Instruction Manual for Photovoltaic Cleaning Cart

1. Introduction

Thank you for choosing the photovoltaic cleaning machine! This manual will help you quickly understand the usage methods and precautions of the equipment to ensure that the equipment achieves optimal results during the photovoltaic panel cleaning process.

2. Product Introduction

The photovoltaic cleaning trolley is an intelligent device specifically designed for the efficient cleaning of photovoltaic panels. It has functions such as automatic cleaning, path planning, automatic return to charging when the battery is low, and automatic leak avoidance, ensuring the trolley's optimal working condition .

3. Installation Preparation

- Ensure that the photovoltaic cleaning trolley (including photovoltaic charging panel and brush) is assembled and fully charged;
- Download and install the PV Cleaning Cart APP on your mobile device: cc10-roscar-2.1.10-268837-cleaner_v2.apk

4. Operating Instructions

4.1 APP Function Introduction

- The main functional interfaces of the APP include:
  - Device connection: There are three connection methods: QR code connection, Bluetooth connection, and remote connection (currently only remote connection is supported);
  - Preference Settings: Set body width, spare buttons, real-time trajectory, etc. as needed;
  - Map Management: Create and manage routes;
  - One-click return to the charging pile: During operation, clicking the one-click return to the charging pile button allows the vehicle to automatically return to the parking position;
  - Manual control: When the trolley is not in operation, clicking on manual control allows manual remote control of the trolley;

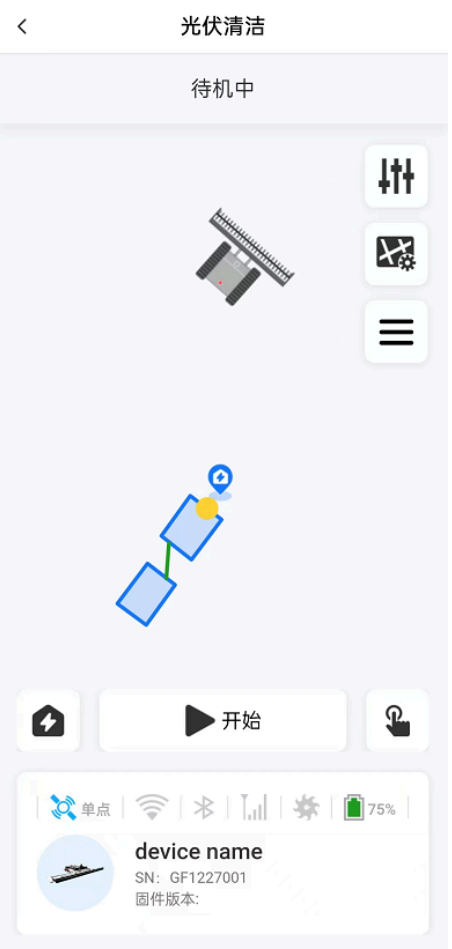
- Status Monitoring: Capable of real-time monitoring of satellite signals, brushes, battery level, and other statuses;

4.2 Device Connection

1. **Scan QR Code to Connect** : Open the mobile APP, click "Scan" on the home page, and scan the QR code on the device.
2. **Bluetooth Connection** : Open the mobile APP, click "Bluetooth Connection" on the home page, and select the car from the device list.
3. **Remote Connection:**Open the mobile app, click "Remote Connection" on the home page, enter the device SN code, and click Confirm to enter the home page.

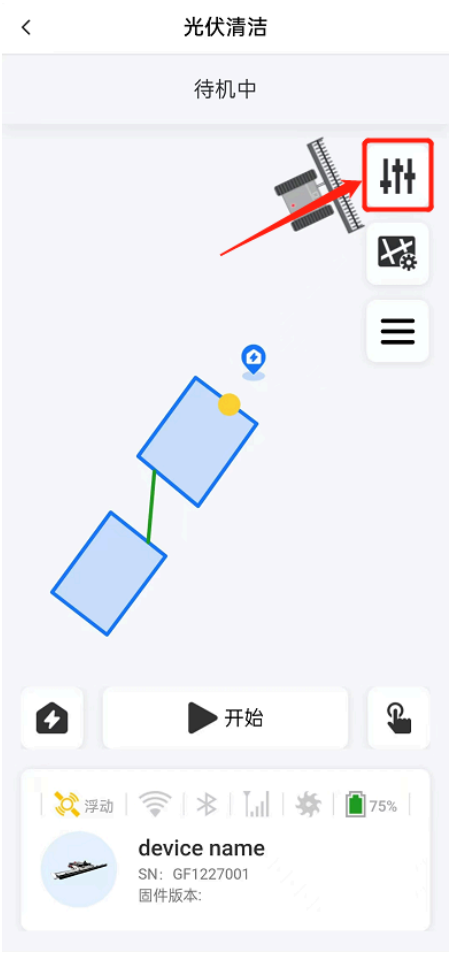


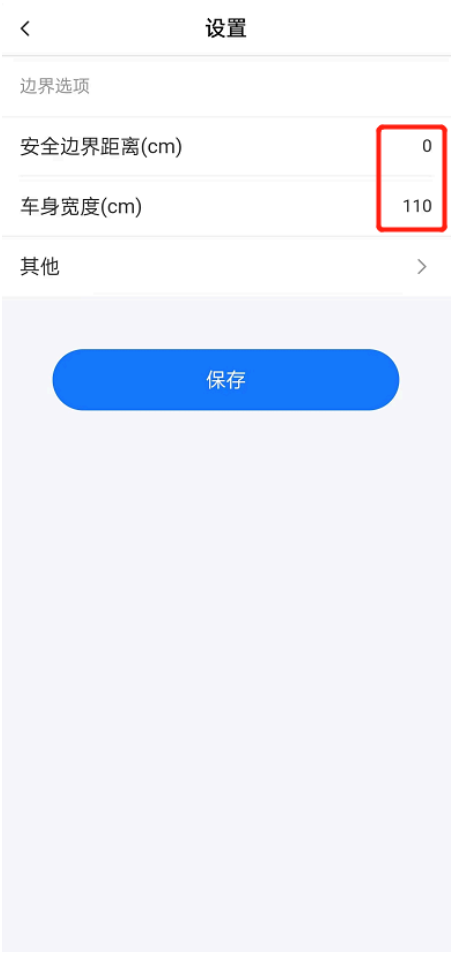


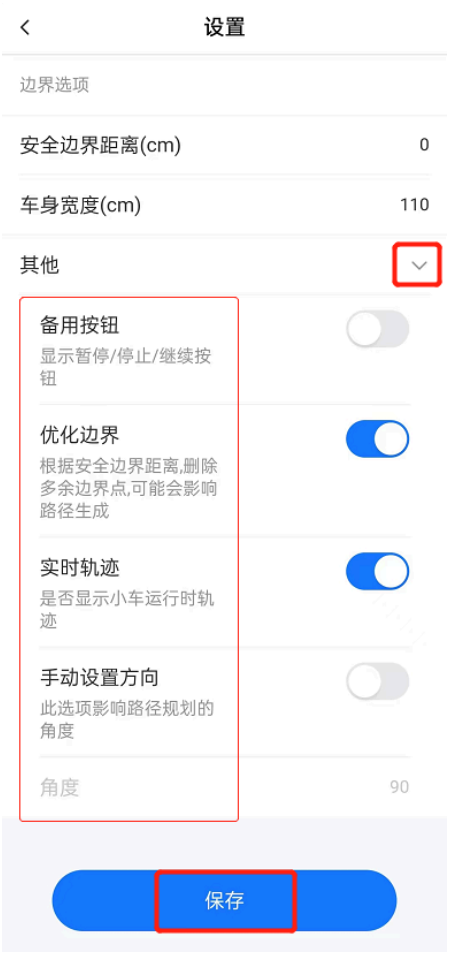


4.3 Preferences

1. After the device is successfully connected, enter the home page and click the first button “Settings” in the upper right corner;
2. Users can set "Safety Boundary Distance", "Vehicle Body Width" according to their needs, and set "Spare Button", "Optimized Boundary", "Real-time Trajectory", "Manual Direction Setting (default angle 90)" in "Other";
3. Click "Save" after the settings are completed.

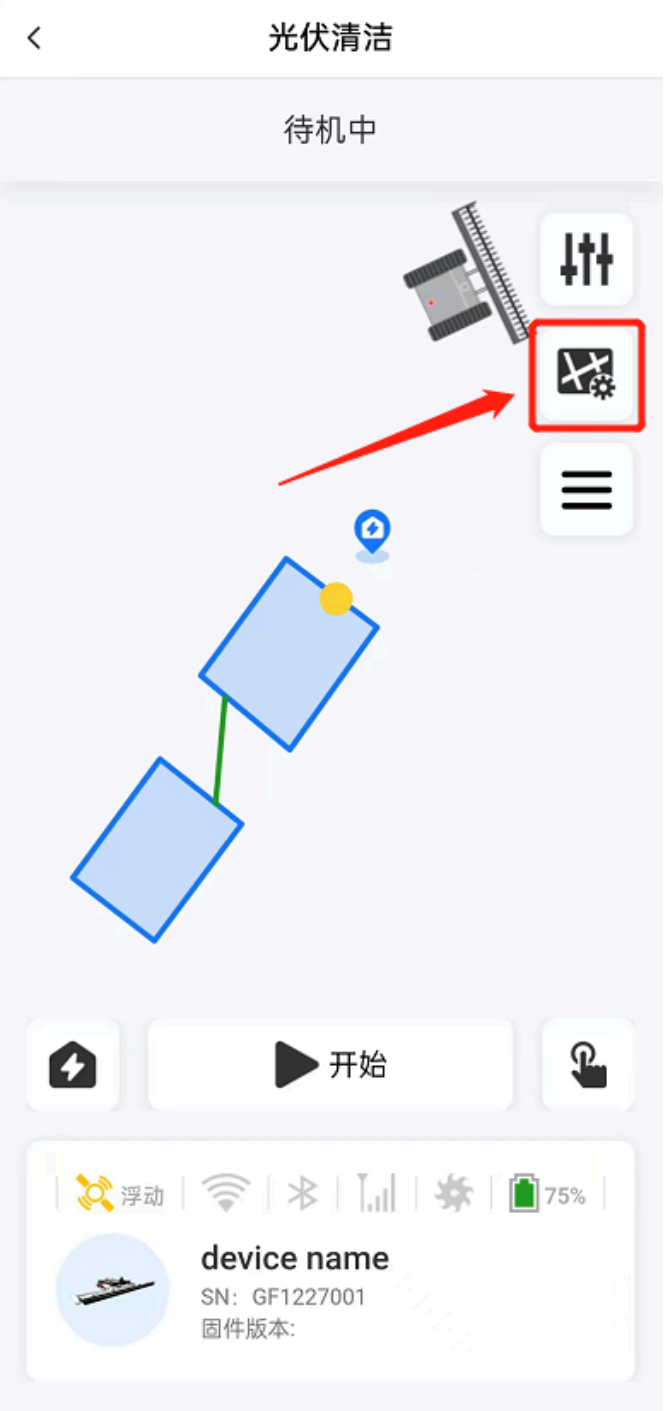






4.4 Map Management

1. After the device is successfully connected, enter the home page and click the second button "Map Management" in the upper right corner;





- **New Workspace:**
  - Click the "⊕" in the upper right corner;
  - Type: Workspace;
  - Name: Any (e.g., Workspace 01);
  - Click Save to enter the path planning interface;
  - Click to mark points at appropriate positions (yellow points: 4 or more points define a plane);
  - After circling the workspace, click Save;
  - During the process, you can undo the marked points or clear all marked points.





- **New Parking Stand:**
  - Click the "⊕" in the upper right corner;
  - Type: Parking Stand;
  - Select the associated area (e.g., Workspace 01);
  - Name: Generate a default name, or customize it (e.g., Parking Space 01);
  - Click Save to enter the path planning interface;
  - Mark point 1 (displaying the charging pile icon) at the location of the parking space, mark point 2 (yellow dot) on the boundary of the working area of the parking space, and click Save;
  - During the process, you can undo the marked points or clear all marked points.

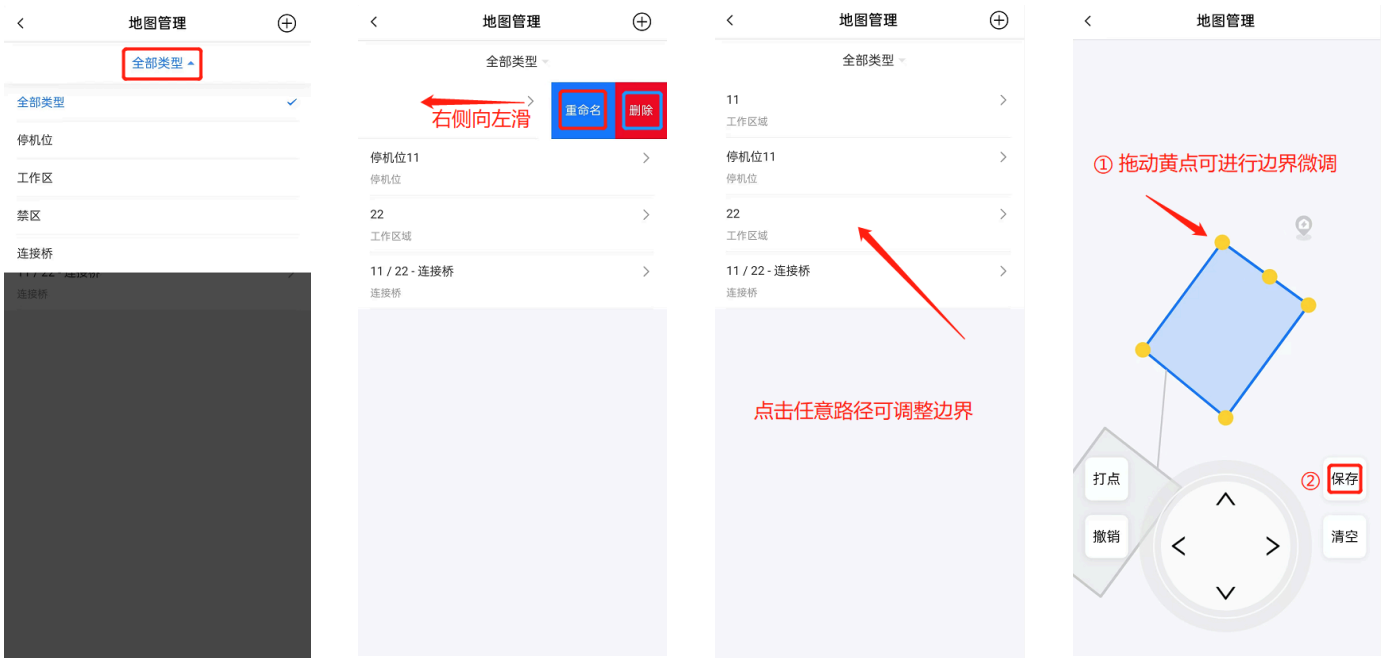




- **New Connection Bridge:**
  - Click the "⊕" in the upper right corner;
  - Type: Connecting Bridge;
  - Select the connection area (e.g., Workspace 01 & Workspace 02);
  - Name: Generate a default name, or customize it (e.g., Connecting Bridge 01/02);
  - Click Save to enter the path planning interface;
  - Mark a point (green dot) at a suitable location at the junction of work areas 01 and 02;
  - Click Save after generating the path;
  - During the process, you can undo the marking or clear all marked points.



2. Users can perform operations such as "type filtering", "renaming", "deleting", and "boundary fine-tuning" on the path according to their needs;



4.5 One-touch Return to Charging Pile

- The "One-click Return to Charging Pile" button on the left side of the APP home page



  - Before starting work, the vehicle can click "One-click Return to Charging Pile" after departing from the charging pile;
  - During single or multi-plot operations, the vehicle can click "One-click Return to Charging Pile";
  - When the vehicle is returning, clicking "Return to Charging Pile with One Click" is ineffective and will prompt "Returning to Charging Pile..."
  - When the vehicle is in a paused state during operation or not in operation, clicking "One-click Return to Charging Pile" is invalid.

4.6 Manual Control

- The "Manual Control" button on the right side of the APP homepage



  - When the trolley is in a non-operational state, you can click "Manual Control" to enter the control page and remotely control the trolley.

4.7 Status Monitoring

- The APP home page monitors the real-time status of the device below, including satellite signals, WiFi, Bluetooth, 4G, brush status, and battery level, to ensure that the device always operates in optimal condition.



5. Usage Operations

5.1 Single Plot Work

1. Ensure that the device is connected to the APP;
2. Create Workspace 01 and Parking Stand 01 (see Section 4.4);
3. Return to the home page, click the "Start" button to issue the trajectory;
4. A new workspace and parking space have been created, allowing direct movement to the appropriate position. Click the "Start" button;
5. The trolley will depart from parking space 01 and operate according to the trajectory. After the trolley's task is completed, it will return to parking space 01 associated with work area 01.

5.2 Multi-plot Work

1. Ensure that the device is connected to the APP;
2. Create multiple work areas 01/02/.. and parking stands 01/02/.. (see content in 4.4);
3. Create a new connection bridge 01-02/... to connect multiple workspaces (see content in 4.4);
4. Return to the home page, click the "Start" button to issue the trajectory;
5. Multiple work areas and parking spaces have been newly created, allowing direct movement to a suitable position. Click the "Start" button;

6. The trolley will depart from the parking space 01 associated with work area 01 and operate along the trajectory. After completing the work in work area 01, it will pass through the connecting bridge 01-02 to work in work area 02 (multiple work areas will pass through the connecting bridge in sequence to move to the next work area). After the trolley's task is completed, it will return to the parking space 01 associated with work area 01 via the connecting bridge.

6. Security Detection

- **Emergency Stop** : Press the emergency stop button and the trolley will stop immediately.
- **Automatic Leak Avoidance** : The device stops and pauses operation before the empty step area.

7. Charging System

- **Automatic Return to Charge on Low Battery:** When the battery level drops below 15% during operation, the vehicle automatically returns to the parking position to charge.
  - Each workspace is associated with a parking spot: the vehicle will return in a straight line to the parking spot associated with the current workspace and then return to the parking spot for charging;
  - Only the first workspace is associated with a parking stand: the vehicle will pass through the connecting bridge, return to the point associated with the first workspace, and then return to the parking stand for charging.

8.Troubleshooting

- Common Issues and Solutions:
  - **Connection failed**: Check network signal and whether the device is powered on.
  - **Device not running**: Check the battery level and work path settings.

9. Maintenance and Upkeep

- Regularly clean the cart and brush to ensure cleaning effectiveness.
- Check the charging system to maintain battery health.

Appendix

- Product Specification

GNSS性能	
定位系统	全系统 全频点
卫星频点	BDS:B1I B2I B3I B1C B2a B2b GPS:L1 C/A L1C L2P(Y) L2C L5C GLONASS:L1 L2 GALILEO:E1 E5a E5b E6 QZSS:L1 L2 L5 L6
RTK精度	1cm
差分方式	4G
RTK天线类型	测量型天线
控制距离	4G网络覆盖范围内，信号大于20%
时间精度	10ns
测速精度	0.03m/s
首次定位用时	冷启动：<30s
RTK初始化时间	<5s
RTK初始化可靠性	>99.9%
性能规格	
开机用时(上电时间)	40s
功耗	250W
刷辊转速	200转每分钟
清洁幅宽	1.5m
工作坡度	12度
行走额定功率	130W
电机功率	180W
毛刷电机功率	180W
行走电机功率	180W*2
行走速度	0.25 m/s
一次清洗宽度	1.5m
操作环境	
工作电压	24V
系统电压	24V
工作温度	-20 ～ +75°C
电池与续航	
充电方式	太阳能充电

锂电池	20 Ah
电池寿命	1000次

