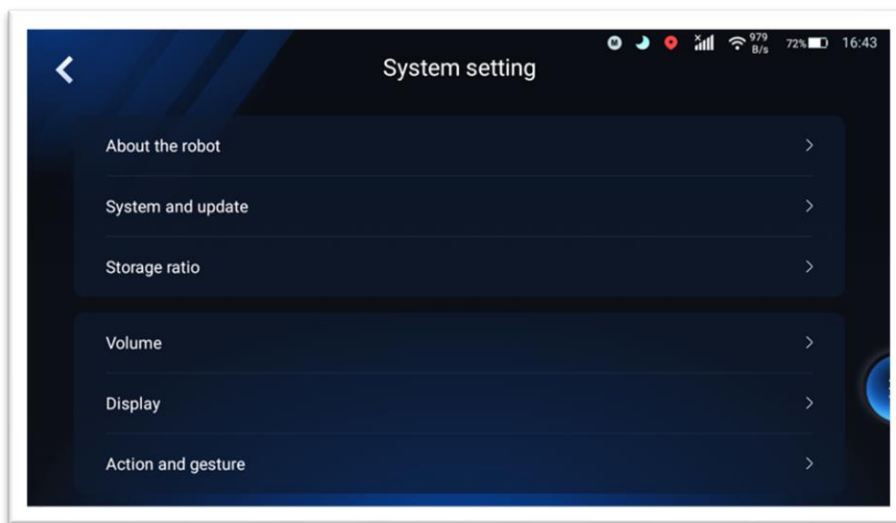
1. Click "**Update APP from local.**"
2. You will see the list of available APP versions.
3. Click the download button on the right and follow the prompts to complete the update.



5. SYSTEM SETTINGS

There are 6 modules in the "**System Settings**":

- [About the robot](#),
- [System and update](#),
- [Storage ratio](#),
- [Volume](#),
- [Display](#),
- [Action and gesture](#).



5.1. About the Robot

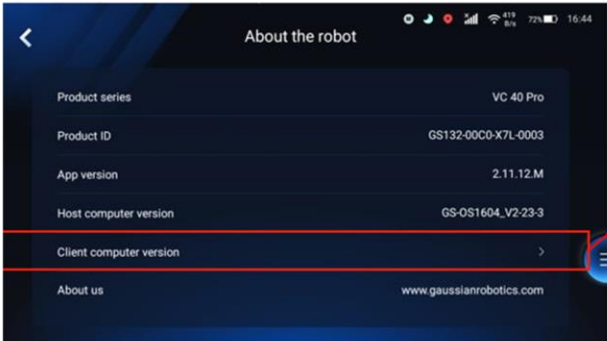
Product model: Scrubber 50, or else Product

Product ID: robot SN

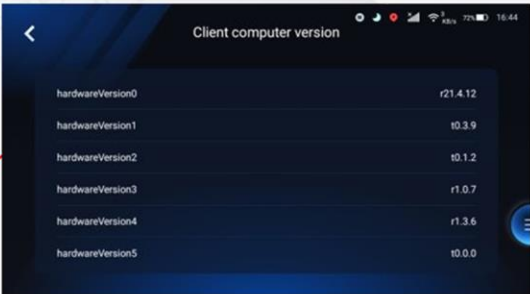
APP version: G-mind version number

Host computer version: software version number

Client computer version: focus on 1, 7, 8



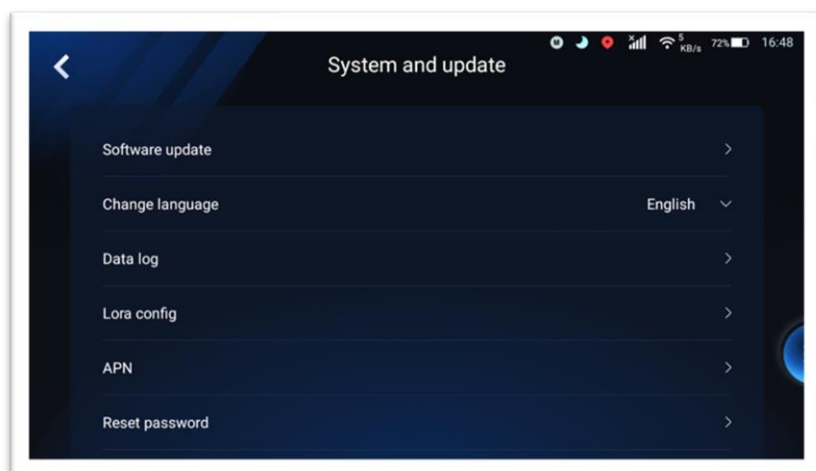
| ID | 描述 | 释义 |
|------------------|--|----------|
| hardwareVersion0 | VERSION_DATA_PRODUCT | 产品版本号 |
| hardwareVersion1 | VERSION_DATA_MAIN_CONTROL_BOARD(STM32) | 主控制板版本号 |
| hardwareVersion2 | VERSION_DATA_AVR | AVR版本号 |
| hardwareVersion3 | VERSION_DATA_IMU_BOARD | IMU版本号 |
| hardwareVersion4 | VERSION_DATA_ULTRASONIC_BOARD | 超声版本号 |
| hardwareVersion5 | VERSION_DATA_BACK_MAIN_CINTROL_BOARD | 下位机回滚版本号 |
| hardwareVersion6 | VERSION_DATA_BATTERY_VERSION | 电池版本号 |
| hardwareVersion7 | VERSION_DATA_MOTOR_DRIVER_VERSION | 驱动器版本号 |
| hardwareVersion8 | VERSION_DATA_ANTI_DROP_VERSION | 气压碰撞版本号 |



5.2. System and Update

There are 7 modules in the “**System and Update**” section:

1. [Software update](#)
2. [Change language](#)
3. [Data log](#)
4. Lora config*
5. [APN](#)
6. [Reset password](#)
7. [Change time zone.](#)





NOTE:

- The “**Lora config**” module is currently unavailable, waiting for the latest version to access it.

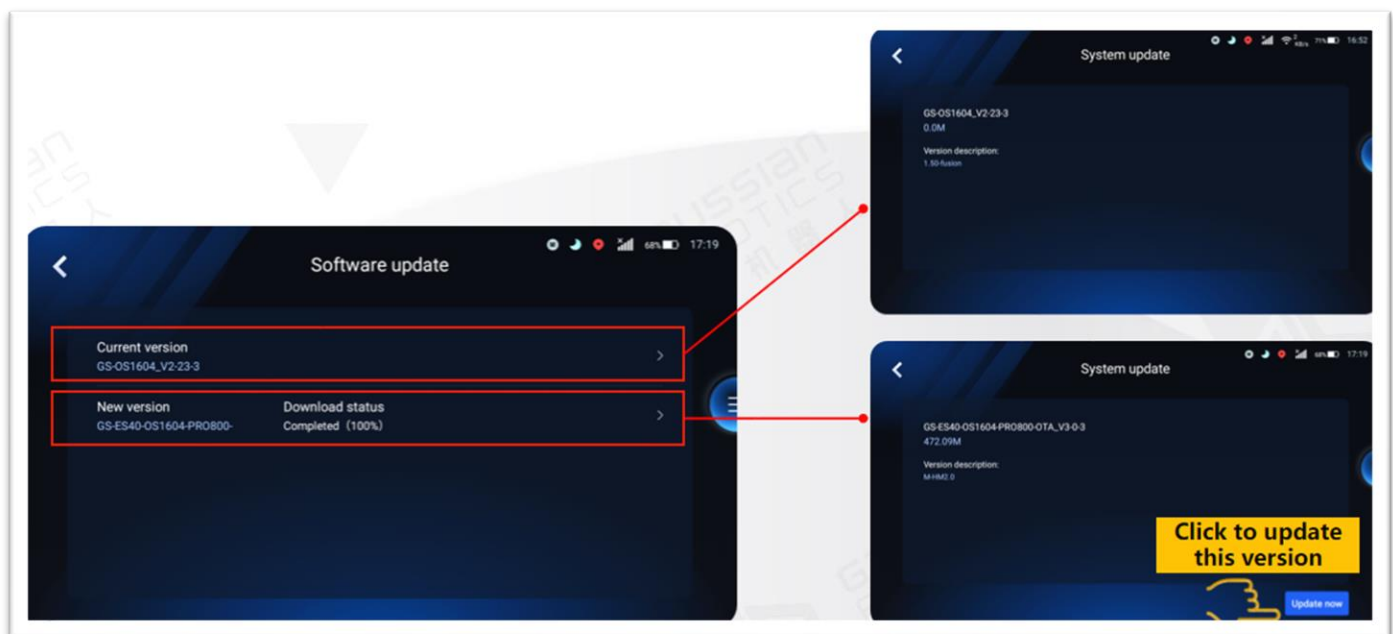
5.2.1. Software Update

Current version:

Description of the G-mind version used by the current robot.

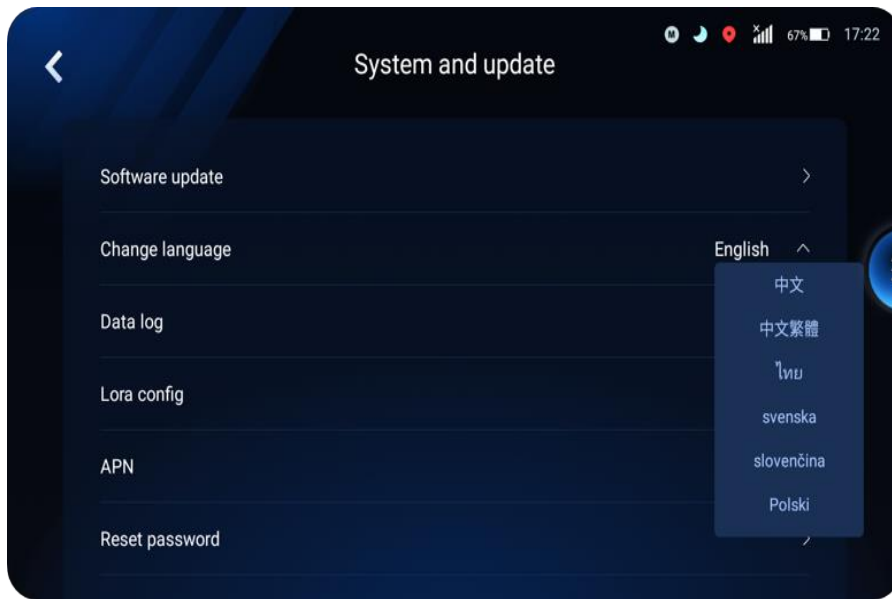
New Version:

The version is currently available for updates, and release notes.



5.2.2. Language Switch

Currently, the APP supports 15 languages:

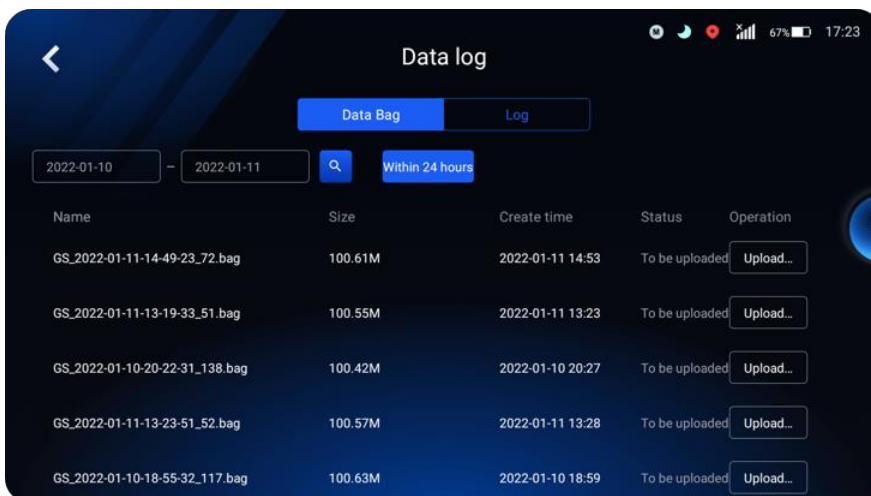


- Simplified Chinese
- Traditional Chinese
- Thai
- English
- Swedish
- Slovenian
- Korean
- Japanese
- German
- French
- Polish
- Dutch
- Norwegian
- Czech

After switching the language, the APP will automatically log you out, and you will need to log in again.

5.2.3. Data Log

You can filter data bags and logs by date, and by module:



*** The "Tempo Studio" tool is used to back up the current data bag/log copy.

5.2.4. APN

APN is used for overseas markets:

Enter the address in the **APN** field and click **Confirm**.

For the settings in specific overseas regions, please contact the local technical support engineer.

5.2.5. Reset Password

First, enter the original password (current password), then enter the new password and confirm, and click "**OK**" to complete.



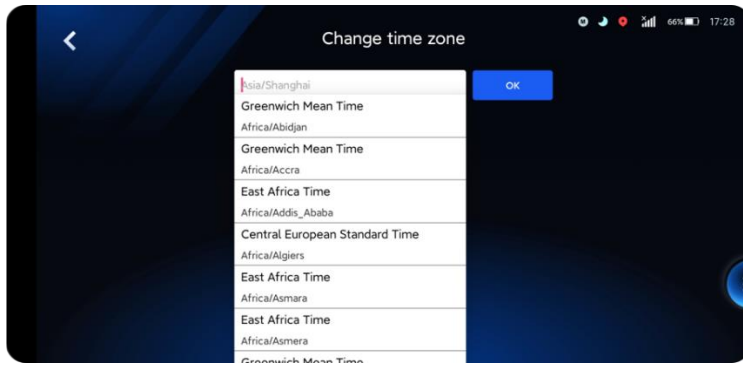
NOTE:

- You can only modify the password of the current account here; if it is an admin account, you cannot modify the user account password.

5.2.6. Change Time Zone

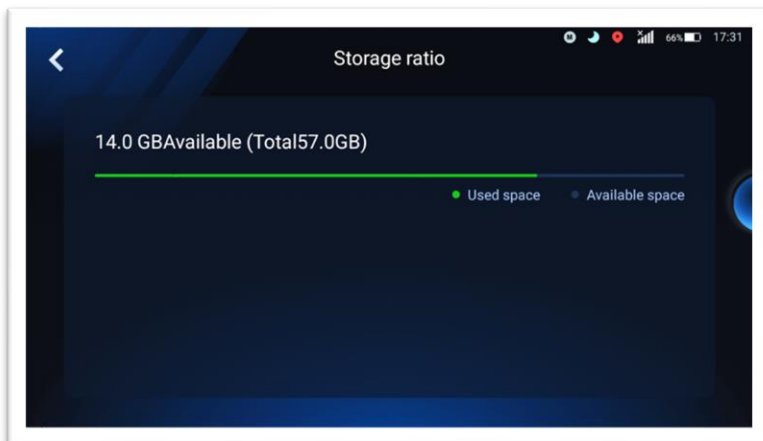
1. Enter the "**Change time zone**" interface and enter text to filter.

2. Select the needed time zone.



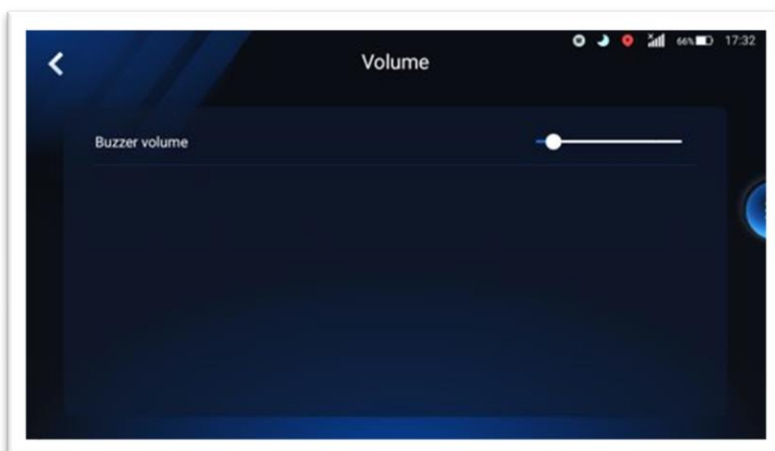
5.3. Storage Ratio

After entering this interface, you can view the total amount of disk, and the current remaining free space:

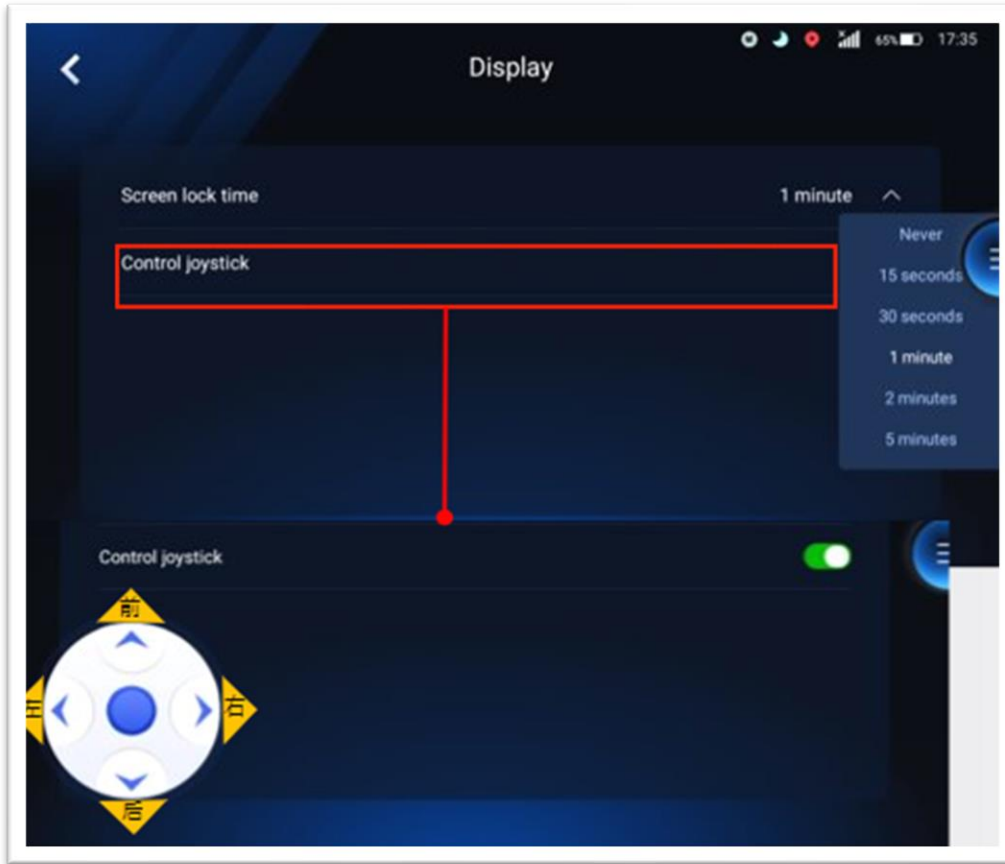


5.4. Buzzer Volume/Display

Enter this interface to adjust the buzzer volume:



Adjust the volume here and synchronize the volume in the drop-down menu.



After entering this interface, you can adjust the **Screen lock time**, and open the **Control joystick** to control the robot to walk through the front, back, left, right, and azimuth keys.

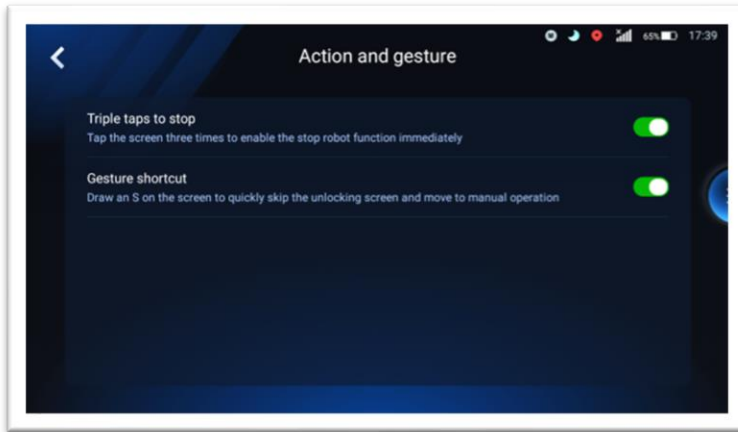


NOTE:

- The Control joystick works in automatic mode only.

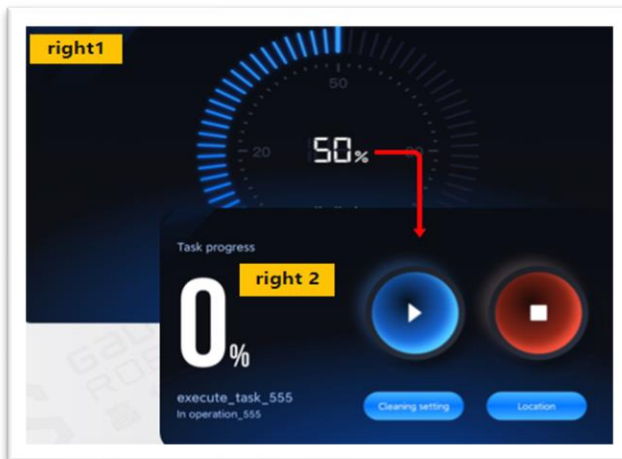
5.5. Action and Gesture

Enter this interface for opening/closing the “**Triple taps to stop**” and “**Gesture shortcut**” switchers/sliders.



5.5.1. Triple Taps to Stop

1. Lock the screen during automatic tasks.
2. Tap the screen **3 times in a row**, to enter the "**Task progress**" interface.



5.5.2. Gesture Shortcut

1. Lock screen during automatic tasks.
2. Draw "S" to enter the "**Task progress**" interface.

6. NETWORK MANAGEMENT

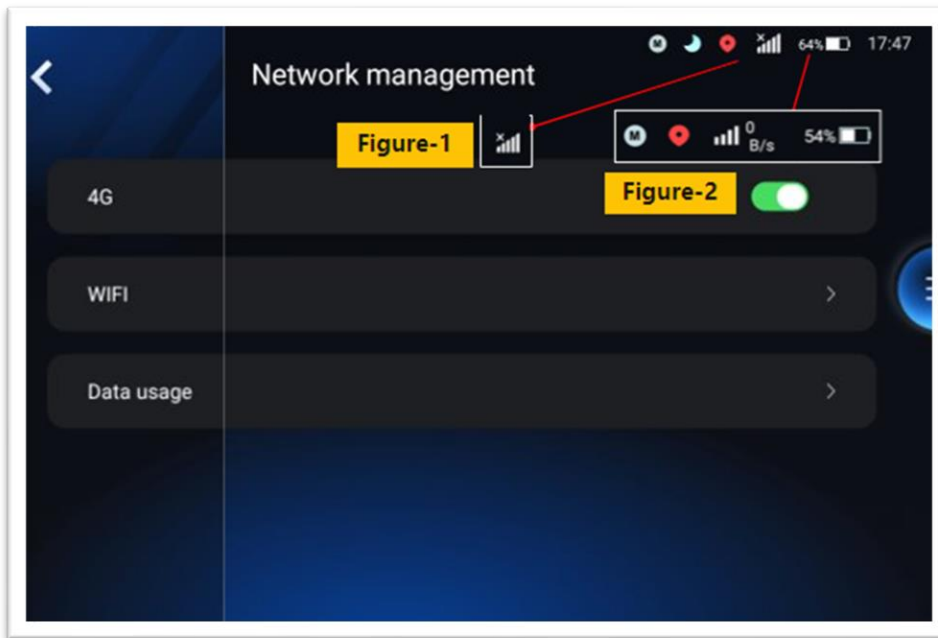
There are 3 modules for network management:

- [4G](#)
- [Wi-Fi](#), and
- [Data usage](#)

6.1. 4G

4G network open and close buttons.

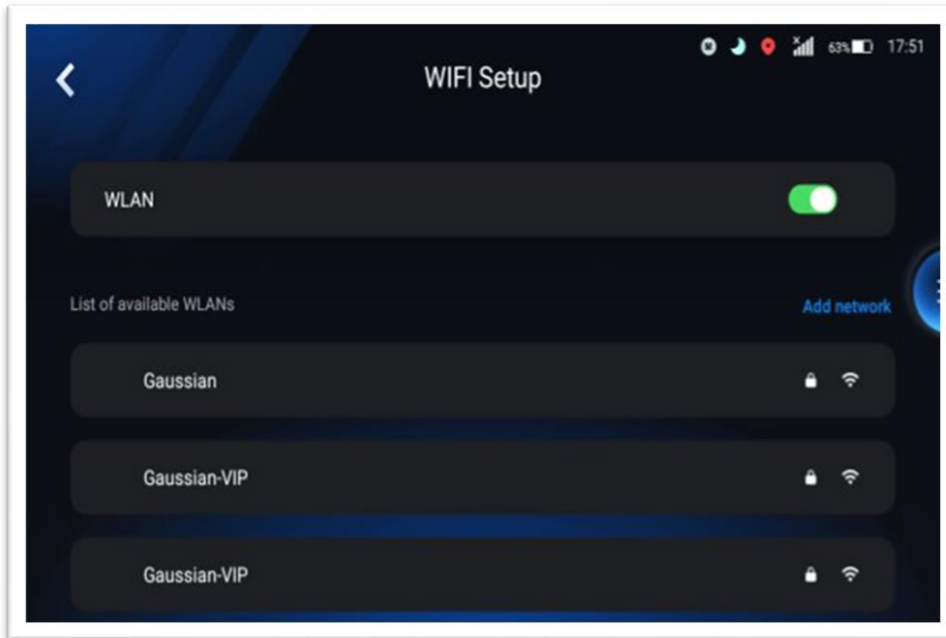
- the network status is white,
- the non-network status will be displayed in the lower right corner of the 4G icon.



6.2. Wi-Fi

Select the Wi-Fi that can be connected in **"Wi-Fi management."**

If the Wi-Fi is turned off, the Wi-Fi icon will be hidden in the status bar.

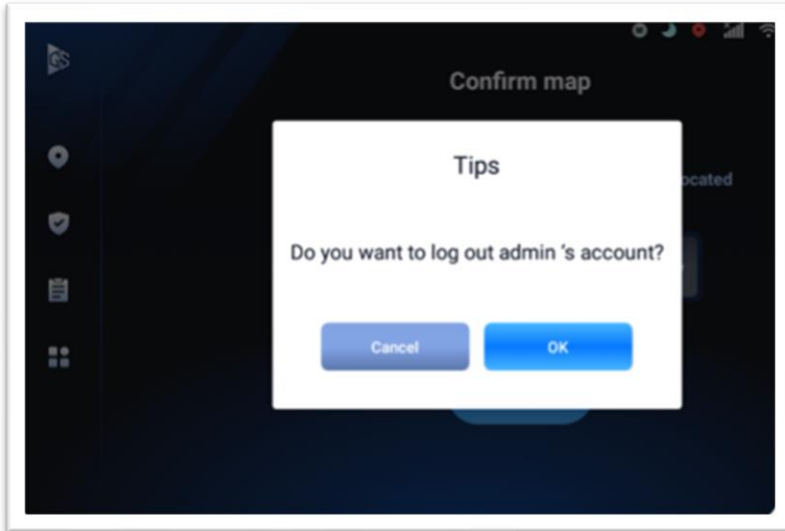


6.3. Dataflow statistics

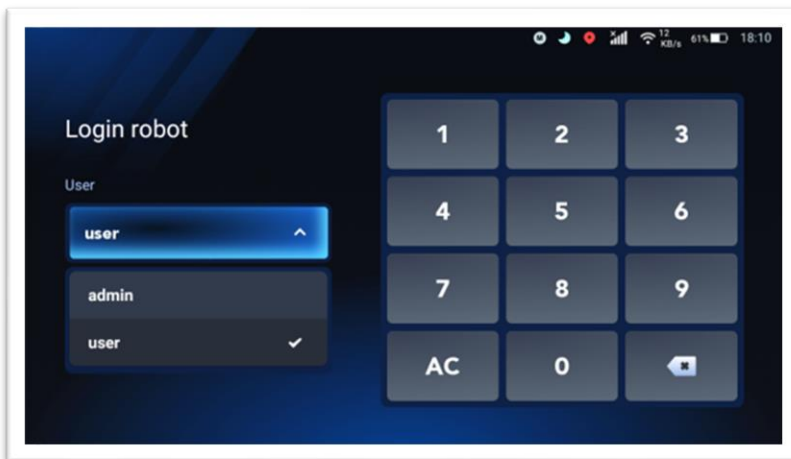
Data usage statistics under Wi-Fi or 4G network.

7. LOGOUT

After clicking logout, a pop-up warning appears asking you to either confirm or cancel your log out of the APP.



1. Click the **"OK"** button to confirm logging out of your account.
2. Otherwise, you may click **"Cancel"** to abort the procedure.
3. Then, you can switch to another account and log in again.



8. TROUBLESHOOTING

The scrubber may not work as you expected. Based on the data fed back by the technical support personnel, we have measured the most common failure situations, and given effective troubleshooting methods and solutions for the above failure situations. In the event of a failure, you can refer to the following table for first-time troubleshooting.

| Fault Phenomenon | Probable Causes of Fault | Solution |
|---------------------------------------|--|---|
| Unclear or double-created map | The scrubber moves at a high speed, resulting in an inadequate quality of the created map. | Please control the scrubber to move at a slow speed during mapping. |
| | The sensor is contaminated with dust or blocked by obstacles. | Clean the outside of the laser sensor with a dust-free cloth. Check whether there is any foreign object near the sensor. If so, please remove it in time. |
| | The environment where the scrubber is located is complicated, and there are high-transparency materials such as glass walls. | During mapping, if it is found that there are high-transparency materials in the surrounding environment, please draw a visual wall in time to control the map boundary. |
| Indistinct or ghosting drawing | The traveling speed of the robot is too fast, resulting in poor-quality mapping. | Please control the robot to run at a slower speed to scan the map. |
| | The sensor is dusty or obscured by obstacles. | Clean the outside of the laser sensor with a dust-free cloth, check if there are foreign objects near the sensor, and remove them if any. |
| | The environment is more complex, and there are glass walls and other high-permeability materials. | When mapping, if high-permeability materials are found in the surrounding environment, please draw a virtual wall to control the map boundary. |
| Initialization failed | <ol style="list-style-type: none"> 1. The wrong map has been chosen 2. Not located at the marked point 3. Surrounded by the crowd at a short distance | <ol style="list-style-type: none"> 1. Choose the correct map 2. Push to the marked point 3. It is prohibited to be surrounded by the crowd |
| Robot does not move | The robot has no power, cannot turn on, and cannot move. | Please connect the charger to the charging port of the robot to charge, and then control the movement of the robot after the battery is fully charged. |


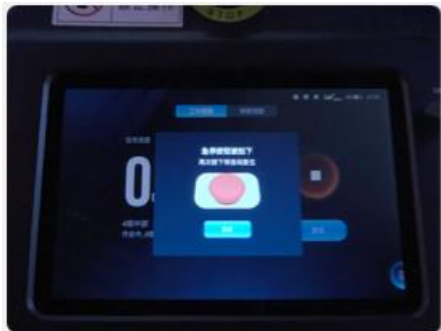

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| | The scrubber is powered off, and it cannot be started and moved. | Please insert the key into the start-up keyhole on the control panel and rotate the key to start the scrubber. Then, try to control the scrubber to move. |
| | The implemented mode is the automatic mode | It is necessary to switch to manual mode by hand. |
| | The red emergency stop button on the control panel is pressed, which results in emergency braking of the scrubber and prevents it from moving. | Please turn the red emergency stop button clockwise and release it to restore the movement function of the scrubber. |
| The robot roller brush fails to rotate | The roller brush button on the control panel is closed and cannot start cleaning. | Open the roller brush button on the control panel and turn it on to see if the roller brush is put down close to the ground. |
| | The brush is wound around the wire garbage, and it is stuck and thus fails to rotate. | Please remove the roller brush for cleaning. After cleaning, install it back into the scrubber. |
| | The full-tank indicator of the recovery tank or the empty-tank indicator of the freshwater tank on the control panel is steady red, indicating that the recovery tank is full or no clean water is in the freshwater tank, and the scrubber cannot continue cleaning. | Drive the scrubber to the maintenance zone to drain sewage, add clean water, and then continue cleaning. |
| The scrubber fails to absorb water | The squeegee mount is not set down. | Press the button of the squeegee blade on the control panel to open it and observe whether the squeegee blade is put down. |
| | The suction button on the control panel is closed so water cannot be absorbed. | Press the suction button on the control panel to open it and check whether the suction function works. |
| | The full-tank indicator of the recovery tank or the empty-tank indicator of the freshwater tank on the control panel is steady red, indicating that the recovery tank is full or no clean water is in the freshwater tank and the scrubber cannot continue cleaning. | Drive the scrubber to the water room to drain sewage or add clean water, and then continue cleaning. |





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| | The connection of the water suction hose is improper, or the water suction hose inhales unidentified objects, causing a blockage. | Check whether the water suction hose is properly connected to the front of the squeegee blade and the recovery tank and whether there is any blockage. If there are any, please adjust or remove them in time. |
| | There is solid residue adhered to the squeegee blade, or the squeegee blade deforms or is severely damaged and worn, affecting the water-gathering effect. | Clean the squeegee blade, adjust the structural shape, or directly use a new squeegee blade. |
| The cleaning effect of the scrubber is poor | The brush has not been cleaned for a long time and is contaminated with a lot of dust and dirt, which affects the cleaning effect. | Remove the roller brush for cleaning and install it back into the scrubber after cleaning. |
| | The brush is severely worn, and the cleaning performance is poor. | Replace with a new roller brush of the same specification. |
| | The type of brush does not apply to the floor type. For example, a brush is used to clean an epoxy floor. | Please refer to the instructions for consumables, and select a brush or cleaning pad suitable for the floor material for cleaning. |
| | The floor to be cleaned is quite dirty or there is a large solid waste on it, so the scrubber cannot clean it all at a time. | Pick up the solid waste on the floor before cleaning, and then repeat the cleaning several times to ensure the best cleaning effect. |
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| The scrubber cannot be charged | The power outlet is powered off and does not supply power. | Please make sure that the power outlet is powered. It is recommended that the charger be connected to another outlet for verification. |
| | The charger is damaged and cannot be charged. | Please check whether the indicator of the charger is steady red. If it is, charging is normal. If it is off or blinking, the charger is working abnormally. In this case, please contact AROS Technical Support personnel to apply for repair. |
| | The battery is damaged and cannot be charged normally. | If the charger functions normally, but the percentage of battery level does not increase with the extension of the charging time, it means that the battery is damaged or abnormal. In this case, please contact AROS Technical Support personnel to apply |





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| | | for battery replacement. |
| The scrubber cannot be started | <ol style="list-style-type: none"> 1. The air switch is off. 2. The battery runs out. 3. The key switch is not turned on. | <ol style="list-style-type: none"> 1. Turn on the air switch. 2. Charge the battery. 3. Turn on the key switch. |





If you have tried all the solutions to the above problems still exist, or if the problems you have met are not listed above, please contact AROS Technical Support for further assistance. Thank you for your co-operation.




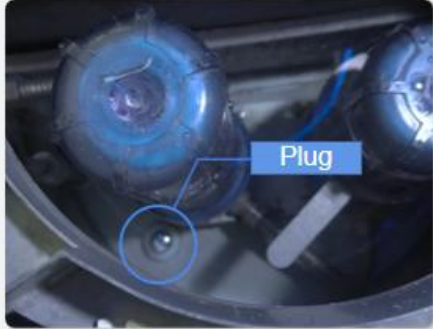

9. APPENDIX A. SOLUTIONS FOR COMMON PROBLEMS

| Problems | Possible Reasons | Solutions |
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| Power-on failure | Air Switch  | Check if the air switch has been turned on. |
| | Battery Activation  | Remove the dust cover of the charging port in the robot and charge the robot for a while, then try to power it on again. |
| | Emergency STOP button engaged  | The robot will pause the current cleaning task when the emergency STOP button is pressed. Press the button again to continue the current cleaning task. |
| Intermittent lag |  | Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off. Then, push the robot to the maintenance point in manual mode. |
| | Wipe external sensors | Check if there is contamination on the surface of the camera or laser, or if they are blocked by something |

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| No actions after starting auto-operation |  | else. Use a soft, clean, and lint-free wipe to clean the surface of the sensors. |
| | Clean front horizontal laser  | Lift the latch of the front bumper and open the shell and clean the front horizontal laser. Close the shell after cleaning. |
| | Emergency STOP button engaged  | Check if the emergency STOP button was pressed. (Red liner light indicator means it was pressed, blue light means it has been released). If it was pressed, click "confirm" on the screen, and press the button again to continue the cleaning task. |
| | Robot lost locating  | Check if the robot lost locating. (White icon means locating is normal, red means lost). If the robot lost locating, push the robot to the landmark point for re-locating. |
| | Alarm message | Open "Health management" and check if there are alarm messages. If they cannot be resolved, please take photos, and contact us for support. |

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| An abnormal noise from rubber strips | <p>Something adhered to strips</p>  | <p>Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off. Then, push the robot to the maintenance point. Lift the squeegee and clean the strips with a clean wet wipe.</p> |
| | <p>Strips damaged or worn</p>  | <p>If the strip is damaged or worn, please do the replacement.</p> |
| Water stains left on the ground | <p>Something adhered to a strip</p>  | <p>Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off. Then, push the robot to the maintenance point. Put on gloves and lift the squeegee to check if something is adhering to the strip. Clean strips with a clean wet wipe.</p> |
| | <p>Air leakage into the water tank</p> | <p>Remove the water tank cover and check if the sealing strip on it is good.</p> |



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| | <p>The cap of the drainage pipe</p>  | <p>Check if the cap of the drainage pipe was closed tightly.</p> |
| | <p>The suction pipe is blocked</p>  | <p>Check if the suction pipe was inserted well or blocked. Loosen the locking screw and remove it and check for any blockage inside it.</p> |
| | <p>Improper height of squeegee</p>  | <p>Engage the squeegee to touch the ground. Check the height of casters and adjust it to achieve a 30-45° between the strip and the ground.</p> |
| | <p>The rubber strip is damaged or worn</p> | <p>If the strip is damaged or worn, please refer to the maintenance guide - rubber strip replacement to do the replacement.</p> |

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| No or low water spray | <p>Filter timeout or overload</p>     | <ul style="list-style-type: none"> ➤ Press the auto/manual mode switch button for 3 seconds and confirm that the button indicator light is turned off. Then, push the robot to the maintenance point. ➤ Open the cap of the wastewater pipe and quickly put it down to drainage (<i>Kind reminder: hold the pipe upward when opening the cap</i>). ➤ Unplug the plug in the clean water tank after the wastewater tank has been emptied. The water in the clean water tank will flow into the wastewater tank. Then, continue to empty the wastewater tank using a wastewater pipe. ➤ Remove the filter bag, filter bottle & cartridge, and steel wire filter. ➤ Flush and clean the filter bag, filter bottle & cartridge, and steel wire filter. ➤ Put the water tank cover back. ➤ Close the top lid. ➤ Ensure the cap is closed tightly, then withdraw the drainage pipe. |



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| Auto-charging failure | Power supply failure | Check the power supply to the workstation. |
| | Rear camera contaminations | Check if there is contamination on the surface of the rear camera, or if it is blocked by something. Clean it with a soft, clean lint-free wipe. |
| | Obstacles around | Remove all obstacles around the workstation and charging pile. |
| | QR code for docking dirty or damaged | Check if the QR code is dirty or damaged. Clean it with a clean wet pipe. |
| | Improper air switch position | Check and turn the air switch of the robot on. |



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| Poor water absorption | The power adapter is damaged | Connect the power adapter with the robot first. Then connect the adapter to the 220VAC power supply. The flashing red indicator means charging is ongoing. If the indicator is off, it means the power adapter could be damaged. Please contact AROS Technical Support for assistance. |
| | The rubber is worn and damaged | Change rubber. |
| | The suction outlet of the water-sucking scratcher is blocked | Remove dirt. |
| | The water tank cover is not well covered | Readjust the water tank cover. |
| | The suction volume of the cleaning configuration is too small | At least, ensure that the suction volume is greater than 70%. |
| | The caster wheel is loose | Readjust the height of the caster wheel to make the rubber contact the ground best. |
| | Excessive water, over 30% | The amount of water sprayed on the marble floor should be kept at 20% ~ 25%. |
| Filtration overload | The steel mesh of the sewage tank is damaged or dirty | If damaged, it should be replaced; if it is too dirty, it should be cleaned. |
| | The filter element of the clean water tank is too dirty | Clean or replace the filter element. |
| | Problems with the filter pump body | Replace the pump. |
| | The water pipe is bent or blocked | Straighten the water pipe and replace it if it cannot be restored. If the blockage is serious, replace it. |
| Water-spraying overload | The steel filtering screen of the clean water tank is too dirty | Clean or replace the steel filtering screen. |

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| No spraying | The solenoid valve is damaged | Replace the solenoid valve. |
| | The amount of clean water in the clean water tank is too small | Add clean water. |
| | The steel filtering screen of the clean water tank is too dirty | Clean or replace the steel filtering screen. |
| | The solenoid valve is damaged | Replace the solenoid valve. |
| | The electric ball valve is damaged | Replace the electric ball valve. |
| | The water pipe is broken or leaked | Replace the water pipe. |
| No filtering | The filtering function is turned off by the tool on the APP main interface | Turn it on manually. |
| | The water level of the sewage tank did not make the third floating ball float | Without treatment, the sewage will be automatically filtered when it reaches a certain water level. |
| | The steel mesh of the sewage tank is too dirty | Clean or replace the steel mesh. |
| | The filter element of the clean water tank is too dirty | Clean or replace the filter element. |
| | The filter pump body is damaged | Replace the filter pump. |
| There are wheel marks on the ground | Check the wheels for dirt | Clean the rubber coating of the rear wheel with a brush. |
| | There is a stained layer on the surface of the ground | Clean it with Gaussian special detergent. |
| | The wheel encapsulation is hard | Replace it with the wheel with softer encapsulation. |
| Locating failed | The robot is not within 2 m of the landmark point | Push it within 2 m of the landmark point. |
| | The wrong floor is selected | Move it to the right floor. |
| | The location and environment of landmark points change too much | Delete old landmark points and create new landmark points. |
| Running is stuck or the head swings | Dirty sensor | Please wipe it gently. |
| | Scratched sensor | Replace parts. |
| | Impacted by strong and direct light | Contact the after-sales personnel for handling. |
| | Inaccurate TF | Calibrate TF. |
| No voice for obstacle avoidance | The power amplifier is turned off | Turn on the power amplifier. |
| | No voice files | Contact the after-sales personnel for assistance. In the future, customized voice content will be supported. |
| | System problems | Contact the after-sales personnel for assistance. |

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| Robot cannot be charged | Speaker failure | Replace the speaker. |
| | The air switch is disconnected | Close the air switch manually. |
| | Damaged charger | Contact the after-sales personnel to replace parts. |
| | The plug-in row is not powered | Replace the plug row or change the charging position. |
| Stop in automatic task | Full sewage tank | Discharge sewage. |
| | Empty clean tank | Add clean water. |
| | The wheel is stuck | Move the robot manually and solve environmental problems. |
| | Other faults | Check the APP alarm and contact after-sales personnel for handling. |
| Unable to enter APP | Loose network cable leads to disconnection of host and slave computers | Re-insert the network cable and tighten it. |
| | Loose network cable of the all-in-one robot | Re-insert the network cable and tighten it. |
| | All-in-one robot failure | Replace the all-in-one robot. |
| | Control box failure | Replace the control box. |
| | System failure | Update the system version. |
| The brush/water-sucking scraper cannot be lowered | No lowering is set under cleaning mode | Reset the cleaning mode. |
| | Structural interference results in the inability to lower | Confirm the interference position for structural adjustment or replacement of components. |
| | Push-rod motor failure | Replace the pushrod motor. |
| | Drive failure | Update parameters and replace the drive. |

10. APPENDIX B: TECHNICAL SPECIFICATION

| Parameter Type | Parameter | Value |
|-------------------------------|--|---|
| ROBOTICS | Navigation Technology | Integrated Lidar-Visual SLAM |
| | 3D LIDAR | No |
| | Primary Laser detection distance | 25 m |
| | Laser scanning angle | 270° |
| | Secondary Laser detection distance (level) | No |
| | Secondary Laser detection distance (inclined) | No |
| | Depth Cameras | 3* Real sense camera |
| | Ultrasonic Sensors | Yes |
| | Anti-drop Sensor | by using an inclined laser |
| | Collision sensor | Yes |
| | Mapping Process | Easy onsite mapping (off-line, on-screen) |
| | Mapping Efficiency (e.g., 3,000 sqm) | 1 hour |
| | Map Editing | On-site, Off-line, On-Screen |
| | Single map coverage | Max. 30,000 m ² |
| | Dynamic Map updating | Yes, a maximum of 30% |
| | Minimum distance close to the wall | 7-10 cm |
| | Ability to detect thin poles and hanging obstacles | Able |
| | Dynamic path planning | Yes |
| | Obstacle avoidance strategy | slow down-stop-wait-bypass-replan path |
| | Start the task anywhere on the map | Yes |
| | Continue the previous task after interrupting/switching to manual mode | Continue from where it stopped |
| | Ability to work in complicated and dynamic scenes | Able |
| | Can detect obstacles higher than N cm | 10 cm |
| SOFTWARE & DIGITAL | Cloud Platform to check the statistics and monitor | Yes |
| | Task Reports and Alerts | Auto-generated and comprehensive email |
| | Mobile App | Yes |
| | Account with different access levels | Yes |
| | Scheduling function | Yes |
| | OTA | Yes |

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| | Ability to work offline | Yes |
| | Manual mode | Yes, Push behind |
| | Adjustable cleaning mode | Yes |
| CLEANING PERFORMANCE | Working width | 50 cm |
| | Water absorption width | 72 cm |
| | Disc Brush RPM | 270 |
| | Cleaning down-pressure | 12,5/15 kg |
| | Number of main brushes | 2 pcs |
| | Optional Rolling brush | Yes |
| | Clean Water Tank Capacity | 24 l |
| | Recovery Tank Capacity | 18 l |
| | Filtration function | 4-stage filtration system |
| | Cleaning speed | 1.1 m/s |
| | Charging time | 1-2 hours |
| | Operation time | 2.5 hours |
| | Cleaning efficiency | 800-1200m ² /h |
| | Max. cleaning area/Charge | 2,000 m ² |
| KEY COMPONENTS AND OTHERS | Battery capacity | 24V / 40Ah Li-ion |
| | The weight of the body (including the battery) | 150 kg |
| | Warning lights | Yes |
| | Dimensions (mm) | 860 (L) X 700 (W) X 1030 (H) |

