MRDVS

Mobile Robot Vision Expert

V2 PRO

User Manual

Revision History

Revision Date	Version Number	Revision Description
13-Jan-25	V1.0	New Document
27-Feb-25	V1.1	Modify TOF Field of View

Index

1. Introduction

1.1 Document Purpose and Scope

This document outlines the specifications of the V2 Pro Camera and provides relevant design details for developers to understand and use the product.

2 Product Overview

The V2 Pro is the third-generation overhead view navigation camera developed by MRDVS. It features significant hardware upgrades over its predecessors, the V1 and V1 Pro.

By combining 2D LiDAR SLAM navigation with overhead view camera visual navigation, the system leverages the complementary strengths of both technologies to achieve comprehensive and precise environmental perception. The LiDAR offers accurate distance and position data, while the camera captures rich imagery and texture. Fusing both data sources enhances environmental understanding, enabling higher localization accuracy and improved system robustness.

2.1 Product Introduction

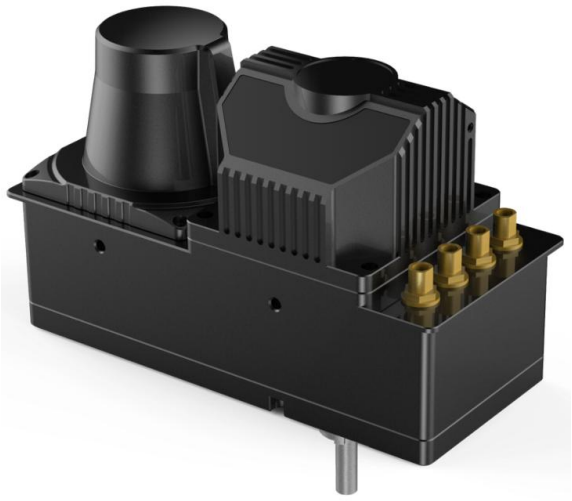


Figure 1 V2 Physical Appearance

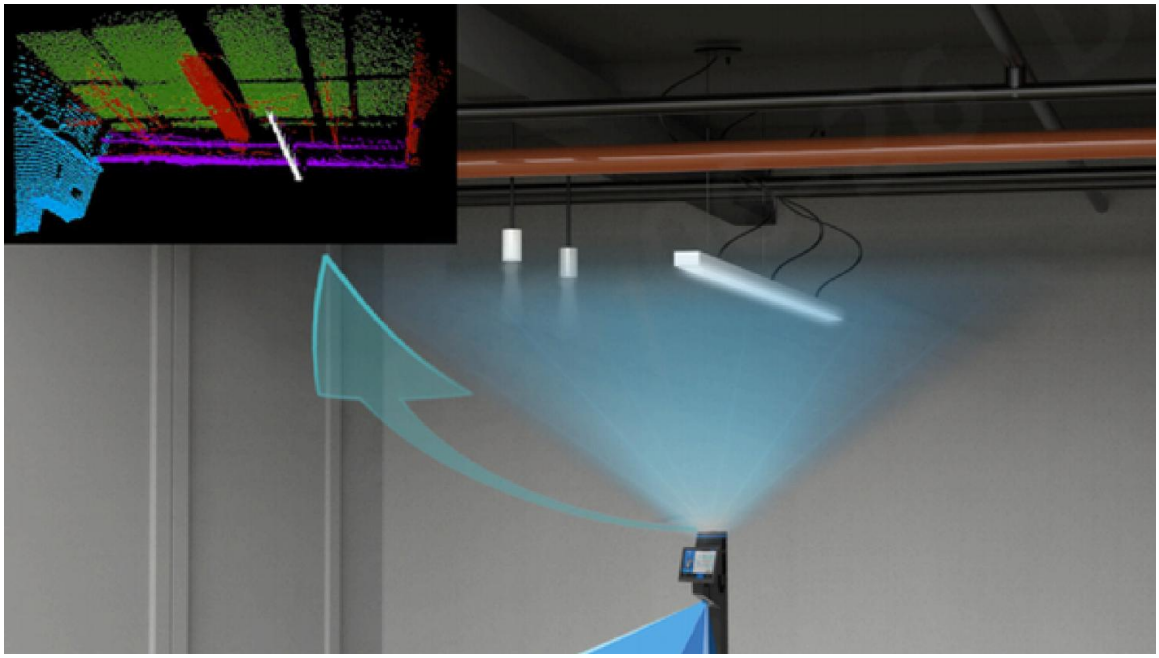
2.2 Functional Features

- All-in-One, High Computing Power: Up to 6.0 Tops computing power; navigation and positioning algorithms can run without an external CPU.
- SLAM and Visual Fusion Navigation Solution

- Strong Environmental Adaptability: Supports narrow p aisles and dynamic multi-layer stacking scenarios.
- Wide Measurement Range: Supports layer heights from 1 to 12 meters.
- Lightweight Camera Management Software

2.3 Application Scenarios

- **Factory logistics**: Supports seamless indoor and outdoor AGV shuttling (e.g., warehouse to platform to truck).
- **Forklift upgrades**: Replaces UWB systems, offering sub-3cm level positioning (including pose data).



3. Specifications

3.1 Basic Specifications

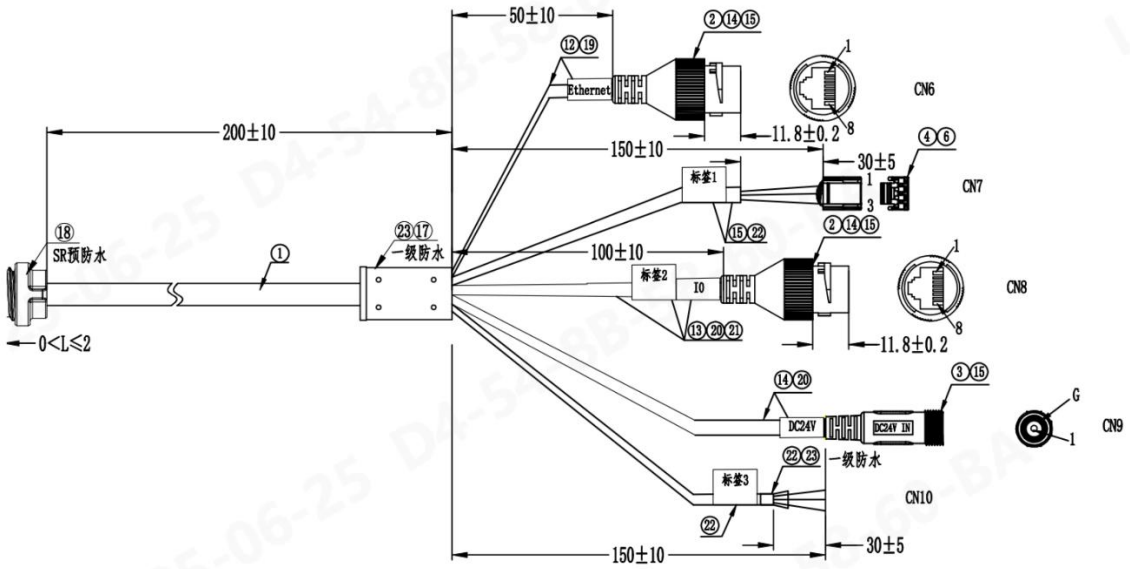
Model	V2 Pro
Overhead View Camera	
Operating Range	1–15 m (ambient light: 0–70 klux)
Field of View (FOV)	94° (H) × 51° (V)
Frame Rate	≥ 20 fps
Interference Resistance	Anti-glare and ambient light immunity
Resolution	1920 × 1080
2D LiDAR	
Scan Frequency	15 Hz / 25 Hz (switchable)
Detection Range	15 m @ 10% reflectivity / 40 m @ 90% reflectivity
Distance Accuracy	±30 mm (typical)
Angular Resolution	0.1°
Horizontal FOV	270°
Main Control System	
Integrated Modules	IMU (Inertial Measurement Unit)
Processor	Rockchip 8-core ARM platform
NPU Performance	6 TOPS
Communication Ports	1× Ethernet / 1× CAN / 4× IO (2 IN + 2 OUT)
Power Input	24V / 3A
Wireless Module	Default Wi-Fi 6 / Optional 5G
Audio Output	1× 3-pin audio_out (L/R/GND)

Dimensions	129 mm × 66 mm × 80 mm
Protection Rating	IP54
Operating Temperature	-20°C to 60°C
Storage Temperature	-40°C to 80°C

Note: Actual product dimensions are based on the 3D model.

3.2 Interface Definition

The camera has three interfaces: a 24V DC power input and two 100 Mbps Ethernet ports. One Ethernet port connects to the AGV; the other is reserved for LiDAR connection.

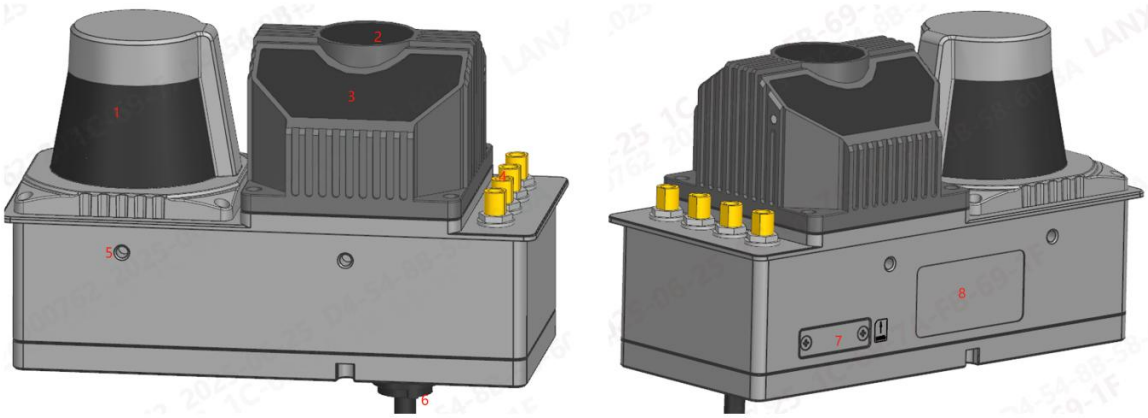


Port	Function	Description
CN6	Ethernet	• RJ45 female connector
CN7	CAN Interface	• Pink: CAN_H • Purple: CAN_L • Black: GND

CN8	IO Interface	• 1：IN1+
		• 2：IN1-
		• 3：IN2+
		• 4：IN2-
		• 5：OUT1+
		• 6：OUT1-
		• 7：OUT2+
		• 8：OUT2-IO IN
		  ○ Active-low 0–3V.
		  ○ Active-high 5–24V.
		• IO OUT: Push-pull output; supports 24V / 100mA

CN9	Power Input	• DC 24V/3A • Pin 1: Positive • G: Ground
CN10	Audio Output	• Red: L (Left) • White: R (Right) • Black: GND

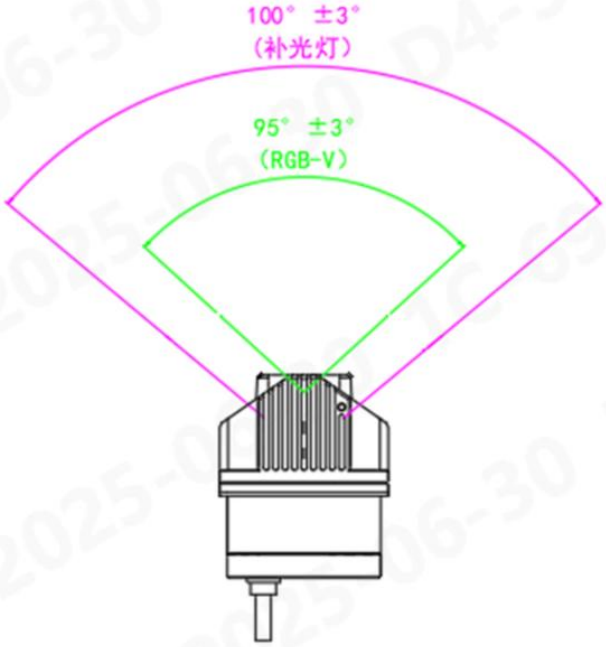
3.3 Camera Component Overview

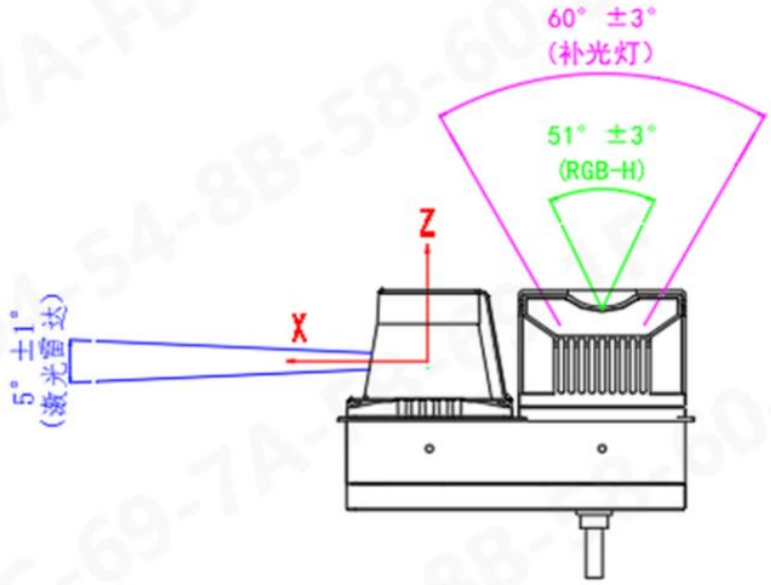


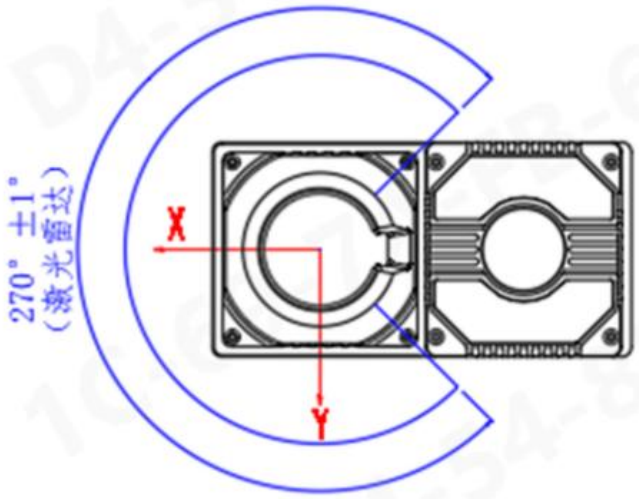
No.	Component
1	2D LiDAR Emission Window
2	Overhead View Camera Lens Window
3	Overhead View Camera Fill Light
4	Wi-Fi / 5G Antenna Port
5	Mounting Holes (4 × M3)
6	Camera Cables (Ethernet, Power, CAN, IO, Audio)
7	5G SIM Card Slot
8	Nameplate / Label Position

4. Camera Integration Guide

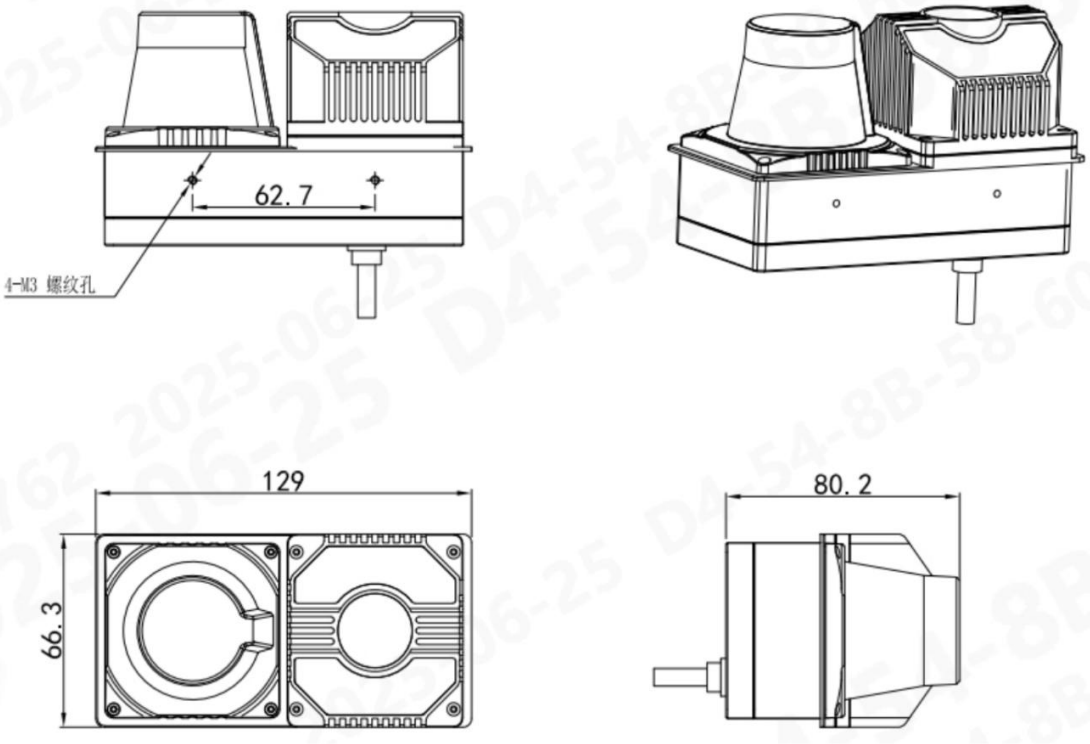
4.1 Detection Range







4.2 Camera Dimensions

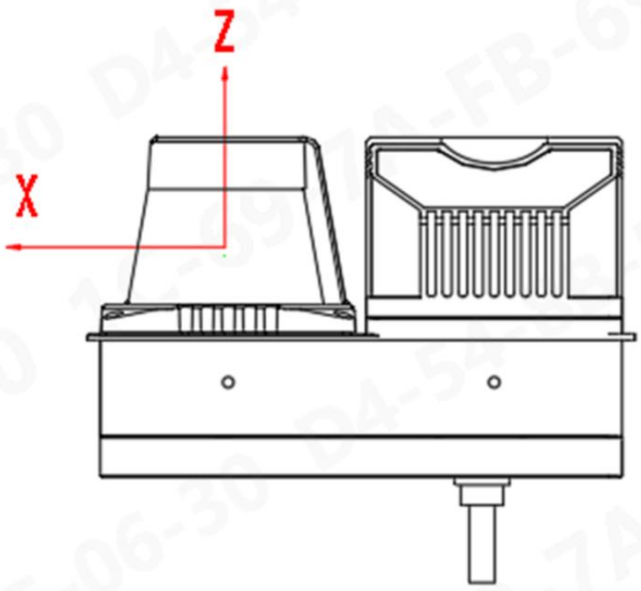


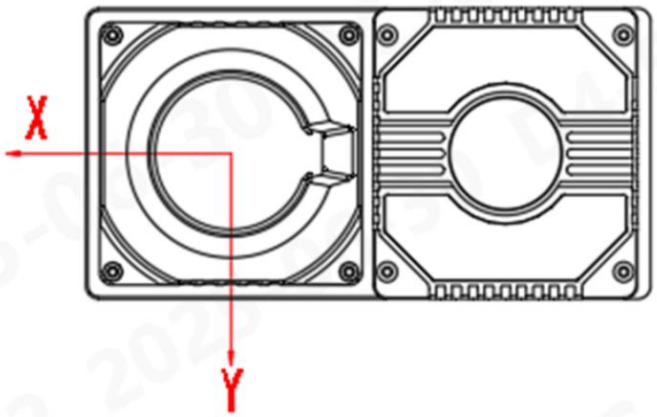
*Refer to the 3D model for precise dimensions.

4.3 Mounting method

4.3 Camera Coordinate System

The camera uses a right-handed Cartesian coordinate system, as shown below:

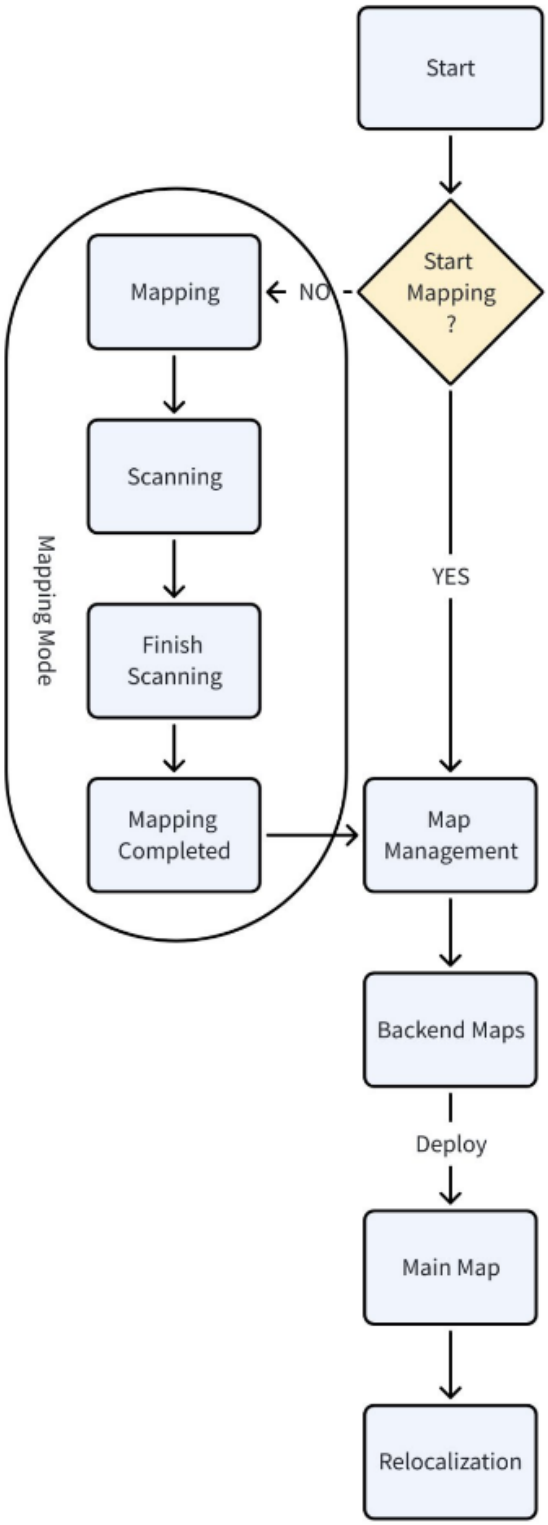



X
Y

5. Environment and Reliability

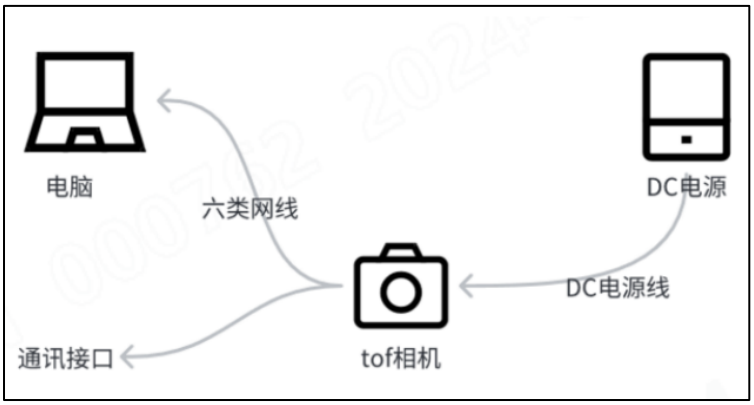
Item		Specification
Operating Environment	Temperature	-20℃ to 60℃
	Humidity	Relative Humidity: 0%～95%RH, Non-condensing
	Illuminance	0KLUX--100KLUX
Storage Environment	Temperature	-40℃ to 85℃
	Humidity	Relative Humidity: 10%～95%RH, Non-condensing
Normal Operating Temperature Rise		Case Temperature Rise <25℃
ESD Level		Contact Discharge ±4KV, Air Discharge ±8KV
RE Level		Complies with GB 9254 CLASS A
Operating Life		10 years
Environmental Certification		RoHS

6. Standard Operating Procedure



6.1 Connection Test

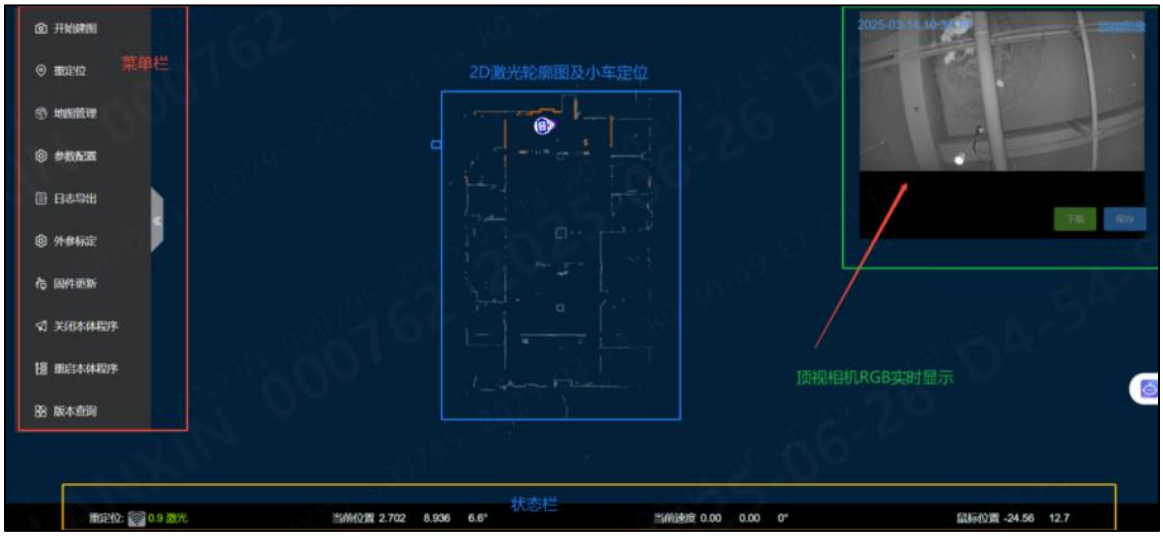
- Connect the camera to a 24V / 3A DC power supply.
    - The power indicator (blue LED) will blink slowly when powered on normally.
- Use a Category 6 Ethernet cable to connect the camera to a computer.
- Default camera IP address: 192.168.100.201.
- Set the computer's IP to the same subnet and disable the firewall.
- On a LAN-connected computer, open a web browser and enter: 192.168.100.201:9998
    - No password required for login.



6.2 Interface Overview

- **Red Menu Bar**: Click to access key functions such as map building, relocalization, and map management.
- **Blue Frame**: Displays the loaded 2D contour map and vehicle positioning icon.
- **Green Frame**: Shows the real-time RGB feed from the overhead view camera.
- **Yellow Frame**:
    - Displays real-time relocalization signal strength:
        - Green = Excellent, Blue = Good, Red = Weak
    - Shows vehicle's current position coordinates and speed

- Displays cursor position coordinates.



6.3 Mapping Process

- Start Mapping

- Create Map Name
- The map name must consist of letters, numbers and underscores, and cannot start with a number.
- Mapping Interface

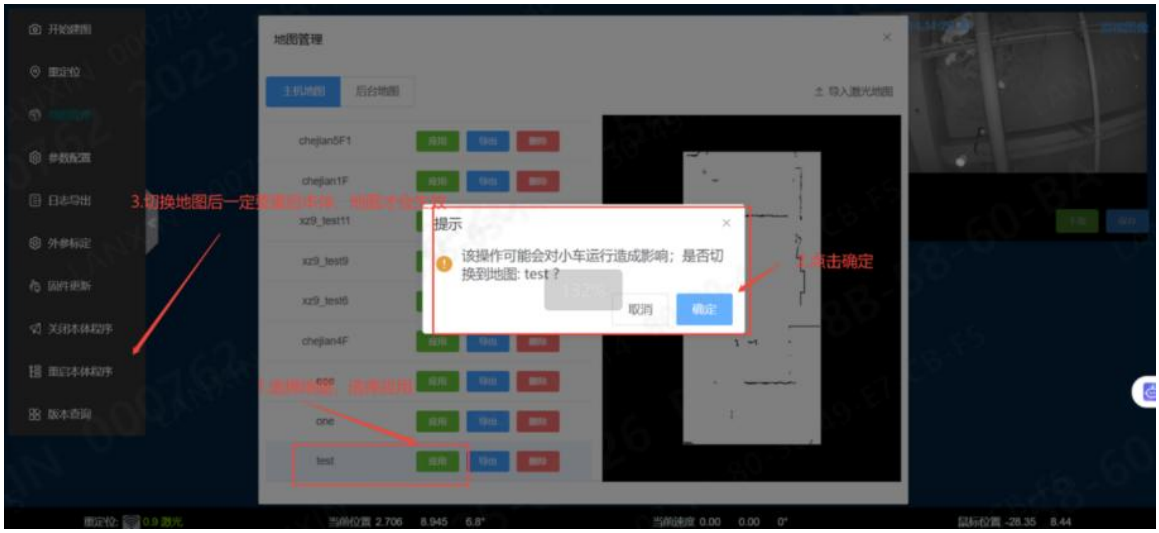
- During mapping, the AGV's maximum linear speed should not exceed 0.5 m/s, and the angular speed should not exceed 20°/s.
- The interface displays the laser profile and the overhead view camera feed.
- Pre-plan the approximate mapping path, keeping a low and uniform speed (<0.2 m/s), moving straight with right-angle turns. Avoid repeated paths and random shaking. For paths in the same direction, maintain roughly 1/3 overlap of the field of view, and generally keep parallel distances around 2 m to maximize coverage of the mapping area or the robot's travel path. The ideal scenario is illustrated in the figure below:

- Finish Mapping
- After the AGV finishes scanning the area, click the menu to end the mapping process. Please wait patiently, the processing time depends on the size of the scanned area.

6.4 Map Management

- Map Management Interface
- Backend Maps

- After mapping is complete, go to Menu > Map Management to view the list of saved maps. The newly created map will appear in the list.
  Click Deploy to push the selected map to the host. If there are multiple maps, each one must be deployed individually.
  You can also modify, export, or delete maps from the list.
- Main Map



To activate a map, go to Host Maps and click Apply. Only then will the map take effect. Export and delete operations are also supported on the Host Maps.

⚠️ After clicking Apply, you must restart the robot for the changes to take effect. Otherwise, issues such as failed relocalization may occur.

6.5 Relocalization

- After clicking “Relocalize”, you can drag with the mouse to roughly set the relocation pose based on the matching cues from the laser point cloud and laser profile, and perform relocation.
- Once relocalization succeeds, any positioning timeout errors will disappear.

6.6 Parameter Configuration

View and configure robot chassis localization parameters and sensor calibration settings, including extrinsic parameters between the laser and the camera.

8. Laser precautions

This product emits invisible lasers during operation, which should be avoided to prevent damage to human eyes. The laser emitted by this product complies with Class 1 safety standards according to EN60825 requirements and does not pose a hazard to human health under normal use conditions.

9. Frequently Asked Questions QA

Serial number	Question	Description
1	No response when clicking to open the camera	Please check if the firewall is turned off. The firewall needs to be turned off.
2	The host computer obtains multiple IPs	The same IP in the local area network is obtained by the camera. You need to select the desired IP to open.
3	Unstable data when opening the camera	It is recommended to use a Gigabit Ethernet cable for the camera. The initial data will be unstable when using a 100M Ethernet cable.
4	Software installation location	If installed in the default C drive, there may be permission settings.