

# **GS-Phantas S1**

## **OPERATION GUIDE**



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## INTRODUCTION

The Cleaning Robot Phantas S1 by Gausium (alias "Gaussian Robotics"), Singapore, is a commercial floor cleaning robot that boldly integrates 4-floor cleaning modes, which grants it unrivaled versatility and usability for cleaning spaces with different types of flooring, both hard and soft.

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## 1. GENERAL

### 1.1. Product Overview

Phantas is an AI-powered floor-cleaning robot designed for small- and medium-sized commercial facilities, particularly office buildings. It integrates 4 cleaning modes and all kinds of Gausium's latest technology breakthroughs to deliver a highly productive and cost-effective all-in-one cleaning solution. Compactly designed, Phantas has strong passability and enables cleaning in tight spaces such as under-table areas. This, combined with its powerful edge-cleaning capacity, guarantees maximum floor-cleaning coverage. Driven by deep learning, Phantas can identify floor types and automatically adjust operation modes. It can also detect contaminations, perform autonomous spot cleaning, and recognize obstacle types to make smart avoidance decisions.



Phantas is developed to free up manpower and reduce human intervention to the greatest extent. The docking station and IoT connectivity provide Phantas with the highest level of autonomy. In the meantime, with the user-friendly Gausium App, operators can control floor cleaning via any smart mobile device from anywhere, anytime. The superb versatility and ease of use make Phantas a product accessible to all – it is created to serve everyone, everywhere.

### 1.2. Product Introduction

#### Strong Passability

Phantas is presumably the smallest commercial floor-cleaning robot the industry has ever seen. With its compact size, the robot can effortlessly pass through and clean narrow aisles and under-table areas.

#### Zero Distance

Backed by the side brush and high-precision sensors, Phantas can clean along the edges 0cm-close. The easy access to tight areas and powerful edge cleaning capacity guarantees maximum cleaning coverage.

#### Hassle-free Mapping Process

Phantas offers easy and hassle-free mapping and map editing via the touchscreen and the mobile app, with no need for professionals or external tools for assistance.

### **Real-time Localization & 3D Environmental Perception**

In a dynamic environment, Phantas will locate itself and update the map in real time. The multi-sensor fusion endows Phantas with 3D environmental perception, which greatly enriches its knowledge of the surrounding environment.

### **Flexible Path Planning**

Phantas offers different path planning modes for you to customize your cleaning plan, including zigzag motion, square spiral motion, and Auto Spot Cleaning.

### **Ideal for Small and Medium-sized Facilities**

Phantas is specially designed for cleaning in small and medium-sized facilities. The small size of Phantas enables superior passability and flexible movement in tight spaces such as under-table areas and narrow aisles.

- 520mm Min. Passable Width
- 650mm Min. Passable Height

### **Fitting Varied Floor Types**

Phantas is a versatile robotic cleaner with 4-floor cleaning modes — vacuuming, scrubbing, sweeping, and dust mopping. It can operate on most hard flooring materials and works perfectly on low-pile carpets. The robot can recognize floor types and will switch cleaning modes to fit different flooring materials.

- 4 Cleaning Modes
- Floor Type Recognition

### **Navigating Safely in Complex and Dynamic Environments**

In a dynamic environment, Phantas will locate itself in real-time and would not get lost due to environmental changes. Powered by AI deep learning, Phantas can recognize different types of obstacles and make advanced behavior decisions accordingly, e.g., it would bypass electric wires rather than passing them over directly.

- Real-time Localization
- Smart Obstacle Avoidance

### **Providing On-Demand Cleaning**

Phantas is an “on-demand cleaner” that provides floor cleaning services wherever and whenever needed. Auto Spot Cleaning allows the robot to clean where waste is detected; the

self-service docking stations extend the robot's uptime for around-the-clock operation; the mobile app enables cleaning tasks to be activated anytime and anywhere on the map.

- Auto Spot Cleaning
- Self-service Docking Station
- Remote-control App

## 1.3. Key Features

### All-in-one Floor Cleaning

- Integrates vacuuming, scrubbing, sweeping, and dust mopping.

### Hassle-free Mapping

- Easy mapping and map editing via the touchscreen and mobile app.

### Floor Type Recognition

- Identifies flooring types and automatically adjusts brush height to protect flooring materials.

### Zero-distance Edge Cleaning

- Able to clean along the edges at zero distance, leaving the edges spot-free.

### Auto Spot Cleaning

- Autonomously performs spot cleaning where waste is detected, bringing up to 400% efficiency improvement.

### Smart Obstacle Avoidance

- Recognizes obstacle types and makes advanced behavior decisions according to the types and features of obstacles.

### Strong Passability

- Able to pass through aisles as narrow as 520mm and as low as 650mm to clean under desks.

### Minimal Human Intervention

- Paired with a charging dock for auto power recharge, and a water tank trolley (optional) for an easy water refill.

## 1.4. Advantages

### Cloud-based Maintenance

- ❖ OTA Updates: Phantas connects to the Gausium Cloud Platform to receive over-the-air updates, offering carefree access to new features and ongoing innovations.

### Remote Maintenance Center

- ❖ The AROS Technical Support provides 24/7 cloud-based diagnostics and troubleshooting for your machine.

### Deep Learning: Smart Obstacle Avoidance

- ❖ Phantas detects static and dynamic obstacles from all directions and performs autonomous smart avoidance in real-time, generating collision-free paths within its workspaces. Unlike many off-the-shelf commercial cleaning robots, Phantas is powered by deep-learning-based algorithms and trained with millions of real-world pictures. It possesses robust obstacle recognition capability and makes behavior decisions according to the types and features of obstacles, e.g., it would bypass electric wires rather than passing them over directly.

### Auto Spot Cleaning: 4X Efficiency Improvement

- ❖ Phantas incorporates Gausium's groundbreaking Auto Spot Cleaning into its path planning. Under this mode, the robot scans the cleanliness of the nearby floor and autonomously performs spot cleaning where the waste is detected. When encountering wastes that are too large for it to clean, the robot will send messages to operators via the App. By cleaning only where it is needed, Phantas brings up to 400% efficiency improvement and significantly reduces the consumption of water, energy, and chemicals.

### Docking Station - Auto power charging: One Stop Self-Service

- ❖ Phantas is paired with a charging dock to minimize human intervention during operation. It can perform self-services by autonomously connecting with the docking station. An optional water tank trolley is available to save your effort for water refilling.

### Gausium Mobile - All on Your Smartphone

- ❖ The Gausium App allows you to control floor cleaning from anywhere, anytime. It offers a plethora of options like map editing, remote control, task scheduling, data reporting, etc.

### Map Editing

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- ❖ Edit your floor map by setting virtual walls or no-go zones to avoid cleaning restricted areas.

## Remote Control

- ❖ Remotely activate, pause, or terminate a cleaning task on your smartphone.

## Task Scheduling

- ❖ Set up a task on the App and the robot will automatically start cleaning at the scheduled time.

## Data Reporting

- ❖ Receive detailed reports of operational metrics and charts of historical statistics via the App to gain data insights and enable data-driven management decisions.

## 1.5. Robot Appearance and Components Overview



Name	Description
<b>Horizontal lidar</b>	Map scanning, locating, and obstacle avoidance.
<b>Front RGB camera</b>	Cruising with cleaning, obstacle avoidance, and capturing the real-time colorful image.
<b>Tilt camera</b>	Ranging, obstacle avoidance, and capturing the real-time colorful image.
<b>Fill-in light</b>	Fill the light for the front camera to assist in cruising.
<b>Squeegee assembly</b>	Scrubbing the floor and absorbing water stains.
<b>Tile laser</b>	Obstacle avoidance.





Name	Description
<b>Auto-docking sensor</b>	Assistance to auto-docking.
<b>Port-auto charging</b>	The ports for auto-charging.
<b>Port-manual charging</b>	The port for manual charging. Open the side protection rubber skirt of the squeegee to get access to it.



Name	Description
<b>Top camera - ToF</b>	Participate in locating.
<b>Power button</b>	Long press it to power the robot ON/OFF.
<b>Screen</b>	Touch screen for G-mind-lite operation.
<b>Emergency stop button</b>	Press it to stop the robot

## 2. OPERATION INSTRUCTIONS


### 2.1. Power On

#### Main Power Breaker

- The main power breaker is positioned above the right wheel.
- "O" means OFF, and "—" means ON.



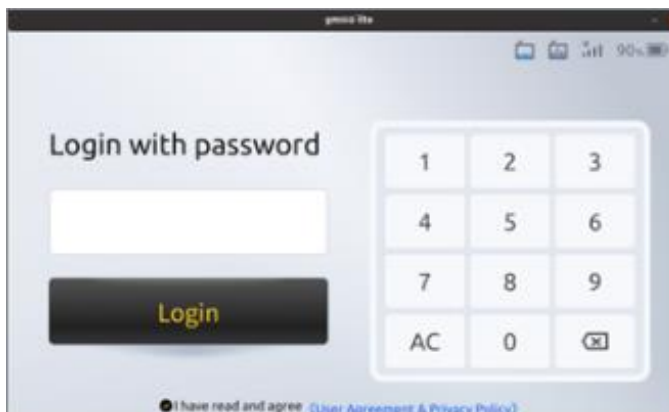
#### Power On

1. Long press the  button for 5 seconds.
2. The screen will be turned on and you will hear the voice prompt.



#### Logging in

1. The boot-up sequence takes 90~120 seconds.
2. Then, the login interface appears.
3. Input the password and click the "**Login**" button.



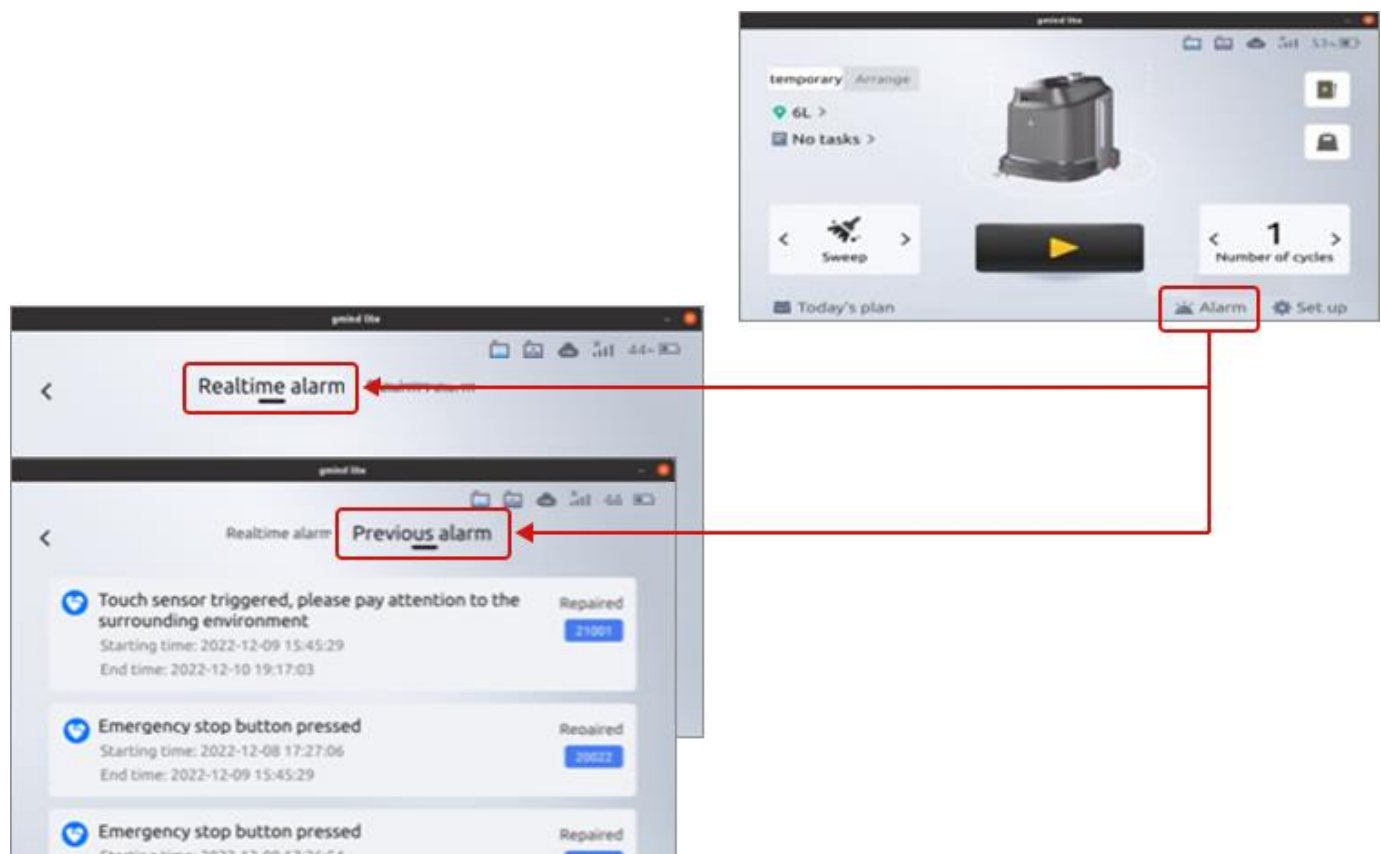
## Health Status & Alarms

1. Click **Alarm** in the lower right corner to check for alarms if any.
2. If no alarms are displayed, it means the robot is fine and functions well.
3. Otherwise, resolve the issues following the prompts.



### NOTE:

- [Call Service]: If the issues cannot be resolved following the prompts, please contact AROS Technical Support for assistance.



## 2.2. Power Off & Storage

### Switch to Manual Push Mode

1. Click **Manual mode**.
2. Click **Push**.
3. Click **Confirm the switch**.



## Move Manually

1. Hold the robot with your hands and move it to the storage place.



## Power Off

1. Turn off the switch to the "O" position and turn off the circuit breaker.

## Open Top Lid

1. Press the **Open** button to open the top lid.



2. Take out the water tank/dust tanks and clean them.



**NOTICE FOR LONG-TERM STORAGE:**

- Clean the consumables if you want to store the robot for a long time.
- Empty the clean water tank and wastewater tank and remove the rubber strips of the squeegee.
- Store them together in a dry and ventilated place after cleaning.

## 2.3. Charging the Battery Manually

### Switch to Manual Mode

1. Click **Manual mode**.
2. Click **Push**.
3. Click **Confirm the switch**.



4. Move the robot to the charging dock.



### Start Charging

- Insert the plug into the port of the robot, then connect the plug to the power supply.
- The **red** indicator flashes when charging starts.





### Fully Charged

- The indicator turns **green** when the robot is fully charged.



### Remove Plug

- Cut off the power supply first, then remove the plug from the port.



#### NOTE:

- Turn the **blue** coupling counterclockwise to unlock the plug.



## 2.4. Adding/Draining Water Manually

### Switch to Manual Mode

1. Click **Manual mode**.
2. Click **Push**.
3. Click **Confirm the switch**.



### Move the Robot to the Maintenance Point

- Hold the 2 sides of the robot and push it to the maintenance point.



### Open Top Lid

- Press the **Open** button to open the top lid.



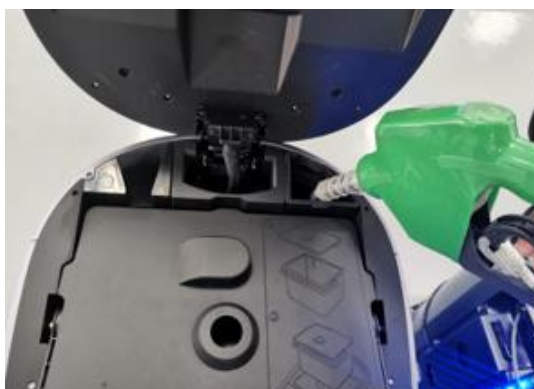
### Take Out the Wastewater Tank & Drain

- Open the top lid, take out the wastewater tank, and pour out the wastewater. Then clean it and put it back into the robot.



### Add Clean Water

- The clean water inlet is in the upper right corner. Use a hose or measuring cup to add water manually.



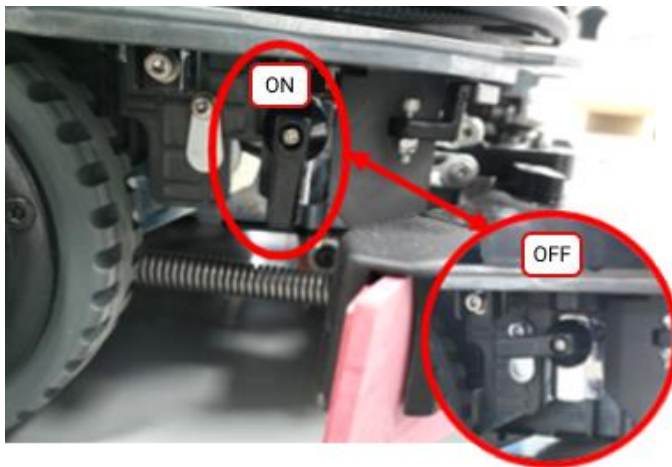


**NOTE:**

- Beware of water spill or overflow when adding water.

## Empty the Clean Water Tank

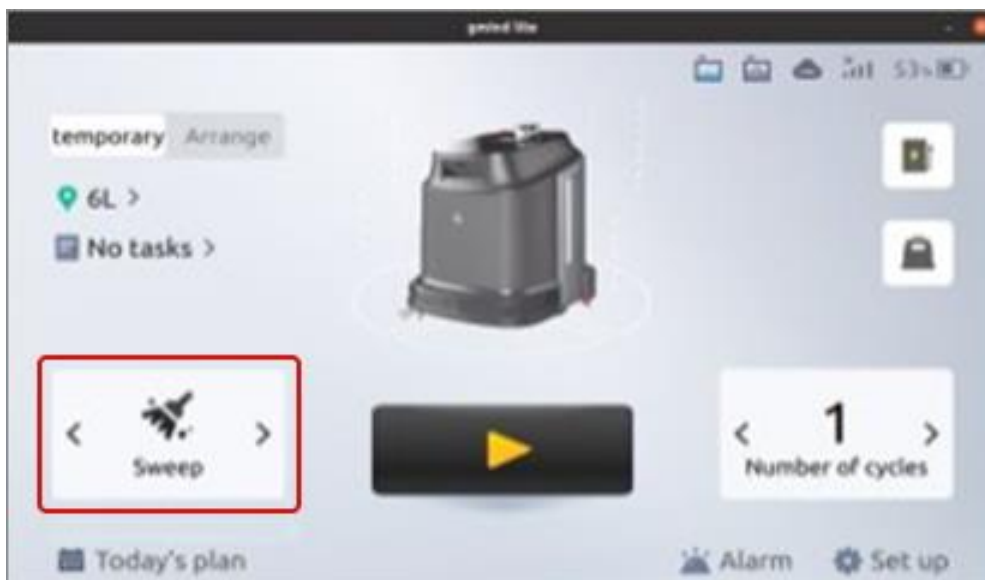
1. There is a valve behind the left wheel that is for draining clean water.
2. Move the robot to a proper place and turn on the valve to empty the water tank if necessary (it takes 3-4 minutes.)



## 2.5. Manual Operation

### Select Cleaning Mode

- Select a cleaning mode (scrubbing, dust mopping, sweeping, vacuuming).



## Switch to Manual Mode

1. Click **Manual mode**.
2. Click **Push**.
3. Click **Confirm the switch**.



## Manual Operation

- Push the robot slowly to do manual cleaning operations.



## End Manual Operation

1. Click **Manual mode**.
2. Click **Push**.
3. Click **Confirm the switch**.



## Clean Water Stain

1. To prevent water contamination after manual mode ends, suction & squeegee will keep working for a while. Continue to slowly push the robot for 1-2 meters to clean the water stain.
2. The suction and squeegee keep working with 30 seconds of delay by default.



## 2.6. Auto Operation

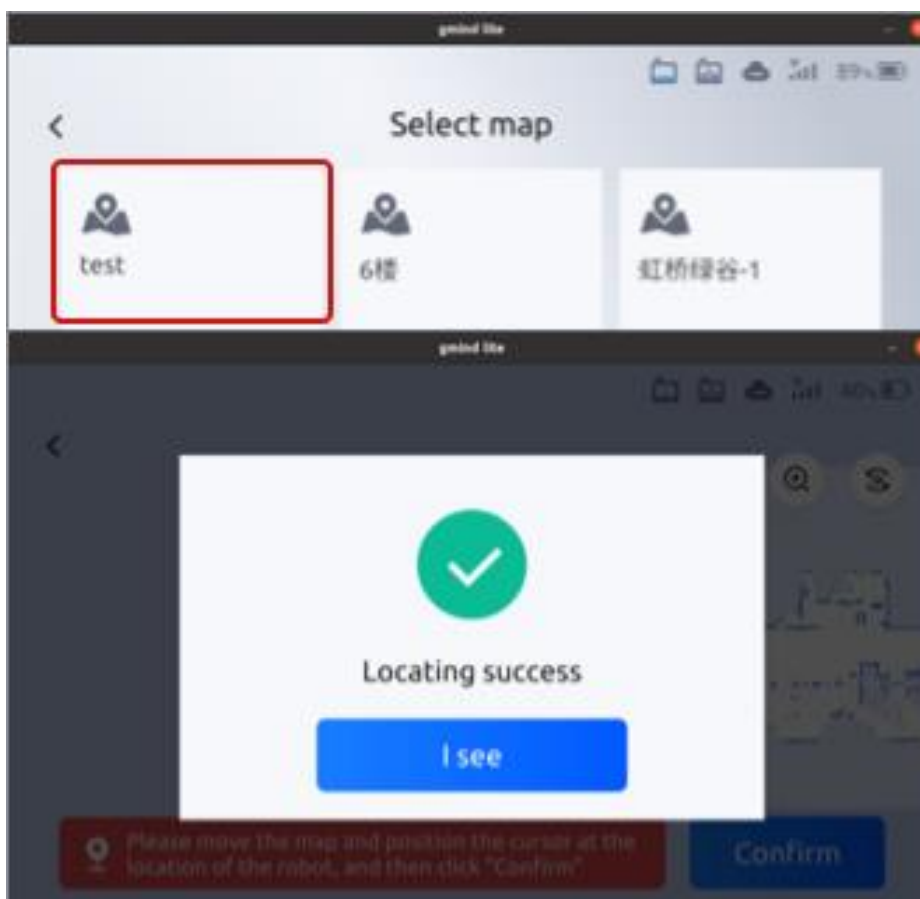
### Choose a Map

- Map is the area you want the robot to clean.



### Check the Position

- Check the robot's position. If the position is wrong, choose the map again and reposition the robot.



### Choose a Task

- Choose a cleaning task that matches the map (refer to the red frame below.)





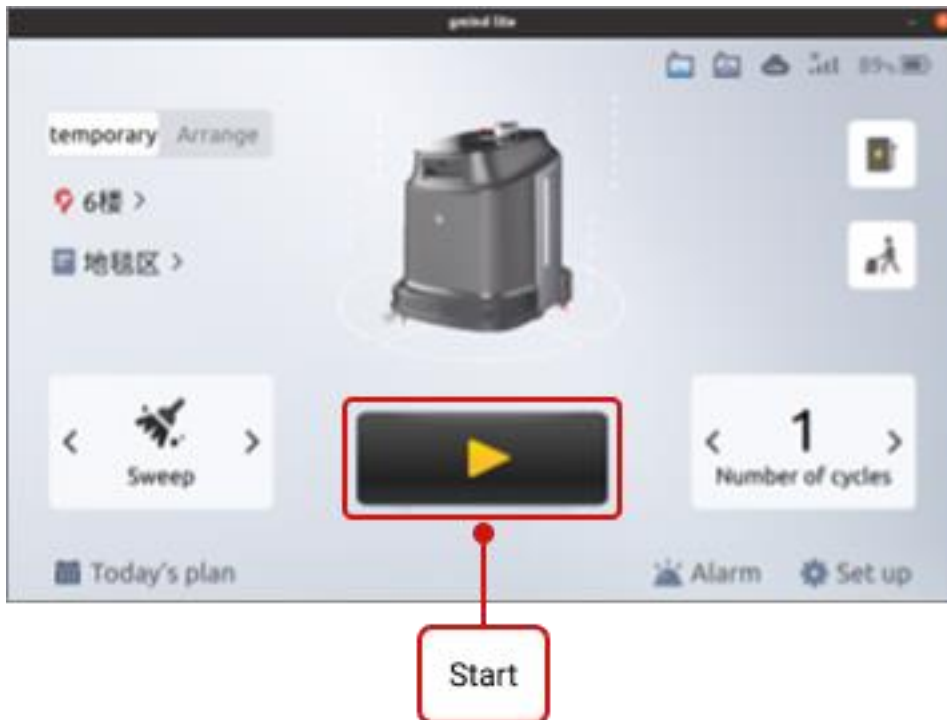
### Choose a Cleaning Mode

- There are four options to choose from scrubbing, dust mopping, sweeping, and vacuuming. The cleaning mode will be switched after each click.

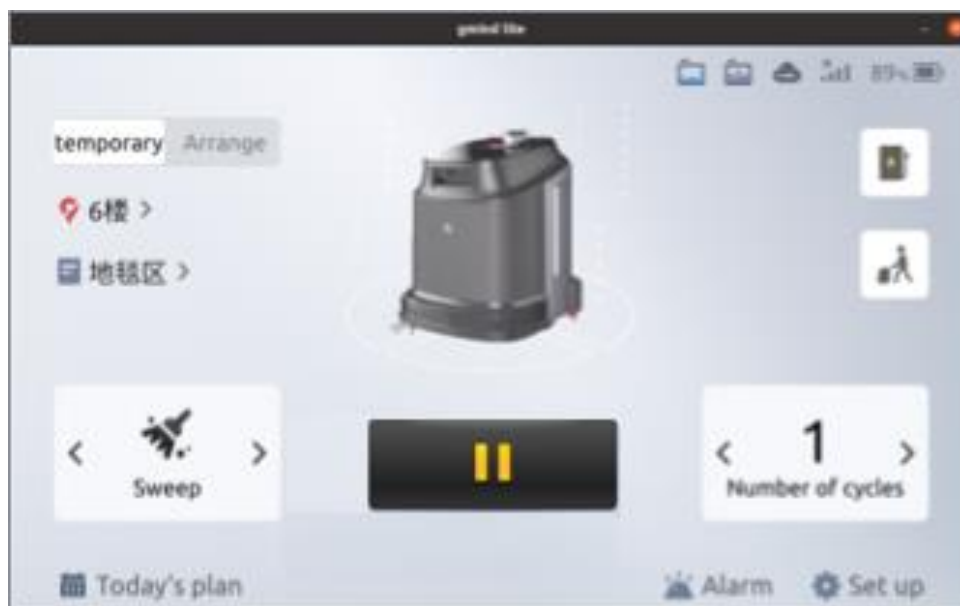


## Start Auto Operation

- Click **Start** to proceed.



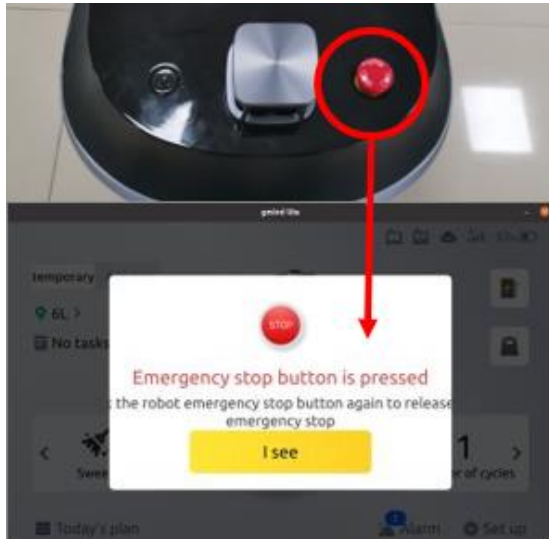
## Auto-Operation Interface



## Pause

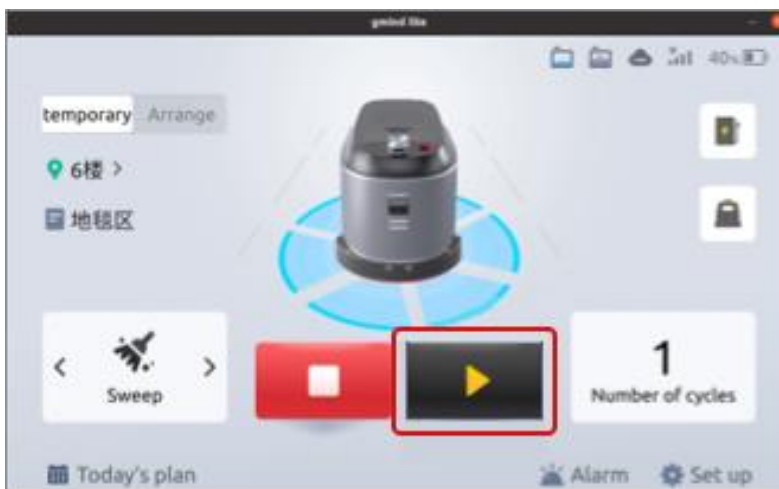
1. Press the **red** button to execute an emergent stop.
2. The robot re-starts 30 seconds after an emergency stop is pressed.
3. Click **Confirm** to retain the stop.





### Continue

- Click the continue button to continue auto operation.



### End

- Click the stop button to stop auto operation.



## 2.7. Switching/Relocating Map

### Switch to Manual Mode

1. Click **Manual mode**.
2. Click **Push**.
3. Click **Confirm the switch**.




### Move the Robot

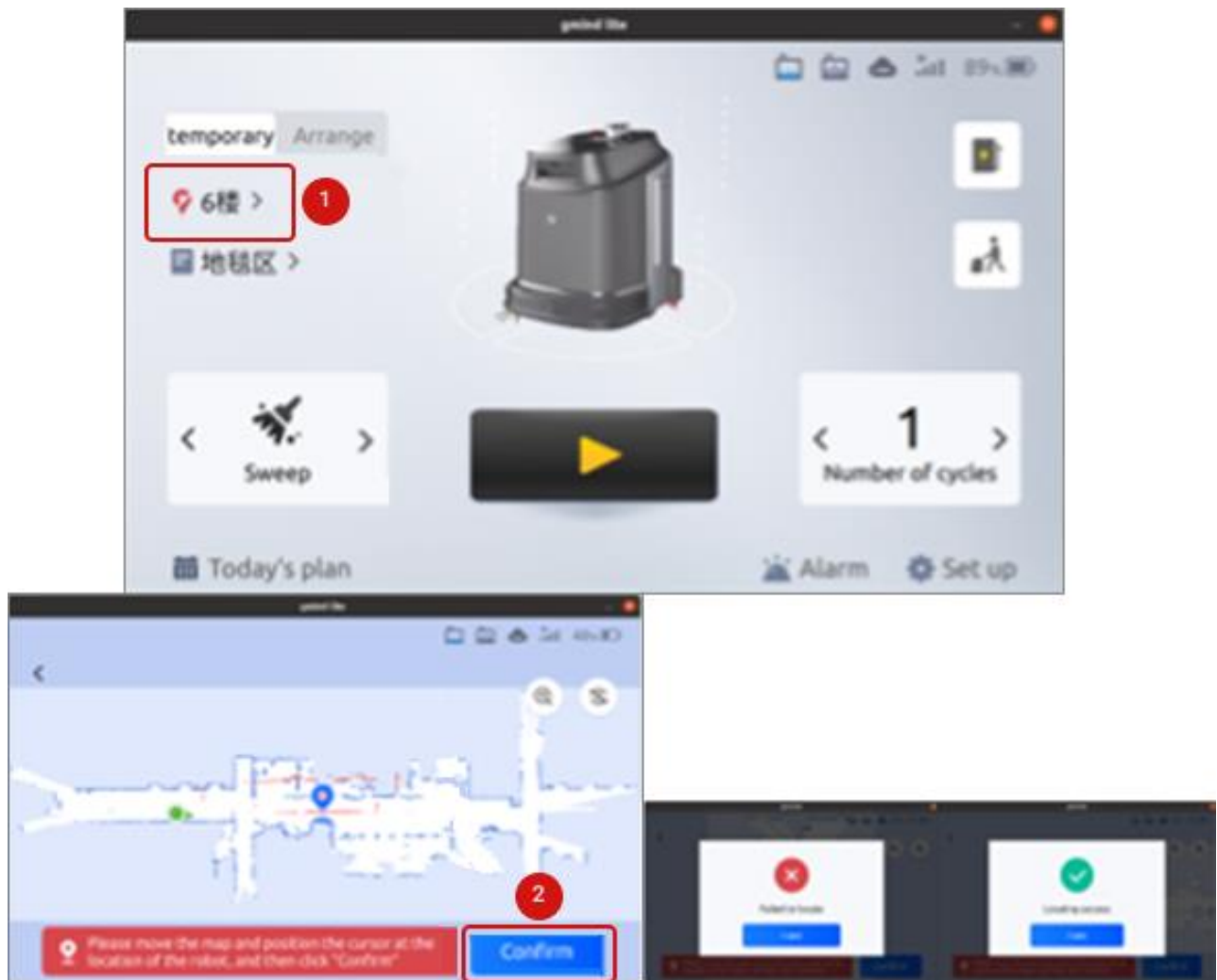
- Move the robot to the area to be cleaned.



### Relocating

1. Click  and select the map for relocating.

2. A message will pop out informing you whether locating succeeds or fails.
3. If locating failed, please check the map or move the robot to another place and try again.



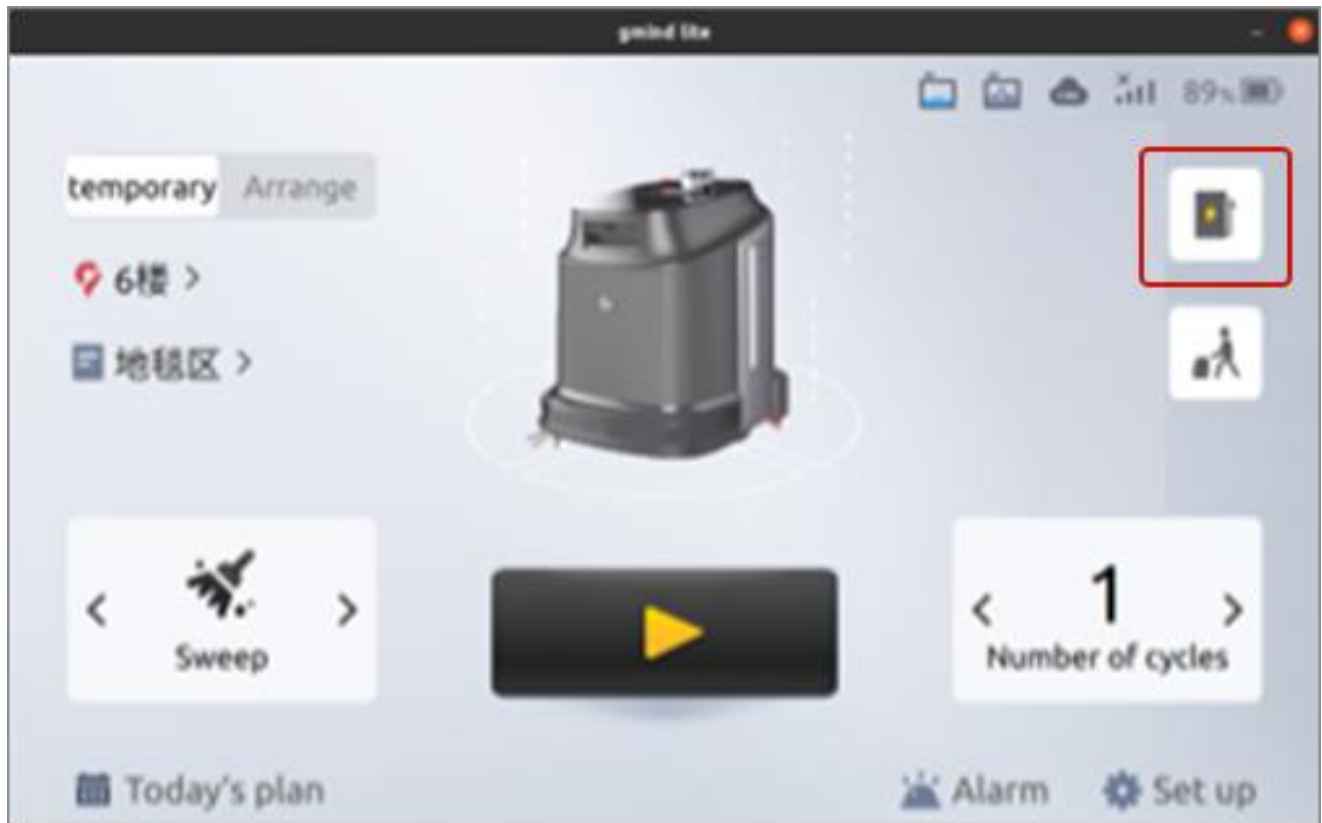
## 2.8. Going Back to Charging Dock

1. Click the **Back to charging dock** icon. The robot will go back to the charging pile automatically.



### NOTE:

- Locating should be correct before clicking the icon.



2. The interface changes after clicking **Back to charging dock**. See the figure below.



## Docking

- After auto-docking succeeded, the screen will show the current charging status.

## On-charging

- The light indicator of the charging pile and the light strip of the robot turn **green** (figure 2).

## Fully charged

- The light strip of the robot turns **blue** (figure 3).



## 2.9. Switching Cleaning Mode

Robot has 4 cleaning modes, and each mode requires specific hardware. Please refer to the table below.

Cleaning Mode	Site Brush	HEPA	Main Brush	Sub Brush	Dust Box	Dust Tank	Dust Bag	Water Tank	Squeegee
<b>Figure</b>				 					
<b>Scrubbing</b>	Not essential	Essential	Essential	Essential (short)	Essential	N/A	N/A	Essential	Essential

				bristle brush)					
<b>Vacuum</b>	Essential	Essential	Essential	Essential (cloth brush or short bristle brush)	Essential	Essential	Essential	N/A	Not essential
<b>Dust Mop</b>	Essential	Not essential	Essential	Essential (cloth brush)	Essential	Not essential	Not essential	Not essential	Not essential
<b>Sweep</b>	Essential	Not essential	Essential	Essential (short bristle brush)	Essential	Not essential	Not essential	Not essential	Not essential

### Switch between Vacuum and Scrubbing

1. A dust tank is for vacuum cleaning.
2. A wastewater tank is for scrubbing mode.
3. Open the top lid to change the tank.



### Switch between Sweep and Dust Mop

1. A bristle roller brush is for sweep mode.
2. A cloth roller brush is for dust mop cleaning.
3. Take out the roller brush assembly from the right side of the robot and replace the sub-brush.



### 3. APPENDIX A: TECHNICAL SPECIFICATION

Parameter Type	Parameter	Value
<b>DIMENSIONS</b>	Length	540mm   21.3 in
	Width	440mm   17.3 in
	Height	617mm   24.3 in
	Net Weight	46kg   101 lb
	Vacuuming/Sweeping Width	410mm   16.2 in
	Scrubbing Width	330mm   13 in
<b>CLEANING</b>	Cleaning Efficiency	400 - 700m <sup>2</sup> /h   4,305 - 7,534 ft <sup>2</sup> /h
	Water Tank Capacity	Coverage > 1000 m <sup>2</sup>   > 10,763 ft <sup>2</sup>
	Dust Bag	8 L   2.1 gal
	Trash Can	0.7 L   0.2 gal
<b>MOVEMENT</b>	Gradeability	8°
	Max. Cleaning Speed	0.8 m/s   1.8 mph
	Min. Passable Width	520mm   20.5 in
	Min. Passable Height	650 mm   25.6 in
	Min. Turn-around Width	620 mm   24.4 in
	Min. Height of Detected Obstacles	10 mm   0.39 in
	Edge Cleaning Capability	0 mm
<b>ELECTRICAL</b>	Runtime	Scrubbing 5h, Vacuuming 5h Sweeping 18h, Dust Mopping 10h.
	Charging Time	2 hours
	Sound	< 65dB
<b>SENSING</b>	Standard	LiDARs, 3D Depth Cameras, RGB Camera Anti-drop Sensor, Anti-collision sensor.
<b>ACCESSORIES</b>	Optional	Charging Dock, Water Tank Trolley.