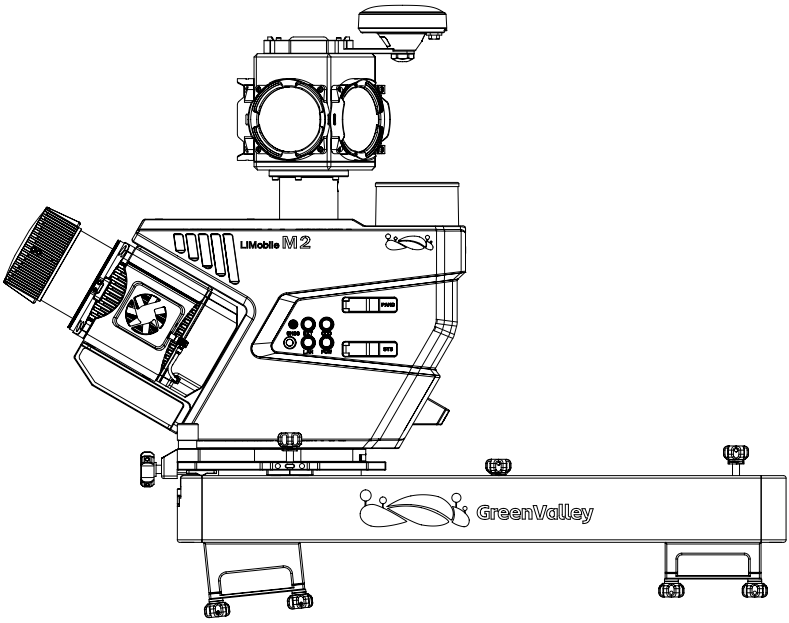
LiMobile M2 Ultra

Mobile Laser Scanning System

Quick Start Manual



Contents

Disclaimer

Before using this product, please carefully read and follow the quick start manual, user manual,and other relevant product manuals. Using this product shall be deemed as having read and accepted all the terms related to this product.

Safety Tips

Before using the device, please carefully read "Equipment Usage Precautions" and the precautions in the user guide, and strictly adhere to them to avoid potential issues such as device damage or data loss.

Product Overview

The LiMobile M2 Ultra mobile laser scanning system, developed by GreenValley International (GVI), is a high-precision survey-grade mobile measurement system. The system integrates a long-range, high-precision LiDAR, GNSS/INS integrated navigation system, multi-channel SLAM LiDAR, and a high-resolution panoramic camera. It also provides multiple expansion interfaces and can be installed on different vehicle models. Paired with GVI's self-developed LiDAR360MLS software, it enables one-stop data processing to deliver industry results in applications like road maintenance, road reconstruction and expansion, road asset census, intelligent transportation, high-precision maps, digital twins, and more.

Device List

1 Sensor Unit Case

No.	Items	Quantity
1	Tablet	1
2	Tablet Charger	1
3	Type-C to Ethernet Adapter	1
4	RJ45 Ethernet Cable	1
5	LEMO Ethernet Cable	1
6	External Power Cable	1
7	SLAM LiDAR Protector Cover	2
8	CFE Card Reader	1
9	Cleaning Set	1
10	Hook and Loop Fastener	1
11	CFE Card Set (2 Disks)	2
12	LiDAR Protector Cover	1
13	Sensor Unit	1
14	Sensor Unit Rain Cover	1

2 Battery Accessory Case

No.	Items	Quantity
1	Wi-Fi Antenna	2
2	Battery Box	1
3	Tool Kit	1
4	Battery Charger	3

3 Roof Rack Case

No.	Items	Quantity
1	Support Structure Component	2
2	Dust Removal Tool Kit	1
3	Roof Rack	1
4	Roof Rack Knob Screw	4

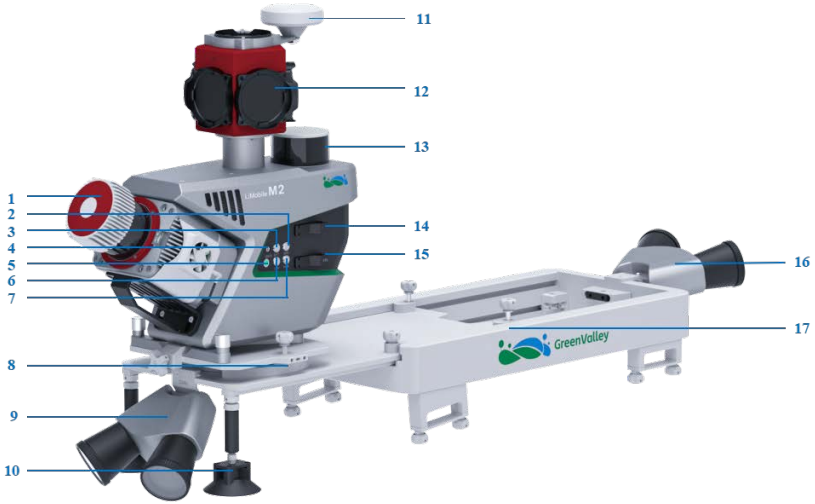
4 DMI Case (Optional)

No.	Items	Quantity
1	Socket Gripper	6
2	Universal Chuck	1
3	Guide Mounting Bracket	1
4	DMI Main Component	1
5	Suction Cup	2
6	Adjustable Wrench	1
7	DMI Storage Bag	1
8	DMI Protection Rope	1
9	Socket Fixing Screw	12
10	Suction Cup Fixing Screw	4
11	Chuck Fixing Screw	2

5 Planar Camera Case (Optional)

No.	Items	Quantity
1	T-Handle Hex Key Tool	1
2	Pavement Camera Set	1
3	Front Camera Set	1
4	Pavement Camera Cable	1
5	Front Camera Cable	1
6	Pavement Camera Mounting Screw	6
7	Front Camera Mounting Screw	6

Device Description



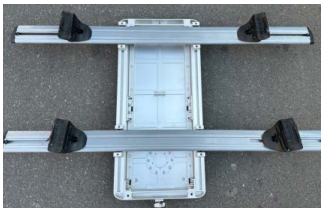
No.	Items
1	LiDAR
2	EXT: Extended Debugging Port
3	ODO: DMI Sensor Port
4	GNSS: Backup Antenna Port
5	Device Power Indicator
6	LAN: Ethernet Port
7	POW: Power Cable Port
8	Swivel Plate
9	Pavement Camera
10	Support Structure Component
11	Antenna
12	Panoramic Camera
13	SLAM LiDAR
14	System Disk Interface
15	Panoramic Camera Disk Interface
16	Front Camera
17	Roof Rack
18	CAM1: Front Camera Port
19	CAM2: Pavement Camera Port
20	CAM3: Camera Debugging Port
21	CAM4: Camera Debugging Port

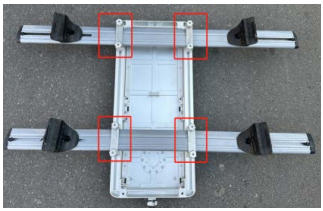
Device Installation

1 Sensor Unit Installation

Step 1: Roof Rack and Luggage Rack Crossbar Installation

(1) Manually tighten the fixing screws to secure the luggage rack crossbar to the roofrack .





(2) Place both on the roof and use a hex key to tighten the four fixing clamps on the luggage rack crossbar.

(3) Manually loosen the four fixing screws on the top of the roof rack, pull the bracket out completely in the direction of the arrow, and then hand-tighten the four screws.

Note:

1.The luggage rack crossbar is not included in the delivery and must be prepared by the user.

2.Position the roof rack as close to the center of the luggage rack as possible.

3.Install the device toward the rear of the vehicle to minimize obstruction.

4.The distance between the limit slots of the roof rack can be adjusted according to the user's vehicle model.

5.When disassembling the device, you do not need to remove the luggage rack crossbar, just unscrew the roof rack bracket screws.

Step 2: Support Structure Component Installation

(1) Align the support structure with the holes under the roof rack and tighten the top fixing knob.

(2) Rotate the black knob at the bottom to lower the suction cup of the support structure until it touches the vehicle body.

(3) Rotate the light gray knob in the middle to the top of the black knob to secure it.

(4) As shown in the diagram, turn the switch on the suction cup to the locked position.

Step 3: Sensor Unit Installation

(1) Take out the sensor unit and install the antenna feeder.

(2) Push the sensor unit in the direction of the arrow until it reaches the limit of the roof rack.

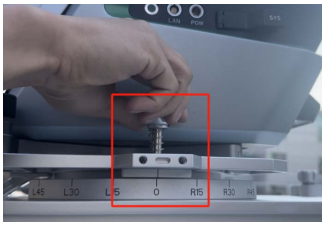
(3) Press down on both safety buttons.

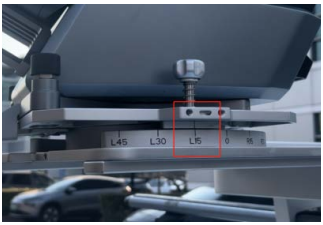
(4) Lift the central locking block of the roof rack and tighten it clockwise.

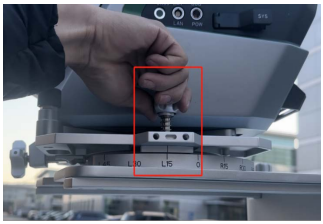
Note:
1. Shake the luggage rack crossbar, roof rack, and sensor unit firmly to ensure stability.
2. The device is calibrated before leaving the factory. Minor scratches may occur during installation and use, which is normal and will not affect performance.

Step 4: Rotation of the Sensor Unit (Optional)

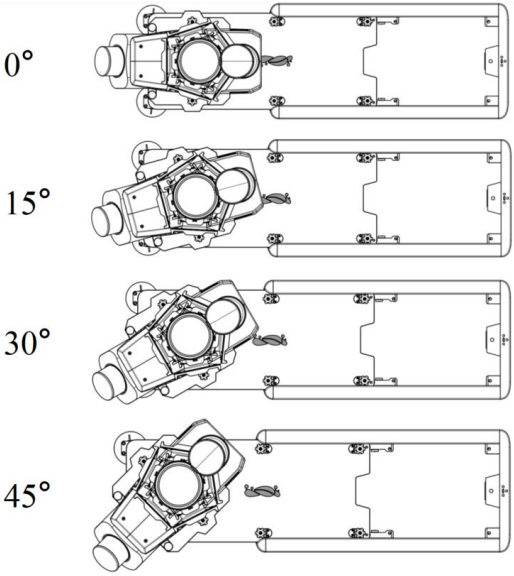
Loosen the fixing screws on both sides of the swivel plate, rotate the device according to the scale on the swivel plate, and then tighten the screws.







Note:
The device supports multi-angle installation and can be adjusted horizontally at 0, ±15°, ±30°, ±45°.



Step 5: Battery Installation

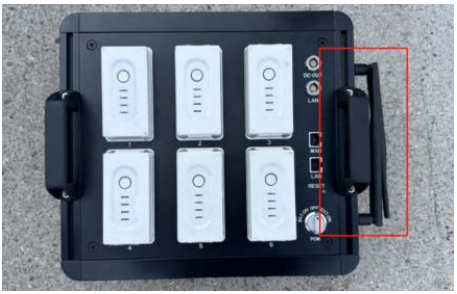
Insert the batteries into the battery box in the direction shown in the figure.

Note:

1. Ensure the battery is installed in the correct direction as shown in the diagram. Reverse insertion is prohibited.
2. Press down on the battery to check if it is securely installed.
3. To remove the battery, press the top buckle inward and pull it out simultaneously.

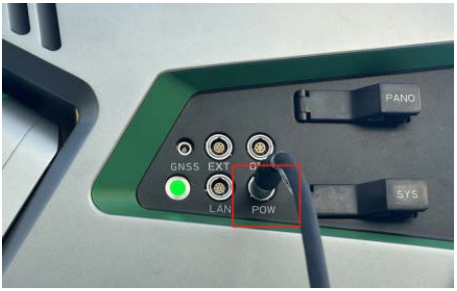
Step 6: Wi-Fi Antenna Installation

Hand-tighten the two Wi-Fi antennas on the right side of the battery box and bend them inward to avoid breakage.

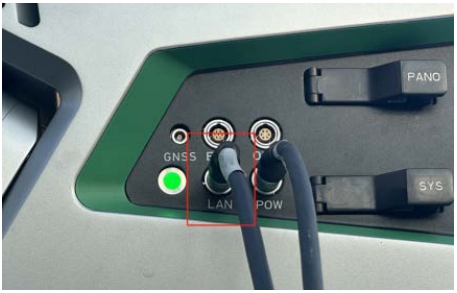


Step 7: Cable Connection

(1) Power Cable Connection.



(2) Ethernet Cable Connection.



Note:
Ensure the correct orientation of cable connectors to avoid damage caused by incorrect insertion.

2 Pavement Camera Installation (Optional)

Insert the pavement camera cable into the pavement camera, fix the pavement camera to the roof rack, and connect the other end of the cable to the sensor unit.



Note:
Remove the lens cover before installation.

3 Front Camera Installation (Optional)

Fix the front camera to the roof rack and connect it to the sensor unit using the front camera cable.



Note:
Remove the lens cover before installation.

4 DMI Installation (Optional)

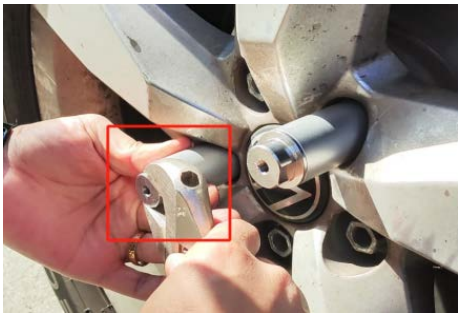
Step 1: Preparation

Use tools to remove the screw caps on the rear right wheel hub of the data collection vehicle.

Step 2: Socket Installation

(1) Push the end of the internal claw of the socket to align with the end of the outer wall of the socket.

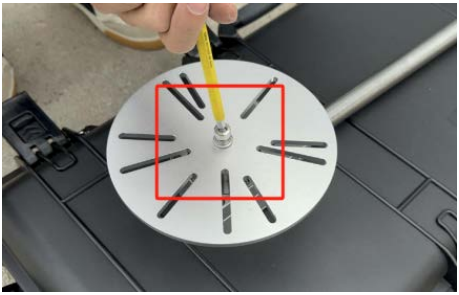
(2) Tighten the internal claw of the socket around the hub screw, use a tool to tighten the front screw of the socket until the entire socket assembly fits snugly against the hub screw. Repeat the above steps to complete the installation of all sockets.



Note:
When the resistance of the screw increases, users can reverse the screw half a turn before continuing to tighten. During the tightening process, keep your hands steady to ensure that the outer wall of the socket and the hub are always in snug contact.

Step 3: Main Component of the DMI Installation

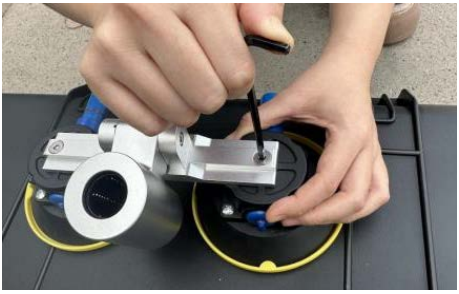
(1) Use the chuck set screw to secure the chuck to the tachometer body.



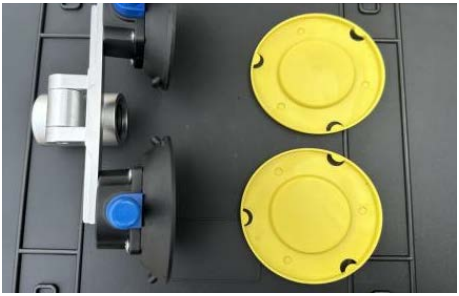
(2) Align the holes of the chuck with the screw holes at the top of the socket. Once aligned, use the socket fixing screws to secure them together.

Step 4: Suction Cup Installation

(1) Use the suction fixing screws to install the two suction cups to the guide mounting bracket in turn.



(2) Remove the yellow protective cover from the bottom of the suction cup.



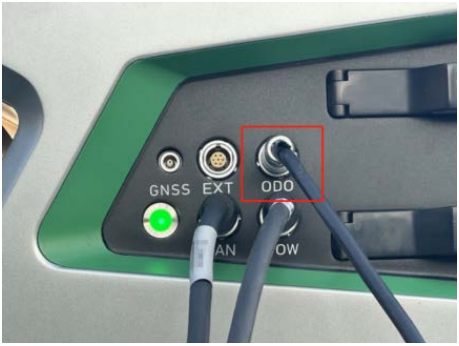
(3) Thread the DMI cable and cable conduit through the socket of the guide mounting bracket. Move the suction cup to a suitable position so that the wire harness is vertical to the ground, and adjust the position of the suction cup so that the air valve faces upward.

(4) Press firmly on the suction cup, continuously pressing down on the blue piston until the suction cup is fully attached.

Note:
Please remove the white cotton pad before pressing the blue piston.

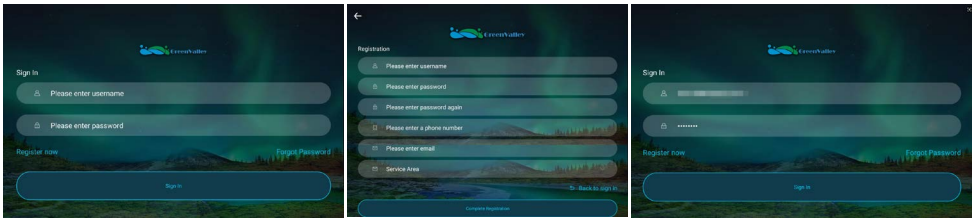
Step 5: Cable Connection

Insert the DMI cable into the ODO port on the side of the sensor unit.



User Registration and Sign In

(1) Connect the tablet to an available internet network. After opening the APP, the user clicks the **Register Now** button on the Sign In page, and the APP redirects to the Registration page.
(2) After filling in the required information, click the **Complete Registration** button, and the APP automatically returns to the Sign In page.
(3) The user enters the username and password, clicks the **Sign In** button, and completes the Sign In process.



Base Station Setup

Before data collection, users need to plan the location of the base station reasonably and setup it. If you are using our company's LiBase equipment, you can find specific operations detailed in the “LiBase User Manual”.

Note:
The base station establishment time must completely cover the data collection time, with more than 15 minutes before and after.

Device Power-On

Turn the rotary switch POW on the battery box to the BAT-ON position, and the green indicator light on the main unit will illuminate.

Note:
The device also supports external power supply mode. If using external power, it is recommended to use an AC voltage of 110 V~220 V outdoor power source (with a power rating of 1000W or higher).

Device Connection

1 Wi-Fi Connection

Search for the Wi-Fi network named LiMobileM2_xxxx on the tablet.
Enter the default Wi-Fi password: greenvalley.

> Note:
> "xxxx" refers to the last four digits of the device's serial number (SN).

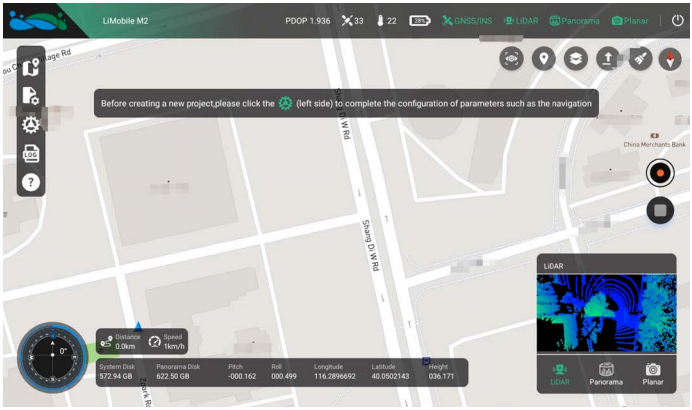
2 Wired Connection

Use an adapter and a standard RJ45 Ethernet cable to connect the tablet to the LAN port on the battery box.

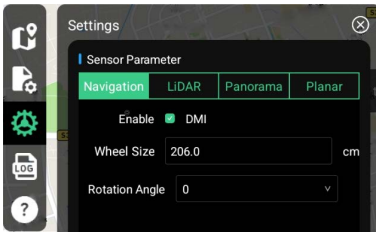
Rapid Data Collection

1 Device Initialization

No user action is required. Data collection can begin once the status indicators for all sensors in the upper right corner turn green.

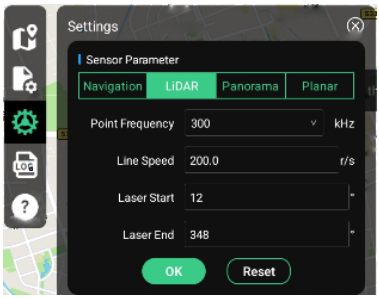


2 Sensor Parameter Settings



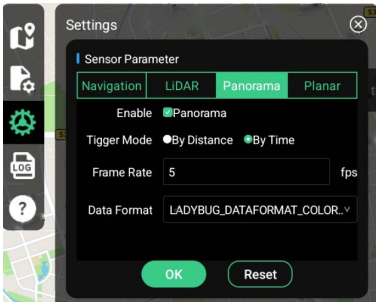
Navigation

DMI Enable Settings: The device will record data only after it is enabled.
Wheel Size: Used to calculate driving distance.
Rotation Angle: Supports multi-angle installation, and can be adjusted to 0, ±15°, ±30°, ±45° in the horizontal position. Users need to choose according to the actual installation angle.



LiDAR

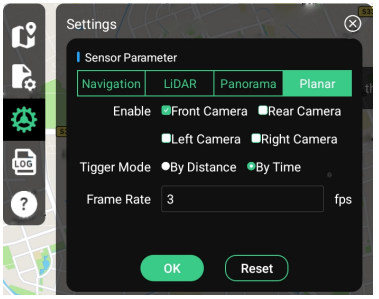
Point Frequency: supports 300 kHz, 500 kHz, 1000 kHz, 12500 kHz, 1500 kHz, 1800 kHz.
Line Speed: supports 10 ~ 250 r/s adjustment.
Laser Start: default parameter 0°
Laser End: default parameter 360°



Panorama

Panorama Enable Settings: The device will record data only after it is enabled.
Trigger Mode: supports By Time and By Distance trigger modes.
1.By Time
Frame Rate: default parameter 5 FPS.
2.By Distance
Interval: default parameter 5 m.
Data Format: supports LADYBUG_DATAFORMAT_RAW8 and LADYBUG_DATAFORMAT_COLOR_SEP_JPEG8 formats.

Note: The camera's By Distance trigger mode is enabled only when the DMI is enabled.



Planar

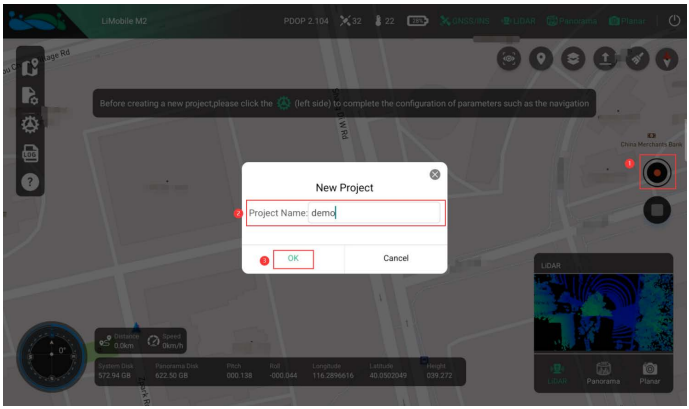
Planar Enable Settings: The device will record data only after it is enabled.
Trigger Mode: supports By Time and By Distance trigger modes.
1.By Time
Frame Rate: default parameter 3 FPS.
2.By Distance
Interval: default parameter 5 m.

Note: The camera's By Distance trigger mode is enabled only when the DMI is enabled.

Note:
1. After settings are complete, click the "OK" button to make the parameters effective.
2. The "Reset" button will restore all sensor parameters to factory defaults.

3 New Project

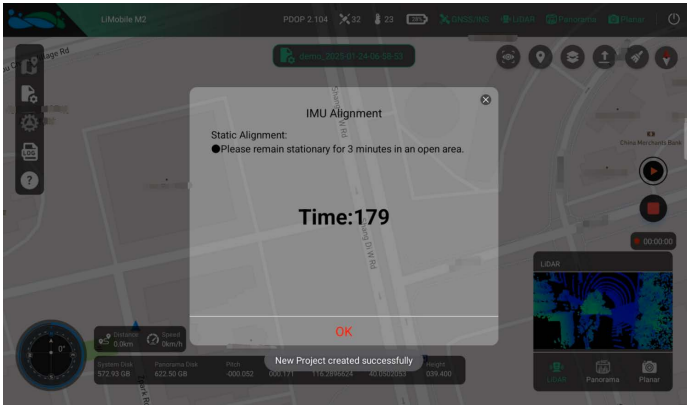
Click the "New Project" button, enter a custom project name, and then click the "OK" button.

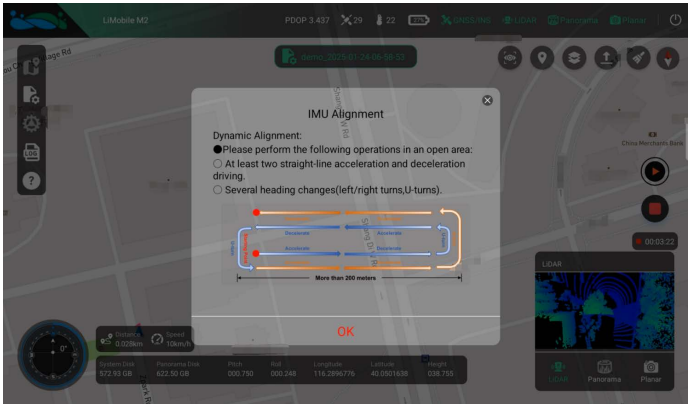


Note:
1.The name of the newly created project should not contain special characters.
2.The final project name is: User-defined name_UTC time.

4 IMU Alignment

The IMU alignment operation is divided into two steps: static alignment and dynamic alignment. Users need to complete the operations in sequence according to the pop-up prompts.



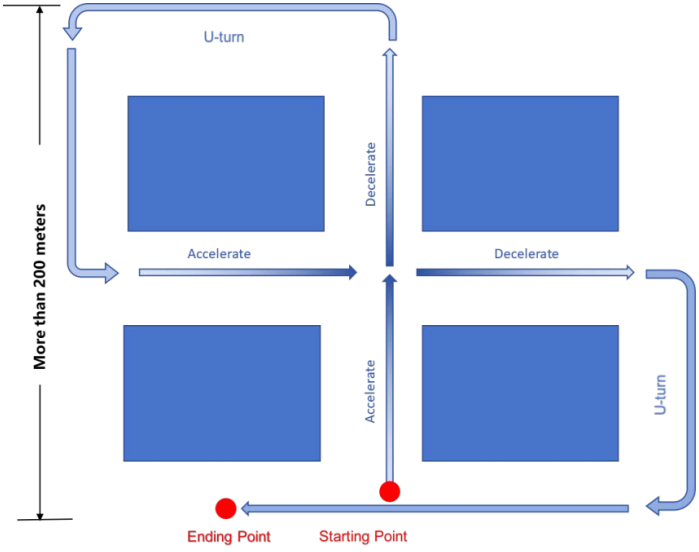


Note:

1.If the IMU alignment operation is not carried out, there will be a high risk that some data cannot be processed.

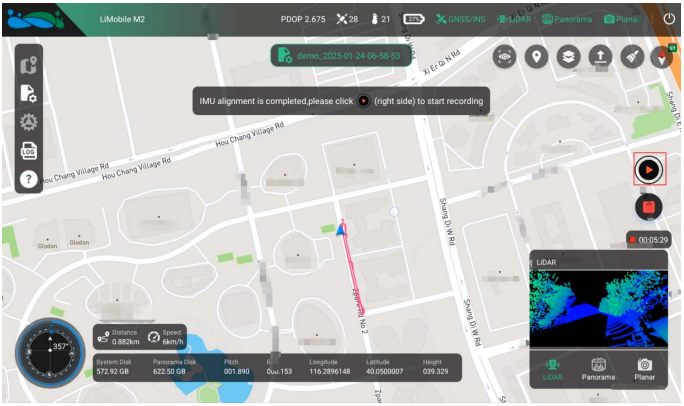
2.If users are under tight schedules and need to shorten the waiting time for the static alignment step, the manual provides other alignment criteria, that is, when the PDOP value is below 2 and the number of satellites is above 15, and this state remains stable for 30 seconds, dynamic alignment can be carried out.

3.If the user's acquisition environment permits, it is recommended to conduct the dynamic alignment operation as shown in the following figure.

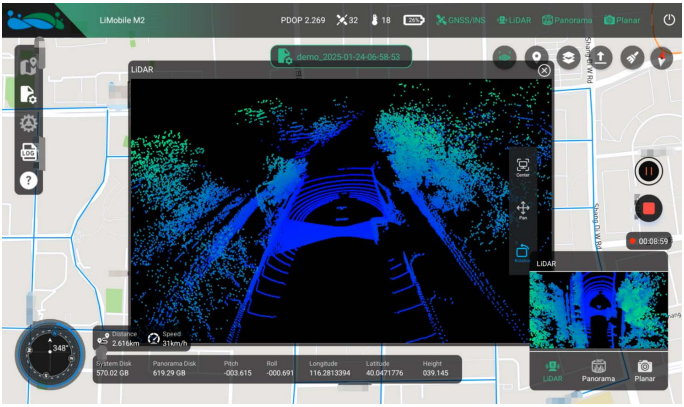


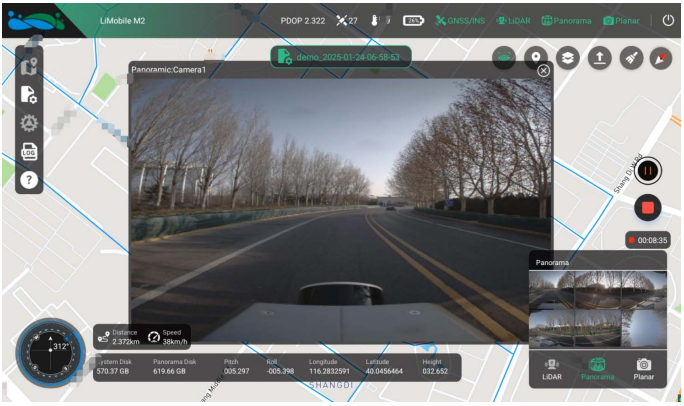
5 Start Data Recording

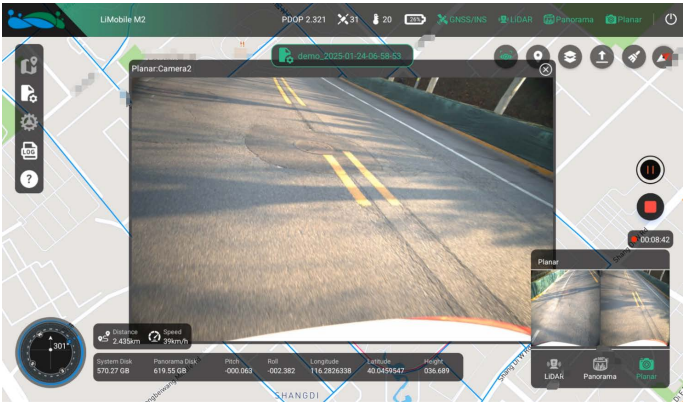
Click the "Start Recording" button.



Users can view the driving route of the equipment in real time on the map, and can also view the collected single-frame point cloud data and image data in real time.

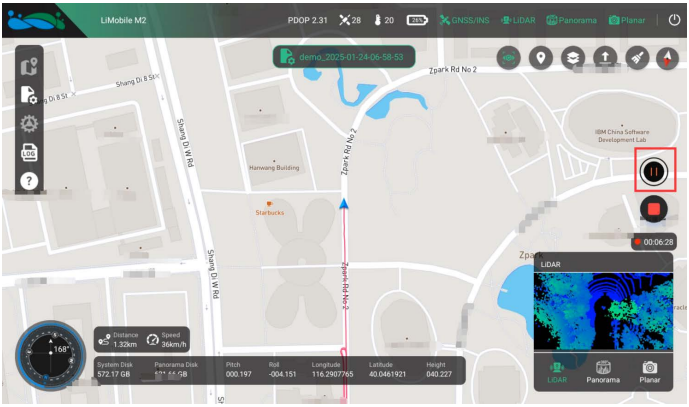






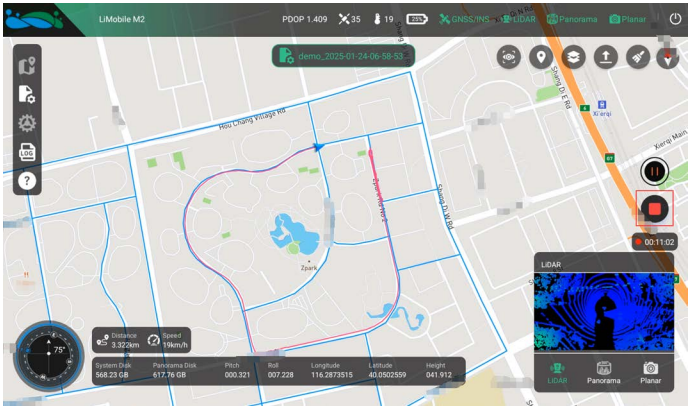
Note:

1. When users encounter situations such as the need to transfer the work area or traffic jams during data collection, they can click the "Pause Recording" button to pause data recording.
2. After the pause of data recording ends, users can click the "Start Recording" button again to obtain data.



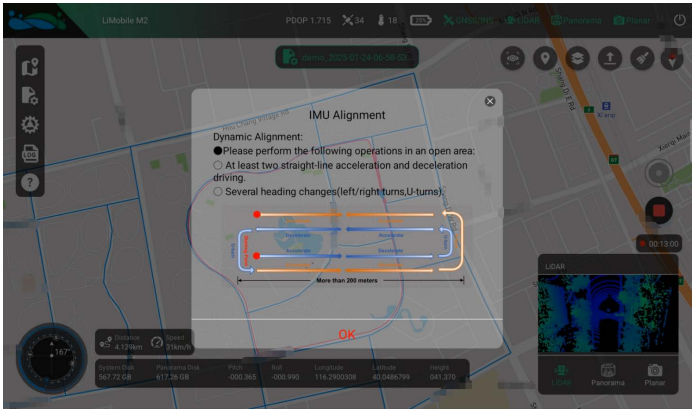
6 Stop Data Recording

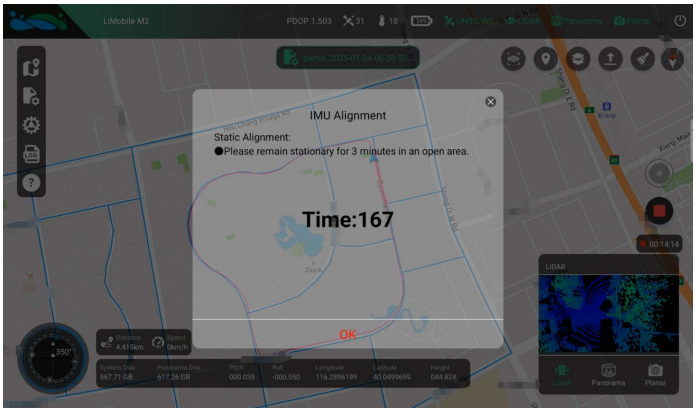
After the collection is completed, click the "Stop Recording" button.



7 IMU Alignment and Close Project

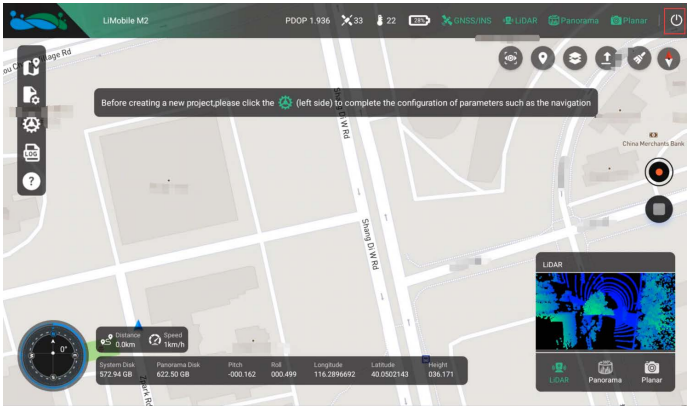
The IMU alignment operation is divided into two steps: dynamic alignment and static alignment. Users need to complete the operations in sequence according to the pop-up prompts. After completion, click the "OK" button to close the current project.





Device Shutdown

After completing all data collection tasks, click the power button in the upper right corner to shut down the device.



Note:

1. Please wait patiently for 30 seconds (the time required for the equipment system to be completely shut down). Do not perform any operations until the interface shows that the equipment connection is disconnected, and then turn off the equipment power.
2. Please cut off the power in advance before plugging or unplugging the disk.

Data Copy and Quality Inspection

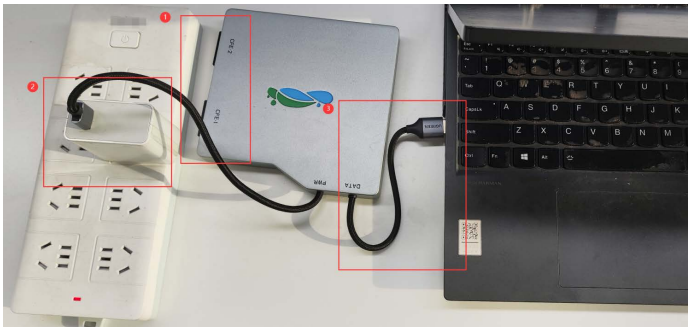
1 Hardware Preparation

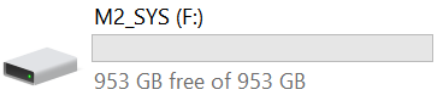
Before copying data and performing quality checks, users must remove the hard drive and connect the hardware as follows. The computer will recognize the M2_SYS and M2_PANO disks.

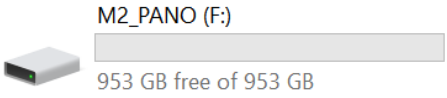
(1) Insert both disks into the card reader.

(2) Connect the power cable at the PWR port of the card reader to a power source.

(3) Connect the data cable at the DATA port of the card reader to the computer, ensuring a stable connection (preferably to a blue USB 3.0 port).





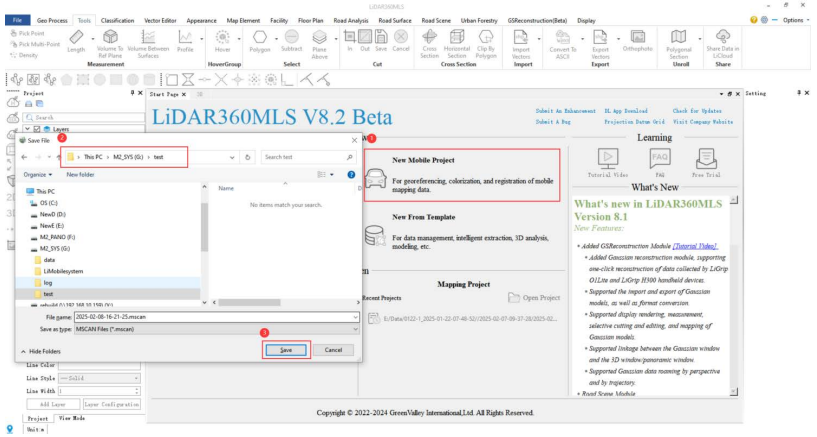


Note:

1. Pay attention to the insertion direction when inserting the disks.
2. Do not rename the project folder before completing data copying and merging, as this may cause errors in data merging.
3. After data copying, ensure the disks are safely ejected from the computer before removal to avoid damage to the disks or data.
4. To ensure stable data transfer, the card reader must be connected to a power source for stable power supply.
5. Avoid directly processing raw data on the storage disks, as this may risk disk damage.
6. It is recommended to create two copies of the data: one for processing and one for archiving.
7. The charger plug is not included in the delivery and must be prepared by the user.
8. After each data copy, check the remaining disk space and clear data as needed. Regularly format the disks by following the steps in the "LiMobile M2 Ultra User Manual".

2 New Mobile Project

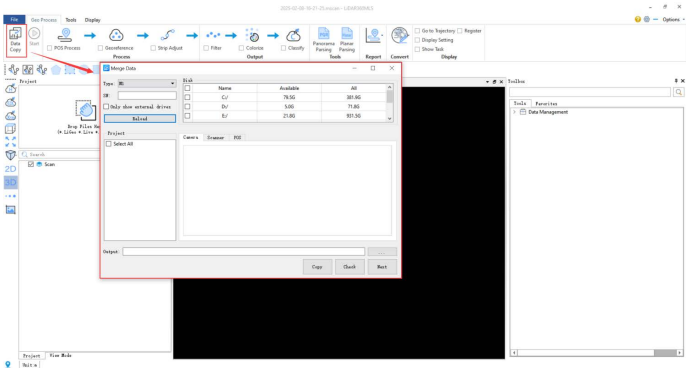
The Data Copy tool is integrated into the LiDAR360MLS software. Before using this function, it is necessary to create a new mobile project. Click the "New Mobile Project" button on the startup page. Users can select a custom storage path and then click "Save" button.



3 Data Copy and Quality Inspection

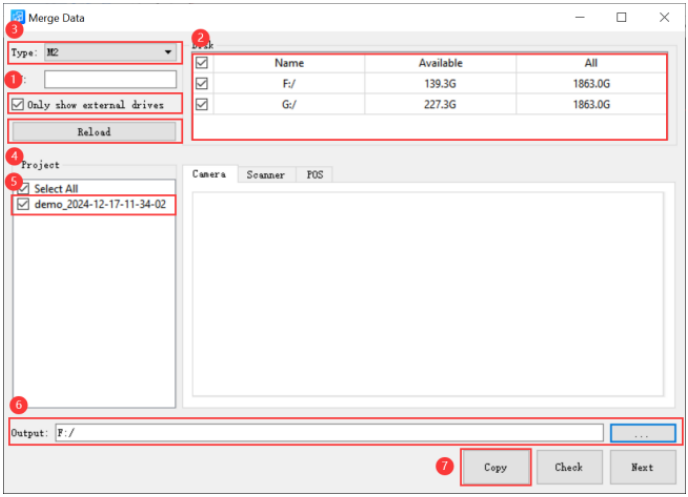
Step 1

Click the "Data Copy" button in the upper left corner of the software interface, and the "Merge Data" dialog box will pop up automatically.



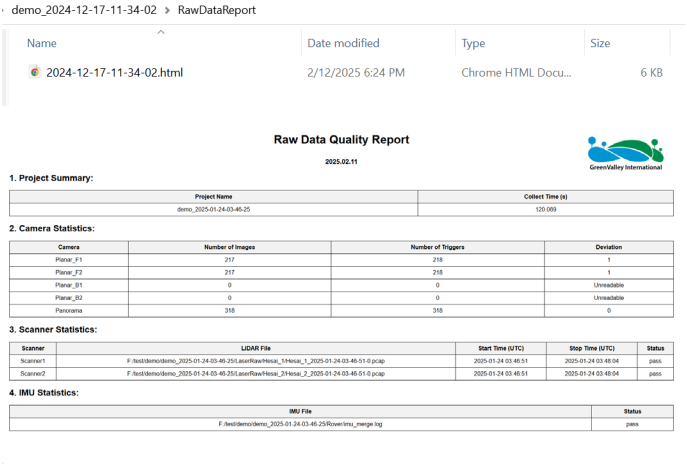
Step 2

(1) Click the option of "Only show external drives".
(2) Check the drive letter corresponding to the device disk.
(3) Select the device type.
(4) Click the "Reload" button.
(5) Check the data that needs to be copied.
(6) Select the output storage path.
(7) Click the "Copy" button.



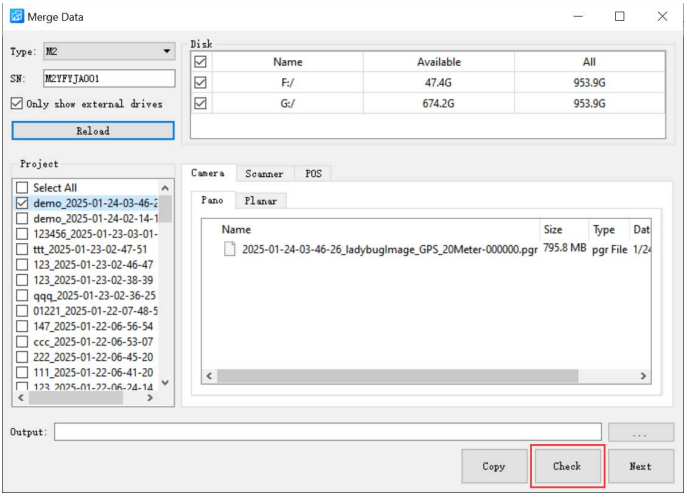
Step 3

After the copy is completed, the software will generate an Raw Data Quality Report and save it under the corresponding project path, and the browser will also automatically pop up the report. If the data status is abnormal, please re-collect the data in time.



Note:

The Data Copy function also supports completing data quality inspection without copying the data. The quality inspection report will be saved in the project path of the corresponding project on the M2_SYS disk.



If you have any questions or suggestions about the manual, please contact us through the following methods:
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