

Pocket 3D

USER MANUAL

U.S. Edition – v1.0

Source and Editorial Note: This U.S. edition is based on technical documentation supplied by Shenzhen Feima Robotics Co., Ltd. SlamScanner.com has reorganized, edited, clarified, and supplemented the source material for U.S. users. Technical procedures and product requirements remain based on Feima source guidance unless otherwise noted.

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Important Safety and Product Notices

Read these notices before operating, charging, transporting, or storing Pocket 3D.

General operating safety

- Pay attention to the surrounding environment during data acquisition. Do not allow operation of the scanner to distract you from traffic, obstacles, drops, stairs, machinery, or other hazards.
- Pocket 3D is not explosion-proof. Do not use it where flammable or explosive gases may accumulate, including fuel-handling areas, mines, confined utility spaces, or similar hazardous locations.

Device protection

Pocket 3D is a precision measurement instrument. Dropping, impact, excessive dust or sand, liquid exposure, or unauthorized disassembly may damage the device.

Protect Pocket 3D from liquid exposure. Do not deliberately immerse the device or expose it to high-pressure or high-flow water. Splash-, water-, and dust-protection performance may decline with normal wear. Damage caused by liquid immersion is not covered by the product warranty.

- Protect the raised lenses of panoramic cameras from scratches and impact.
- Always shut down using the power button. Do not remove the battery handle or disconnect external power while the device is operating.

Battery and charging safety

- Use a compliant USB-C PD charger. Feima specifies 20 V PD charging, recommended current of at least 2 A, and recommended power greater than 30 W.
- Allow a hot battery to cool to room temperature before charging. Feima specifies an ambient charging range of 5°C to 40°C (41°F to 104°F).
- Store batteries in a cool, dry location away from children, pets, heat sources, direct sunlight, sharp objects, and conductive materials.
- Do not use a battery that is swollen, leaking, punctured, severely damaged, or otherwise abnormal. Follow applicable local requirements for lithium-battery recycling and disposal.

1 Product Introduction

1.1 Product Overview

Pocket 3D is a handheld SLAM LiDAR reality-capture system designed to collect spatial data for point-cloud, panoramic-image, and 3D Gaussian Splatting (3DGS) workflows. The system combines a 16-channel LiDAR scanner with an external supported panoramic camera, mobile control through SLAM GO iOS/Android app, and desktop processing in SLAM GO POST Pro Windows desktop software.

Pocket 3D supports rapid capture of indoor and outdoor environments and can be used for surveying and mapping, documentation, visualization, digital-twin and reality-capture applications, and other workflows that benefit from registered LiDAR and imagery. During data acquisition, the SLAM GO mobile app provides a real-time point-cloud display, allowing the operator to view the mapped environment as it is being captured.

1.2 Included System Components

- Pocket 3D scanner body
- SP20 intelligent battery handle/base
- TF (microSD) memory card (Installed)
- Camera mounting hardware (on board)
- USB SD/microSD card reader
- Wrench set & Extra Mag circle
- Charging cable
- Soft body carrying case
- Quick Start Guide
- Inspection certificate

The SLAM GO mobile app is auto licensed when it recognizes an available Pocket 3D device the and SLAM GO POST Windows desktop application recognizes project data from Pocket 3D and enables all required processing and visualization capabilities.

1.3 Key Technical Specifications

Specification	Value
Complete Machine	
Weight	700 g (1.54 lb), excluding camera
Dimensions	127 × 105 × 223 mm (5.0 × 4.1 × 8.8 in)
Power	7 W
Storage Capacity	64 GB TF (microSD) card
Battery Model	SP20
Battery Capacity	2450 mAh
Battery Runtime	Approx. 3 hours
Operating Temperature	-20°C to 50°C (-4°F to 122°F)
Relative Humidity	<95%
Accuracy*	
Relative Accuracy	2 cm @ 60 m (0.8 in @ 197 ft)
Absolute Accuracy	5 cm (2 in)
LiDAR	
Measurement Range	0.15-100 m (0.5-328 ft)
Range at 10% Reflectivity**	30 m (98 ft)
Number of Channels	16
Horizontal Field of View	360°
Vertical Field of View	40°

Scan Frequency	10 Hz
Point Rate	48,000 points/second
Interfaces	
USB Type-C	Battery charging
Wi-Fi	Supported
Bluetooth	Supported
Bottom Mount	1/4-inch threaded hole

* Measurement accuracy under typical conditions.

** Test conditions: normal incidence, ambient illuminance 0-100 klux, detection probability 50%.

1.4 Controls and Status Indicators

The power/function button is used to power the device on and off and to start or stop acquisition. The system/status LED indicates startup, standby, initialization, acquisition, abnormal conditions, and firmware upgrade status.

Device state	Button action	Function
Power off	Press 1 second	Display battery level
Power off	Hold 3 seconds	Power on
Standby	Double-click	Start acquisition
Standby	Hold 3 seconds	Shut down
Scanning	Double-click	Stop acquisition

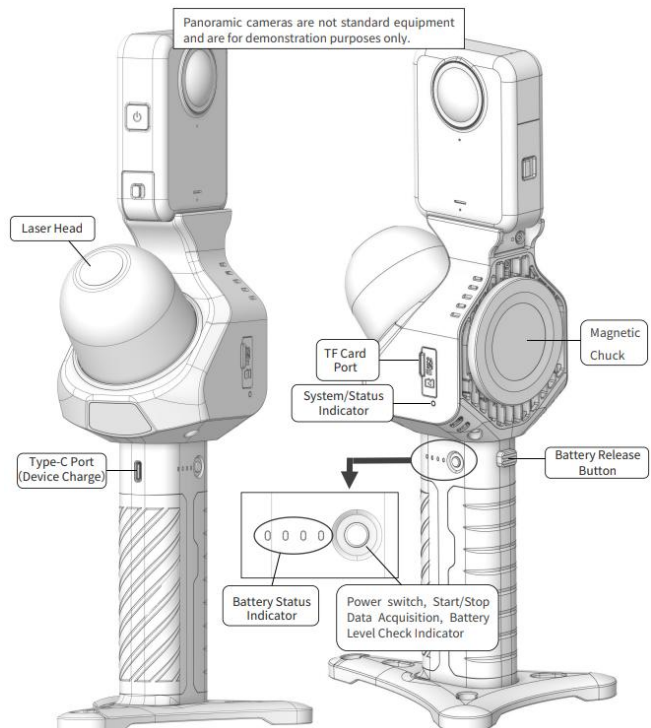
System/Status Indicator	Meaning
Steady green	Standby: scanner is on and ready to start acquisition
Fast-flashing green	Static initialization in progress: keep the scanner stationary
Slow-flashing green	Normal data acquisition in progress

1.5 Power / Charging

USB-C Charger: Pocket 3D does not currently include a charger in the standard package. Users must provide a compatible USB-C Power Delivery (USB-PD) charger that supports 20 V output. A 30 W or higher USB-C PD fast charger is recommended. Standard 5 V-only USB chargers are not suitable.

1.6 Hardware Layout

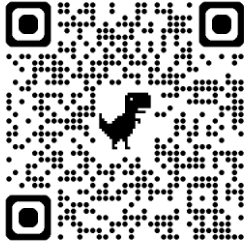
The diagram shows the layout of the various aspects and features of the hardware.



1.7 Included Software

SLAM GO is the companion mobile app for Pocket 3D, providing scanner setup, control, and monitoring from a compatible mobile device. SLAM GO POST Pro is the Windows desktop processing and visualization software for Pocket 3D, used to process collected data and generate, review, and manage scan results. Applications

SLAM GO Mobile App: To activate and start working with your Pocket 3D scanner in Section 3 you will need the SLAM GO mobile app. The SLAM GO app can be obtained through the iOS App Store or Google Play store for Android devices. You will also use this app to operate the scanner in the field and to connect and control a supported panoramic camera during data acquisition.



SLAM GO Android



SLAM GO iOS



SLAM GO

SLAM GO POST Pro Windows Desktop Application: To process the data collected with your Pocket 3D scanner, you will need the SLAM GO POST Pro Windows desktop software. The software is available for download from SlamScanner.com.

<https://slamscanner.com/support/software/>



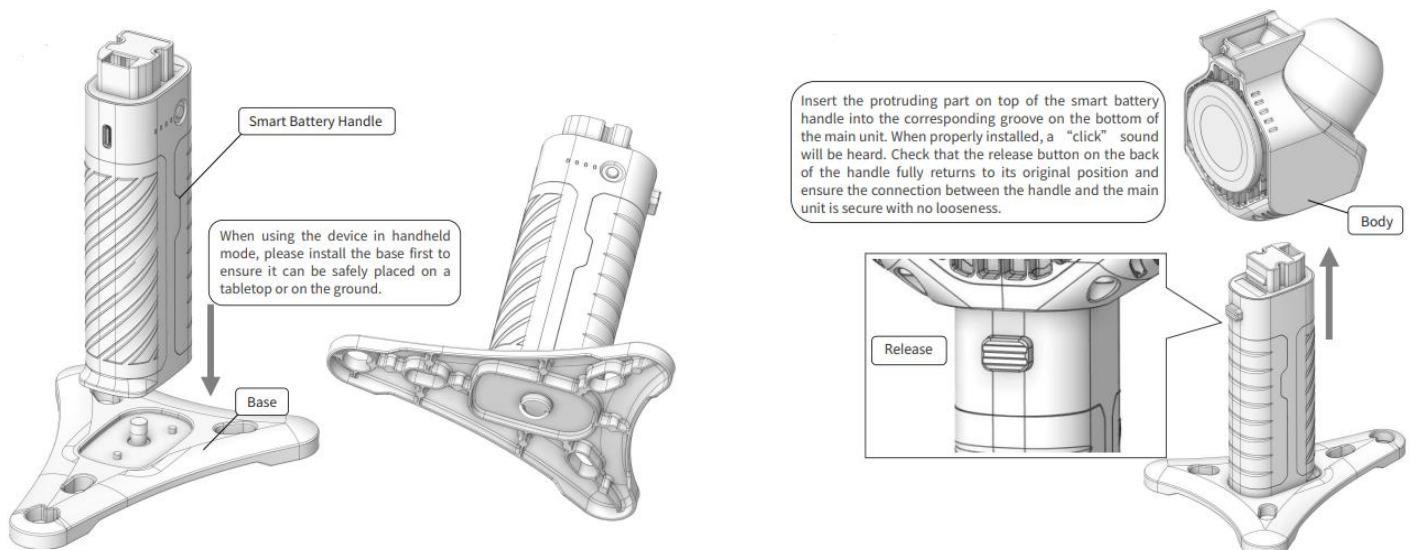
SLAM GO POST Pro

2 Hardware Setup and Assembly

2.1 Assemble the Scanner and Battery/Base

Install the scanner body securely on the intelligent battery handle/base as shown in the diagram. Confirm that the assembly is fully seated and rigid before use.

Note: It is best practice to attach the removable base to the battery first and then attach the scanner head to the batter and base assembly. This allows you to set the battery and base assembly on a stable surface while you attach the scanner head.



2.2 Install a Supported Panoramic Camera

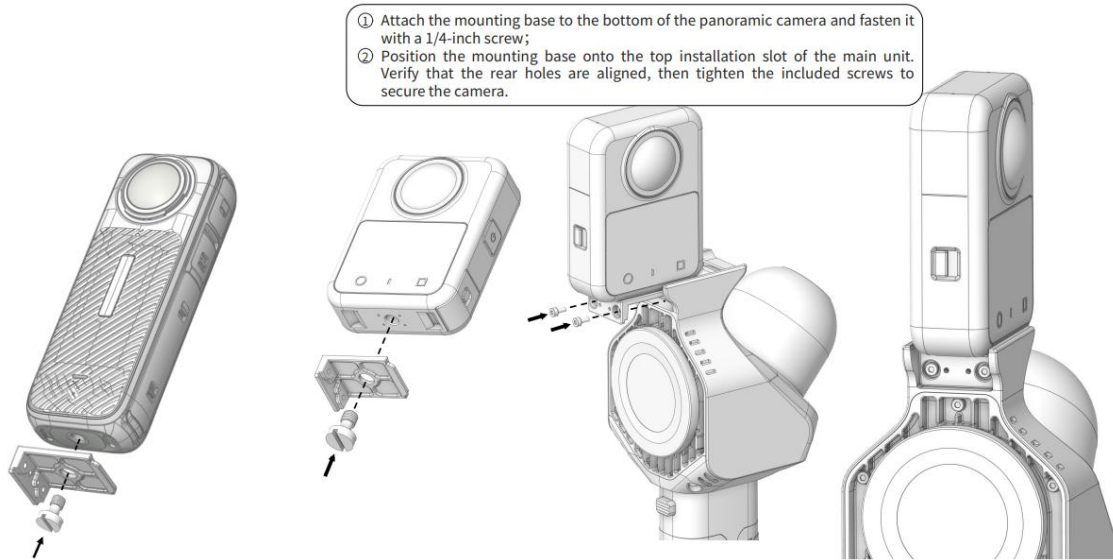
Pocket 3D supports third-party panoramic cameras.

- DJI Osmo 360
- Insta360 X4, X4 Air, and X5.

The panoramic camera attaches mechanically to Pocket 3D using the supplied mounting hardware. No wired connection between the camera and scanner is required. The panoramic camera is connected to the SLAM GO mobile app after the hardware has been assembled. Camera connection and control are covered in Section 3.

Install the panoramic camera using the provided universal mounting bracket. Secure the bracket to the camera with the 1/4-inch screw with anti-loosening washer. Secure the camera and bracket to the scanner body using the two provided M2x5 mounting screws. The camera should be secure and rigidly attached.

Camera Orientation: The default installation orientation is with the panoramic camera screen facing to the left and the power button facing toward the rear of the Pocket 3D. The camera may alternatively be installed rotated 180°. During panoramic-camera calibration, select the installation orientation that matches the actual camera position. Once calibrated, the camera orientation must remain unchanged unless the camera is recalibrated.



IMPORTANT - Camera calibration is required before image-based acquisition, pano generation and point-cloud colorization using 360 imagery, or 3DGS processing. Once calibrated, keep the camera mounted in the same position. Removing, loosening, repositioning, or reinstalling the camera requires recalibration.

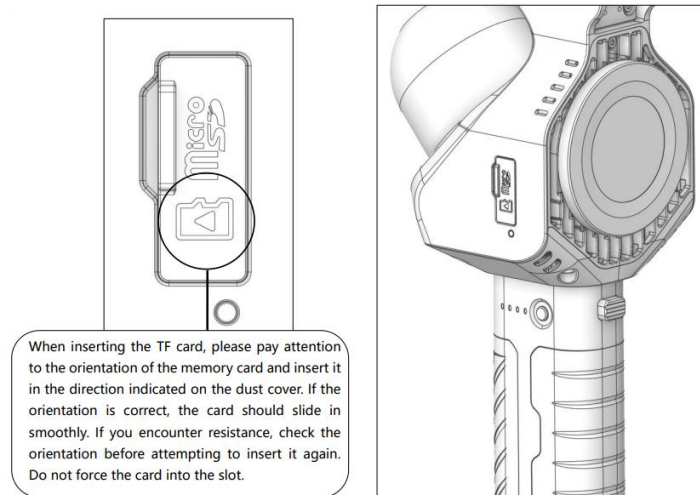
2.3 Install the TF (microSD) Card

Pocket 3D supports TF/microSD storage capacities up to 256 GB. The supplied TF memory card has an operating temperature range of 0°C to 50°C (32°F to 122°F) and is suitable for data storage under normal operating conditions.

Keep at least 10% of the card capacity free to ensure sufficient space for data acquisition.

For operation in more extreme temperatures, Feima recommends a U3-speed-class memory card with an operating temperature range covering -25°C to +85°C (-13°F to 185°F).

Power the scanner off before inserting or removing the card.



3 SLAM GO Mobile App Setup and Device Connections

After assembling Pocket 3D and installing the panoramic camera, install and configure the SLAM GO mobile app. SLAM GO is required for initial scanner activation and is recommended for normal operation with a supported panoramic camera.

3.1 SLAM GO Account and Operation Insights

Before first use, create a Feima account. SLAM GO supports registration using either a mobile phone number or an email address.

IMPORTANT: North American Users: Although the SLAM GO registration screen defaults to the phone number registration method, **email registration is required** for users in the United States and Canada. Select the email-registration option rather than proceeding with the default phone number method. A verification code will be sent automatically to the email address entered and normally arrives within one or two minutes.

After SLAM GO registration, you will connect Pocket 3D to the SLAM GO mobile app to make it available for use. Pocket 3D uses Bluetooth during the initial connection process to establish its connection to the phone's Wi-Fi hotspot, which is then used for normal communication. After initial setup and connection, Pocket 3D will normally reconnect to SLAM GO automatically when the phone's Wi-Fi hotspot is enabled.

Notes:

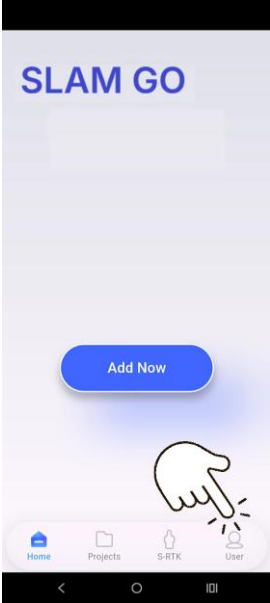
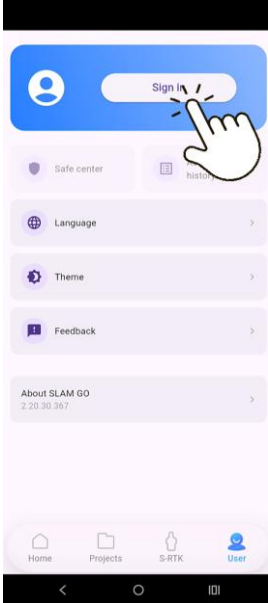
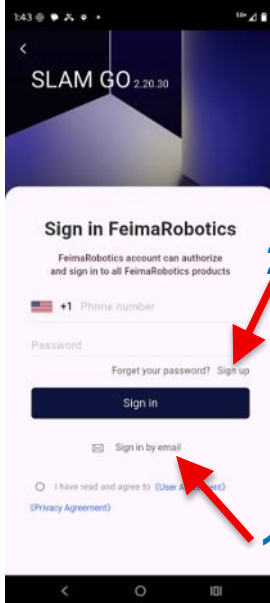
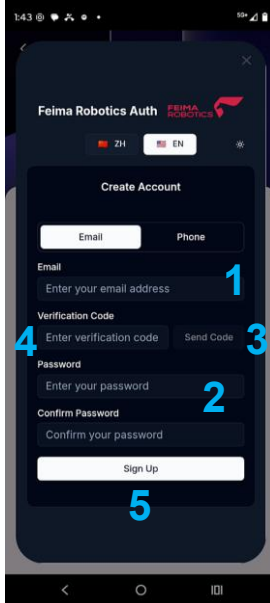
1. Android devices shut off the Hotspot by default whenever the mobile device is shut down and needs to be enabled to allow the Pocket 3D to connect to SLAM GO.
2. Android mobile devices often have a default power setting that disables the hotspot after 5 minutes and this can be frustrating and it is recommended this be changed.
3. If you are experiencing any difficulty in the mobile device recognizing the presence of Pocket 3D, you may need to switch the hotspot frequency from 2.4 ghz, to 5 ghz.

3.2 Create an Account

Before you start using SLAM GO, you should set up an account. The screens can be a little unclear as to the steps required.

- By default, the system wants to use a phone number for activation, but users should select the email method
- The "Sign In" screen has a large "Sign In" button, but for the initial set up you need to select the small "Sign Up" link

- The info input page has a few challenges but if you follow the sequence outline below it is very simple. WE suggest entering your email and password (twice) before you request a code. Do not hit this “Sign Up” until you get the code in place. Once you ask to send a code the app starts a count down. It can be challenging to retrieve the code, enter the code and then still need to enter your password (twice) before the count expires.

After Starting the app:	After Selecting User:	Sign In Screen:	Info Input Page
			
After Launching SLAM GO Select User	Select Sign In	1. Configure to Use Email 2. Select Sign In	1. Enter an email address 2. Enter a new password twice 3. Request a code 4. Retrieve the code from your email and enter it 5. Sign up

3.3 Connect Pocket 3D and Activate It

This connection sequence shows how to connect to any scanner and also shows the steps required if the scanner has not yet been activated. The scanner must be running in standby mode. In addition, **you must have the mobile device's hotspot on and know the password.** Note that android devices ALWAYS turn off the hotspot when the device is turned off, so you always need to turn it on when first turning on the device.

When a scanner is fresh from the factory, it requires activation before first use. This is a one-time occurrence. It will happen automatically. The activation requests a user and company name. Steps 1-3 will always occur when connecting an unknown scanner to the app. Step 4 will only happen when the scanner has never been activated.

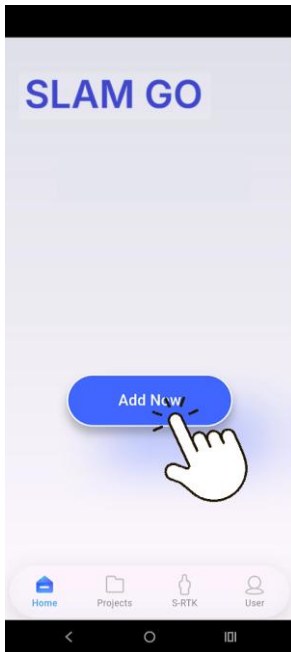
Step 2, connecting to the hotspot can often take a few minutes for the scanner to recognize the hotspot and may need some manipulation. You need to start by selecting the Bluetooth icon  at the top of the screen. In busy network environments hotspots seem to have less seniority. When a hotspot is recognized, it will show in the list of “Available” and in some cases it will auto connect and show in the “Connected” field.

If you don't see your device's hotspot, you can try toggling the mobile device hotspot on/off. You can also change between 2.4 GHz, 5 GHz (on android) or Max Compatibility (on iOs). Both are supported and, in some cases, one works better than the other.

The Pocket 3D name (serial number) will show. Select it and then select the hotspot.

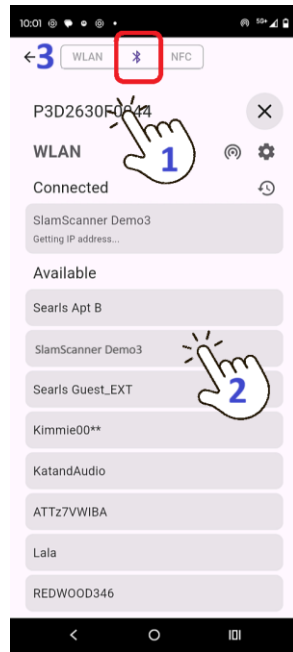
Once you are connected to a new device, it will ask for the activation info. Activation is instant.

1. Add a New Device:



Select "Add Now".

2. Connect the Hotspot:



Select the Bluetooth icon at the top of the page

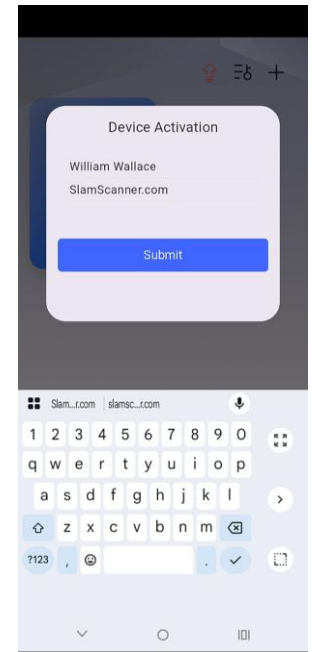
1. Select the Pocket 3D
2. Select the device's hotspot and provide the password
3. Return to the start screen

3. Open a Scan Session:



Select the Pocket 3D

4. New Device Activation:



Enter the activation info as requested

3.4 Camera Parameter Presets

When using the DJI Osmo 360 camera, please configure it as follows for Data Acquisition:

- Hyperlapse mode, 8K, 30 fps, ×10, Standard (Distortion Correction) mode.

When using an Insta 360 camera, please configure it as follows for Data Acquisition:

- TimeShift mode, resolution of 5.7K/6K/8K, frame rate of 30, and speed multiplier of ×10.

Reference your specific camera documentation for instructions on how to set up the proper configuration. Like the calibration process, the cameras will retain these settings once you adjust them as prescribed.

With the panoramic camera securely installed, configure it using the settings specified above.

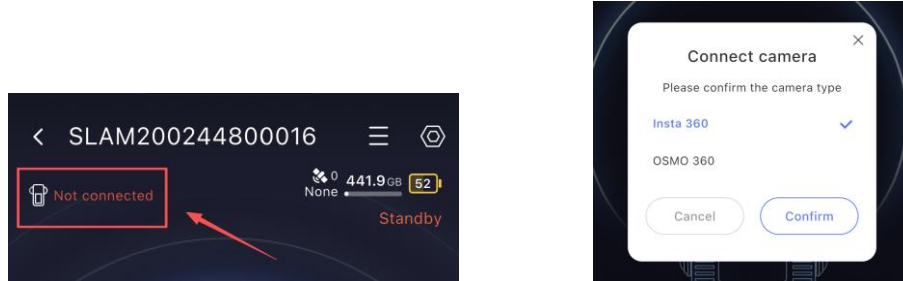
Note that these calibration process camera settings are the same setting to use during normal data acquisition. The calibration project needs to use the same parameters as normal data acquisition.

3.5 Camera and SLAM GO App Connection

SLAM GO can establish a wireless control connection with a supported panoramic camera. Once connected, SLAM GO automatically starts the camera recording when a Pocket 3D scan is started and stops the camera recording when the scan is ended. The camera can be connected in the SLAM GO mobile app before it is mechanically installed or calibrated.

With Pocket 3D connected to SLAM GO, open the Start Work screen. A camera icon in the upper-left corner displays the current camera connection status. Before a camera is connected, the status displays Not Connected in red.

1. Power on the supported panoramic camera and keep it near the Pocket 3D and mobile device.
2. On the SLAM GO Start Work screen, tap the camera icon.
3. In the Connect Camera dialog, select Insta360 or Osmo 360, as appropriate, and select Confirm.
4. SLAM GO searches for available cameras. Select/approve the camera that appears.
5. SLAM GO sends a confirmation code to the camera. Accept the connection request/code on the camera.
6. Camera status changes to “**Connected**” in blue when camera is connected.



The camera connection information is retained by SLAM GO. After disconnecting from Pocket 3D and reconnecting during a later session, the camera status will again initially display Not Connected. With the previously configured camera powered on and nearby, tap the camera icon and approve the reconnection in SLAM GO. The confirmation-code step on the camera is not required again.

During normal operation, verify that the camera shows Connected before starting an image-based scan. When connected, SLAM GO automatically starts and stops camera recording with the Pocket 3D acquisition sequencing.

Camera File Timestamps: Connecting the panoramic camera through SLAM GO provides camera recording control but does not set or synchronize the camera's internal clock. Verify the camera time as described above before collecting calibration or project data. This is not a processing requirement, but having accurate timestamps is a good way to identify/associate camera files with the proper scanner project files.

3.6 Operating With or Without the SLAM GO App

The SLAM GO mobile app is required for initial account setup, device connection, and activation of Pocket 3D. After the scanner has been activated, Pocket 3D can be operated independently using its onboard function/power button to power the scanner on, initiate static initialization and data acquisition, stop acquisition, and power the scanner off.

However, when a supported panoramic camera is used, operation through SLAM GO is recommended because the app can connect to and automatically control the panoramic camera. With the camera connected to SLAM GO, starting and stopping Pocket 3D acquisition also starts and stops the camera recording.

The SLAM GO app also provides additional field functionality, including remote scanner control, a real-time point-cloud display that allows the operator to monitor the mapped environment as it is being captured, and direct control-point acquisition.

Control points can also be recorded without the app. During acquisition, position the center of the Pocket 3D base over the control point and allow the scanner to remain stationary for approximately 10 seconds. The system will automatically detect the stationary condition and record a control point.

See Section 1.4, Controls and Status Indicators, for a quick reference to button functions and Section 5, Basic Operation, for scanner operation during a normal scanning session.

4 Panoramic Camera Setup and Calibration

After the panoramic camera has been installed, configured, and connected as described in Section 3, it must be calibrated with Pocket 3D before collecting data for panoramic imagery, point-cloud colorization, or 3DGS models. Calibration establishes the precise spatial relationship between the camera and the scanner so that imagery can be correctly aligned with the LiDAR and SLAM data during processing. The calibration process is simple and straight forward.

Pocket 3D uses acquisition timestamps to associate panoramic-camera recordings with the corresponding scanner data during processing. Before collecting calibration or project data, verify that the panoramic camera's internal clock is set accurately. Use the camera manufacturer's mobile app to set or correct the camera time, using an accurate world clock or similar time reference as necessary.

The calibration process is as follows.

- After mechanically attaching the camera, you will perform a prescribed scanning project.
- You will collect data in a specific manner in a specified type of scene
- Then in SLAM GO POST you will process the scan work using a specialized calibration project processing feature
- That process will generate a calibration file and that file is then loaded onto the scanner to provide it with the new calibration parameters
- This calibration remains valid as long as the camera remains firmly affixed to the scanner
- The scanner carrying case accommodates any of the attached cameras and ensures calibration is rarely ever needed again

Once calibration is complete and the calibration file is stored in Pocket 3D, the device has been calibrated for all subsequent data collections.

4.1 When Calibration Is Required

- After the panoramic camera is installed for the first time.
- After the camera is removed and reinstalled.
- After the camera mount is loosened, shifted, or its installation orientation is changed.

4.2 Calibration Site

Select a flat, unobstructed wall with clearly identifiable visual texture. Avoid plain, single-color walls and reflective surfaces. The wall should be at least 3 m (10 ft) long and 1.5 m (5 ft) high to provide sufficient calibration features. Keep people and moving objects out of the calibration area during data collection. The example below shows an ideal wall with a mural, but nothing this elaborate is required; a wall with sufficient visible texture and detail is suitable.



4.3 Collect Calibration Data

During calibration data collection, move the scanner at a slow, steady pace and keep it facing directly toward the wall throughout the calibration path. The operator should remain out of the panoramic camera's view as much as practical to avoid blocking wall features.

4.4 Calibration Data Collection Recommendations

For calibration data collection, use the SLAM GO camera connection described in Section 3.5 whenever practical. Confirm that the panoramic camera shows Connected before starting the calibration capture. Selecting Start Work will start both panoramic-camera recording and Pocket 3D acquisition.

At the end of the wall-calibration path, panoramic-camera recording must be stopped while Pocket 3D acquisition continues for the additional LiDAR capture. Because selecting End Work in SLAM GO would stop both devices, stop only the camera at this point using voice control or the camera's physical control. Voice control is preferred because it minimizes the possibility of disturbing the scanner.

If automatic camera control is not being used, start and stop the scanner and camera separately. Voice control is preferred where supported because it minimizes physical handling of the camera.

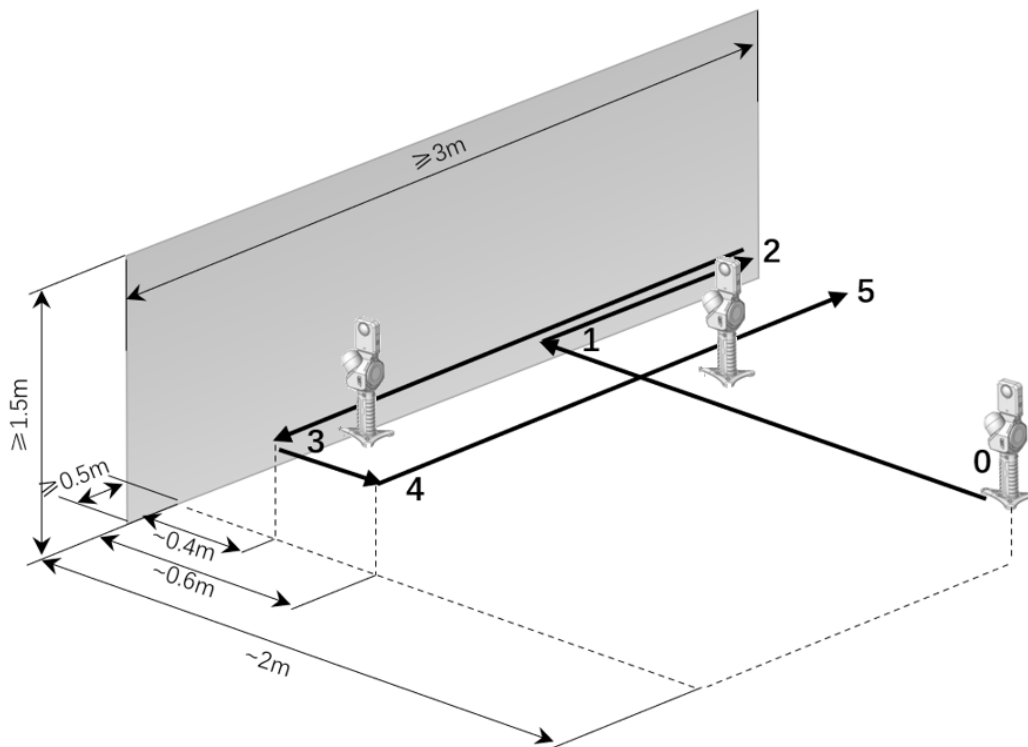
- **Collect more than one calibration dataset.** When practical, collect several calibration datasets during the same setup. This provides an alternate dataset if a calibration attempt is unsuccessful and can avoid having to return to the calibration site and repeat the field procedure.
 - If you are capturing multiple calibration data sets (as a backup), be sure to execute a complete start to stop data collection cycle for each calibration capture for both the camera and scanner.
- **Allow sufficient recording time.** A complete calibration capture will typically result in approximately two minutes of panoramic-camera recording. Perform the calibration movements slowly and deliberately rather than attempting to complete the sequence quickly.
- **Maintain consistent camera settings.** Configure the panoramic camera using the specified calibration settings. The same camera settings used for calibration must also be used during subsequent Pocket 3D data collection.

4.5 Calibration Procedure (Field)

1. **Position 0: Prepare the scanner.** Place the scanner on a flat, stable surface facing the center of the wall, approximately 2 m (6.5 ft) away. Press and hold the battery/power button to turn on the scanner. The status indicator will flash red during startup and then turn solid green when the scanner enters standby mode.
2. **Verify the panoramic-camera connection.** Confirm that the panoramic camera is powered on, correctly configured, and displays Connected in SLAM GO. The camera will begin recording when Start Work is selected.
3. **Start Pocket 3D acquisition.** Select Start Work in SLAM GO. If you have the camera connected to SLAM GO it will begin recording immediately, and Pocket 3D will enter its static initialization process. The scanner status indicator will fast-flash green during initialization, and SLAM GO will display the initialization countdown. Initialization takes approximately 20 seconds. Keep the scanner completely still at Position 0 throughout this period. When initialization is complete, the scanner enters acquisition mode, and the status indicator changes to slow-flashing green.
4. **Position 0 → Position 1** – Approach the wall. After the scanner enters acquisition mode, pick up the device and perform the required gentle left-right alignment motion. Then move toward the wall at a slow, constant speed until reaching Position 1, approximately 0.4 m (16 in) from the wall. Keep the scanner stable and facing directly toward the wall.
5. **Position 1 → Position 5** – Complete the horizontal calibration passes.

- **Position 1 → Position 2:** Maintaining a distance of approximately 0.4 m (16 in) from the wall, move slowly from the center toward the right side of the wall. Keep the scanner facing straight at the wall and sweep across the scene by walking sideways. Stop approximately 0.5 m (20 in) from the right edge so that wall features remain within view.
 - **Position 2 → Position 3:** Continue facing the wall and move horizontally at a slow, constant speed across the wall toward the left side, stopping approximately 0.5 m (20 in) from the left edge.
 - **Position 3 → Position 4:** Step back slightly from the wall to approximately 0.6 m (24 in).
 - **Position 4 → Position 5:** Maintaining this distance, move slowly back across the wall toward the right side to complete the calibration sampling path.
6. **Stop only the panoramic-camera recording.** At Position 5, keep the scanner stable and stop the camera using voice control or its physical control while allowing Pocket 3D LiDAR acquisition to continue. Do not select End Work in SLAM GO at this point because that would also stop Pocket 3D acquisition.
 7. **Complete the LiDAR capture.** With Pocket 3D LiDAR acquisition still running, scan the ceiling, floor, and surrounding environment around the calibration wall to provide additional point-cloud coverage and support a robust 3D reconstruction of the scene.
 8. **End Pocket 3D acquisition.** When the additional LiDAR capture is complete, select Stop Work in the SLAM GO app or double-click the handle button. There is no need to return to Position 0 before ending this calibration scan.

Feima recommends collecting multiple calibration datasets during the session, so another dataset is available if calibration fails. Keep the device slow and stable; panoramic-camera recording should be approximately two minutes.

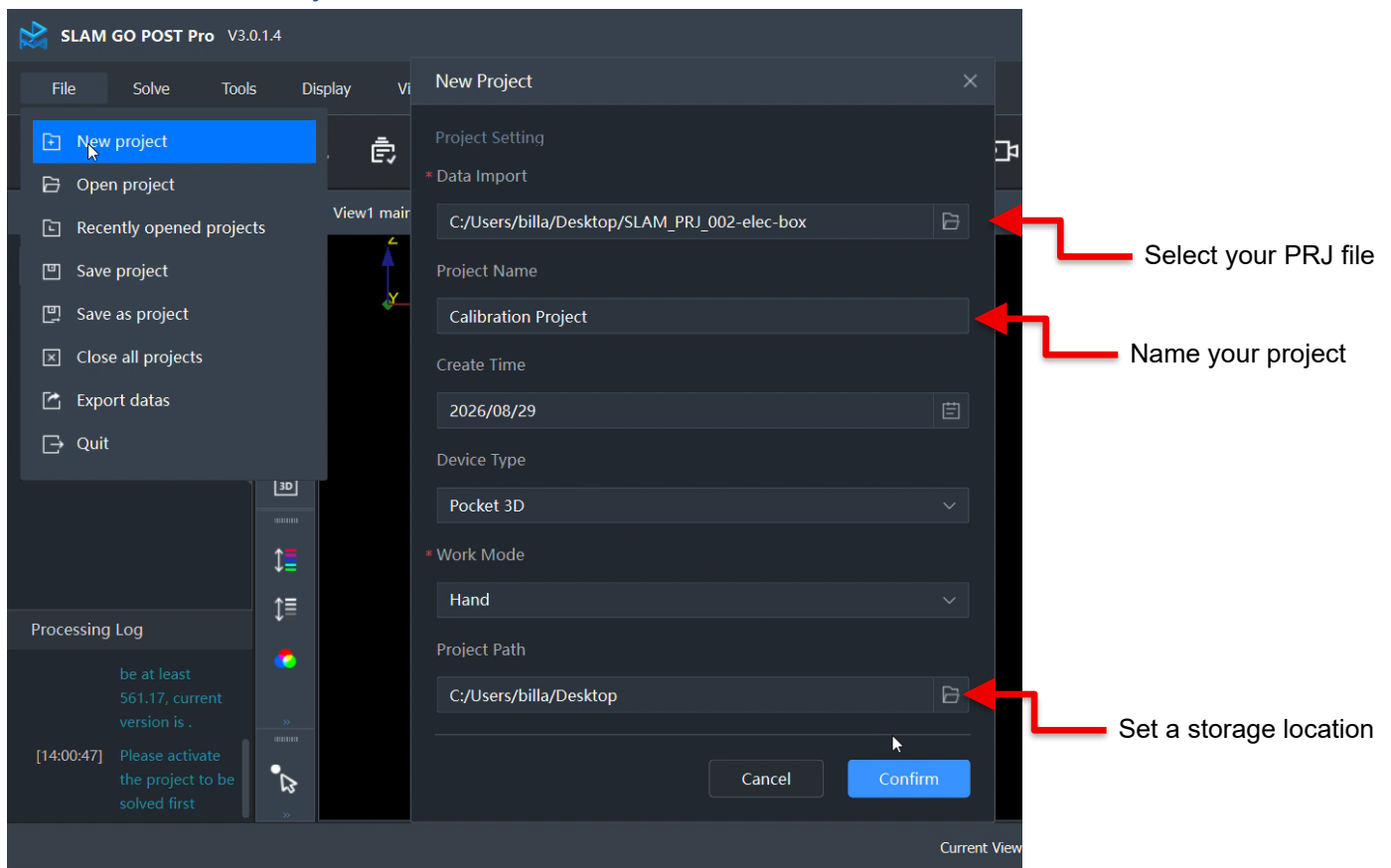


4.6 Process the Calibration in SLAM GO POST Pro (Office)

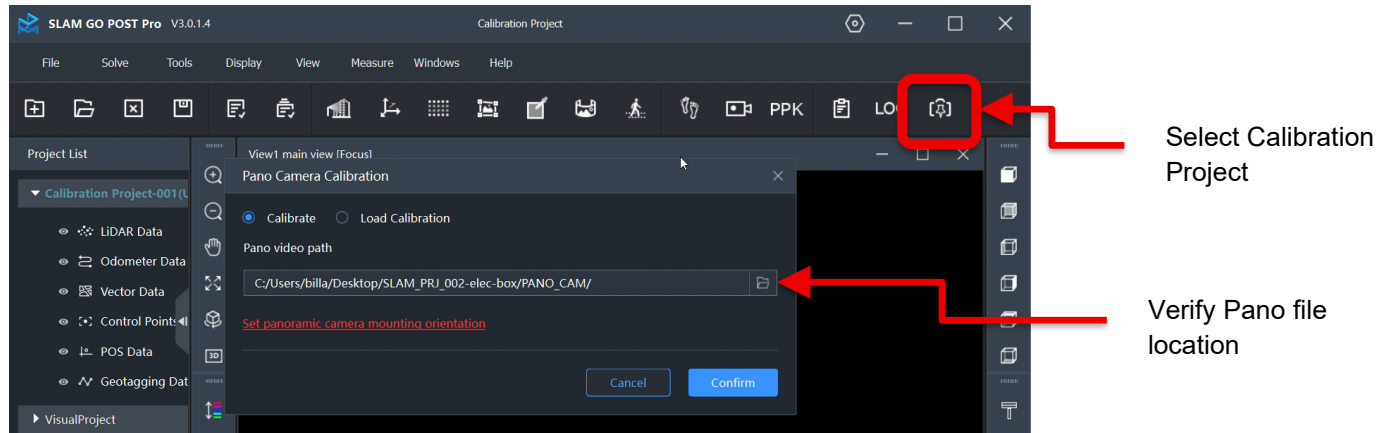
Prepare and copy the scanner and panoramic-camera calibration data to the processing computer as described in the data-preparation instructions in Section 7.

1. Copy the folder calibration project folder microSD card of the scanner. Look for the newest folder SN_000nn and copy the folder SLAM_PRJ_00n and all its contents to your processing computer.
2. Copy the associated *.OSV or *.INSV to the PANO_CAM folder of the project. (See Section 7 if this is unclear)
3. In SLAM GO POST Pro, choose File > New Project and select the prepared calibration project data. The software automatically identifies the Pocket 3D device model and assigns a default project name and location; these may be changed if desired.
4. Select Panoramic Camera Calibration from the toolbar. The calibration dialog automatically loads the panoramic-camera image folder. Select Set Panoramic Camera Installation Direction and choose the orientation that matches the camera's actual physical mounting orientation on Pocket 3D. Confirm the settings and start the calibration process.
5. When calibration is complete, inspect the color-mapping result. A successful calibration should show the imagery correctly aligned with the point-cloud geometry without obvious ghosting or misalignment. If the color mapping is disordered, ghosted, or visibly misaligned, recollect the calibration data and repeat the calibration.

4.6.1 Create a New Project



4.6.2 Run a Calibration Project



4.7 Verify and Store the Calibration

A successful calibration creates a file named `pano_cam_calib.yaml` in the calibration project directory.

To store the calibration on the Pocket 3D device:

1. Copy `pano_cam_calib.yaml` to the DATA folder on the Pocket 3D TF/microSD card.
2. Insert the card into Pocket 3D and power on the scanner.
3. Pocket 3D automatically copies the calibration file to its internal storage.
4. Once stored, the calibration is automatically included with new projects collected by the scanner. You do not need to copy the calibration file into each new project manually.

After the calibration file has been successfully stored, Pocket 3D automatically deletes the copy from the DATA folder on the TF/microSD card.

Note: If the panoramic camera is removed, loosened, repositioned, or reinstalled, recalibrate the camera before collecting new image-based data.

Keep the panoramic camera attached for storage whenever practical. The supplied soft case is designed to accommodate Pocket 3D with supported panoramic cameras installed, helping preserve calibration.

5 Basic Operation

5.1 Typical Scanning Workflow

After the scanner and panoramic camera have been set up and the camera has been calibrated, normal scanning operation is straightforward. Open that app and a running scanner will show up on the home screen. The green dot indicates it is connected. If the camera is not connected, select the Not Connected link at the top left to connect it. Then hit Start Work. The app will start up the camera and Pocket 3D enters a 20 second initialization phase as the app provides a countdown. When it starts, you will see collected data start to show on the screen. Pick up the device, do the left right synch motion and get scanning. The mobile app shows your progress as you work, and you will see point clouds and your walking path.

1. Home Screen:



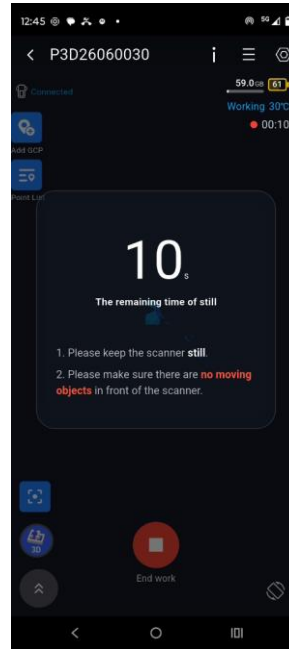
Select the Pocket 3D to get started

2. Start Work Screen:



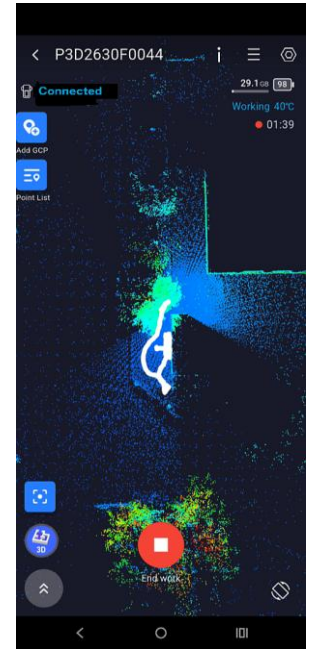
1. Connect the camera
2. Hit Start Work

3. Initialize Count Down:



Leave the scanner alone while it initializes

4. Working:



1. Watch your work
2. Hit End Work when you are done.

5.2 Power On for Standby Mode

Place the Pocket 3D device on a fixed, stable surface such as the ground, floor, or a sturdy tabletop. Do not hold the scanner in your hand.

- Ensure that the area in front of the scanner contains observable surfaces or objects within the scanner's measurement range. Feima specifies that the nearest measured object in front of the scanner should be more than 0.4 m (16 in) away.

Press and hold the Pocket 3D function/power button for approximately 3 seconds. After power-on, the scanner performs its startup and self-check sequence. Wait until the system/status indicator is steady green, indicating that the device is in standby mode and ready to begin acquisition.

5.3 Prepare the Panoramic Camera

When panoramic imagery will be collected for point-cloud colorization, panoramic-image generation, or 3DGS processing, power on the panoramic camera before beginning the scanning session.

Confirm that the camera lenses are clean and that the camera is using the same recording settings used during panoramic-camera calibration. If the camera has been removed, loosened, repositioned, or reinstalled since calibration, recalibrate it before collecting image-based data.

On the SLAM GO Start Work screen, verify that the panoramic camera status displays Connected. If the camera is not connected, select the camera icon and establish the connection as described in Section 3.5.

When the camera displays Connected, SLAM GO will automatically start and stop panoramic-camera recording when you Start Work for Pocket 3D acquisition. There is no need to separately start the camera before beginning a normal scanning session.

5.4 Start the Scanning Session

Place Pocket 3D on a fixed, stable surface and confirm that the scanner is in standby mode with a steady green status indicator.

Select Start Work in the SLAM GO app. The connected panoramic camera will begin recording immediately, and Pocket 3D will enter static initialization. The system/status indicator will fast-flash green during initialization, and SLAM GO will display the initialization countdown. Initialization takes approximately 20 seconds.

During static initialization:

- Leave Pocket 3D on a fixed, stable surface such as the ground, floor, or a sturdy tabletop. Do not hold the scanner in your hand.
- Keep the scanner completely still throughout the initialization period. The scanner may be placed at an incline, if necessary, but it must not move.
- Do not point the scanner into open space. Position it so that clearly defined, stationary surfaces or objects are visible within its field of view.
- Keep objects immediately in front of the scanner more than 0.4 m (16 in) away. Nearby walls, furniture, structural features, or other stationary surfaces within approximately 10 to 50 ft generally provide useful geometry for initialization.
- Keep the scanner's field of view free of moving objects. During initialization, avoid people or other moving objects passing in front of or immediately around the scanner.

When initialization is complete, the system/status indicator changes to the normal acquisition slow-flashing green state. You may then pick up the scanner and proceed with the starting alignment motion and data capture as described in Section 6.

5.5 End the Scanning Session

When data collection is complete, it is best to return the scanner to the starting location when practical. Returning to the starting area provides loop closure and is a best practice for SLAM data collection, but it is not a hard requirement.

Select End Work in the SLAM GO app. Pocket 3D acquisition will end, the system/status indicator will return to steady green, and the connected panoramic camera will stop recording automatically.

Before beginning another scan, verify that the scanner has returned to standby and that the panoramic camera continues to display Connected in SLAM GO.

5.5.1 Manual Start and Stop Operation

Pocket 3D and the panoramic camera can also be operated manually when automatic camera control through SLAM GO is not being used.

For manual image-based acquisition, use the following sequence:

1. Start recording with the panoramic camera.
2. Start Pocket 3D acquisition.
3. Complete the scan and stop Pocket 3D acquisition.
4. Stop the panoramic-camera recording.

Coordinate the camera and scanner start and stop operations to occur within approximately 10 seconds of each other. Voice control may be used with supported panoramic cameras to reduce the need to physically operate the camera controls.



This graphic shows the concept of the video session spanning longer than the LiDAR session

Pocket 3D acquisition can be started by using the SLAM GO Start Work feature or by double-clicking the function/power button. You can also stop scanning with the SLAM GO mobile app or by double-clicking the button again. When operating the scanner manually, follow the same static-initialization requirements described in Section 5.4.

5.6 Control Points (Optional)

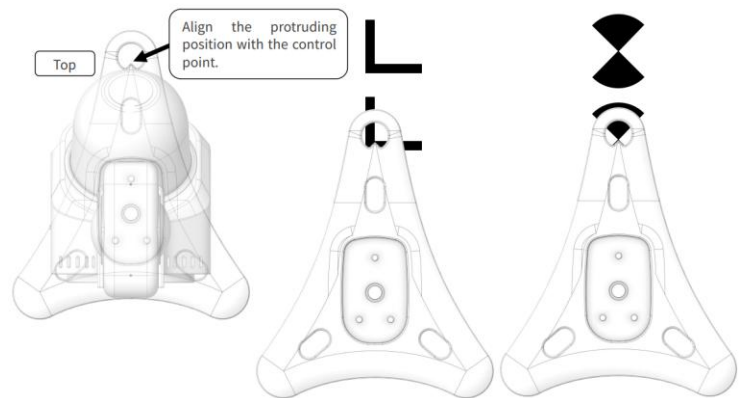
The Pocket 3D device does not have internal GNSS support, but you can add control points to your scan project to integrate the project with Survey control as a post process. To set control points during a scanning session, align the crosshair at the center of the Pocket 3D base directly over the control point. Use either of the following control-point acquisition methods to record the point. After the point is recorded, normal data acquisition may continue without an additional waiting period.

1. A control point can be recorded using the control-point acquisition function in the SLAM GO app.
2. For automatic control-point collection, allow the scanner to remain stationary over the point for approximately 10 seconds. The scanner detects the stationary condition and automatically records the control point.
 - a. Note: If collecting control points for use in a survey integrated workflow, remain aware of this automatic functionality and avoid unintentionally occupying any prolonged static position to avoid collecting unplanned control points.

After a control point has been recorded, normal data acquisition can continue.

5.6.1 Control-point layout guidance:

- Acquire at least three control points.
- Do not arrange the control points in a single straight line. Feima recommends an L-shaped or otherwise well-distributed arrangement.
- Where multiple control points are used, distribute them across the project area rather than concentrating them in one location.
- During control-point acquisition, orient the scanner toward areas containing useful ground or environmental features and avoid moving objects immediately in front of the device.



5.7 Shutting Down the Scanner

Press and hold the Pocket 3D function/power button to shut down the scanner. Wait until the system/status indicator is completely off before removing the intelligent battery handle, disconnecting power, or handling the TF/microSD card.

IMPORTANT - Power off Pocket 3D before inserting or removing the TF/microSD card or before performing card-based data-copy operations. Hot swapping the card may damage the memory card or stored data.

6 Field Data Acquisition

This section provides a summary description of proper field operations for data acquisition. Please see the **3DGS Field Survey Procedure** manual for a more complete description of the suggested process.

6.1 Core Capture Philosophy

- Your first path of data collection should establish a complete overall collection of the scene before concentrating on close-range detail.

- Move slowly and smoothly enough to preserve useful imagery and stable pose estimation.
- Use overlap and loop closure deliberately to control accumulated SLAM error.
- Add close-range and multi-height imagery where the final deliverable requires it.
- Collect additional data with a purpose: coverage, viewpoint diversity, detail, occlusion recovery, or loop support.

6.2 Plan the Capture Path

When practical, choose a starting and ending location with good surrounding geometry and multiple possible directions of travel rather than a confined or visually limited location. A well-chosen start/end location provides useful overlap and makes it easier to close the acquisition route at the end of the scan.

For indoor capture, it is a best practice to open doors along the planned scanning route before beginning acquisition. Where rooms or other spaces are to be included in the project, open their doors in advance so the operator can move smoothly between spaces without interrupting the capture. Having the same door captured in a closed and open attitude can potentially be problematic.

For large or complex environments, particularly areas with limited or poorly defined features, plan the scanning route before beginning data acquisition. A planned route helps maintain useful coverage, overlap, and loop geometry while reducing the likelihood of missed areas.

Large scenes may also be divided into separate acquisition regions or datasets. When doing so, provide sufficient overlap between adjacent regions to maintain common scene coverage.

For close-range work, Feima recommends dividing the site into logical blocks no larger than approximately 20 m × 20 m (65 ft × 65 ft). These blocks are planning units, not separate scan projects; a continuous data-acquisition session can extend across many blocks. The block concept is simply a way to break a larger or irregular site into manageable areas for systematic capture. A block does not need to be square or rectangular and can follow the natural geometry of the site—for example, a room, hallway, section of a building, or other logical area.

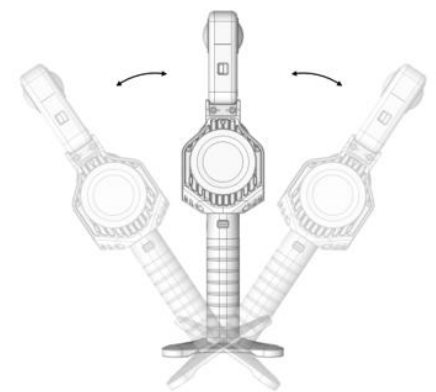
Capture each block broadly first, then return selectively for close detail. Establishing broad coverage before moving in for close detail also gives the SLAM system a stronger environmental reference. Close-range capture can substantially restrict the LiDAR field of view and may increase the risk of mapping error or drift if adequate surrounding geometry has not already been established.

Except in extremely narrow spaces, use an S-shaped or serpentine route rather than a single straight traverse. Keep adjacent passes no more than about 5 m (15 ft) apart. Closer pass spacing improves overlapping visual coverage and can produce clearer ground texture between adjacent routes.

Use relatively small loops and shared overlap rather than one very large loop. Feima recommends that a single closed loop not exceed approximately 200 m (650 ft).

6.3 Starting a Capture

Follow the typical initialization process, ensuring the camera is connected to the SLAM GO mobile app, that the scanner is in an appropriate static position before you issue the Start Work and begin the initialization. After static initialization, pick up the scanner and perform a controlled left-right tilting movement, changing the scanner's orientation by approximately 45° to each side. Complete one smooth back-and-forth motion in approximately 2–3 seconds. This alignment motion provides varied pose observations for time alignment between the panoramic camera and IMU and provides useful motion information to the SLAM processing system as data acquisition begins. The scanner must change orientation during the movement; simply moving it horizontally from side to side is not sufficient. Avoid abrupt or shaking motions.



Controlled left-right alignment motion.

After completing the alignment motion, sweep the starting area through a full 360° horizontal rotation. Complete the rotation slowly and smoothly, taking approximately 5 seconds. The purpose of this rotation is to capture the area behind the scanner that may have been obscured by the device or operator. A controlled body turn with the scanner held in front, or a small walking circle around the starting position, can be used to complete the sweep while maintaining smooth scanner motion.

6.4 Overall Scene Capture

Use smooth S-shaped or serpentine routes to establish broad, overlapping coverage. For general scene capture, Feima guidance is approximately 0.5-1 m/s (1.5-3 ft/s). For fine/detail capture, move no faster than approximately 0.3 m/s (1 ft/s). The practical objective is smooth, stable motion rather than maintaining an exact walking speed.

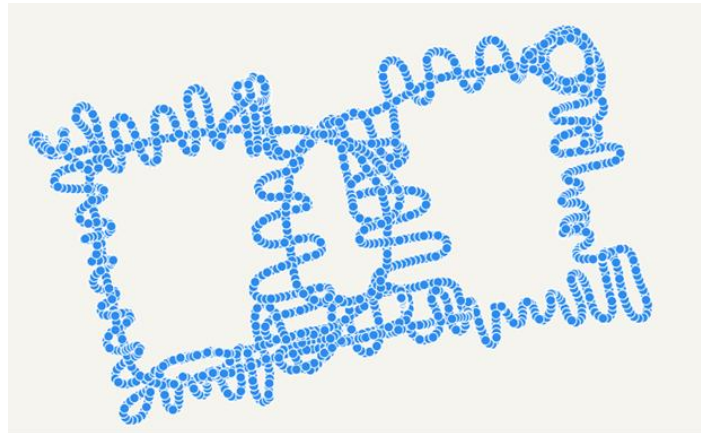
For scenes with significant occlusion or where visual quality is especially important, increase viewpoint diversity by using additional routes through the scene and varying the height of the scanner. Raising and lowering the scanner between passes provides viewing angles at different elevations and can help capture areas hidden from a single route or scanner height.

Where space permits during general scene capture, avoid walking immediately alongside walls and maintain reasonable separation from moving pedestrians. This helps preserve broader views of the surrounding environment and reduces obstruction by people moving through the scene.

During data acquisition, avoid directing the scanner primarily into open or featureless space. Whenever practical, maintain useful structural or environmental features within the scanner's field of view to provide geometry for SLAM positioning.

Vary the scanner's orientation during capture to avoid maintaining exactly the same scanner orientation for extended portions of a 3DGS scan. Changing orientation and viewpoint often helps prevent the same scene features from repeatedly falling near the panoramic camera's image-stitching boundaries.

See the **3DGS Field Survey Procedure** for more complete descriptions of walking speeds.



Example of an S-shaped/serpentine collection trajectory.

6.5 Capturing Detail

Once the overall scene is established, return to targets requiring greater visual clarity. For normal close-detail capture, Feima recommends a target distance of approximately 0.3 m (1 ft) or greater and a speed no greater than approximately 0.3 m/s (1 ft/s). For signage, exhibits, architecture, and other detail-rich targets, use high, center, low, and grid-like viewpoints to capture the subject from multiple viewing angles and reduce areas that are visible from only a single perspective.

6.6 Manage Capture Size and Processing Workload

3DGS projects require substantially more processing than point-cloud generation alone. Long captures can create tens of gigabytes of imagery, and 3DGS training may continue for many hours; builds exceeding 24 hours are possible on large datasets. Collect sufficient, purposeful coverage rather than maximum capture. Where project

requirements allow, use natural boundaries such as rooms, floors, wings, courtyards, or exterior zones as logical datasets.

6.7 Special Capture Situations

Ground walking-path coverage: The scanner, camera, and operator can obscure portions of the ground along the walking path. In normal multi-pass coverage, adjacent or crossing passes may provide the missing viewpoints. Special attention may be needed in narrow pathways, single-pass routes, or other locations where normal overlapping passes do not provide an alternate view of the ground. Where continuous ground appearance is important, add a supplementary pass with the scanner rotated approximately 45–90° sideways and travel generally parallel to the original path so that the previously obscured ground is viewed from the side.

Corridors and narrow spaces: orient the device approximately 45-90° sideways so a camera lens looks along the direction of travel. Where space permits, use a gentle serpentine path.

Doorways: Treat the doorway as an overlap zone. Slow down or pause briefly and orient the scanner so that one panoramic camera lens has a clear view through the doorway and into the space being entered. Move smoothly through the transition, then obtain a useful view back through the doorway into the previous space before continuing the planned capture.

Ceilings and overhead surfaces: When detailed overhead coverage is required, tilt the scanner upward so that a panoramic-camera lens has a clear view of the ceiling or other overhead surfaces. Add supplementary passes as needed to capture areas that are poorly visible from the normal scanner orientation.

Passing vehicles and other large moving objects: If a large vehicle or similar moving object passes through the immediate scanning area, avoid deliberately tracking it with the scanner. Instead, turn the scanner away from the moving object and temporarily direct it toward stable, stationary features in the surrounding environment. After the object has passed, return to the planned capture path and continue normal data acquisition.

Dynamic scenes: Where practical, minimize capture of scene elements that change substantially during acquisition, such as moving pedestrians and traffic, swaying vegetation, or changing content on large video displays. For 3DGS capture, a more visually consistent scene provides more consistent imagery for reconstruction.

Reducing operator visibility in the capture: When minimizing the operator's appearance in the resulting pano and 3DGS scenes is important, Pocket 3D can be raised above normal carrying height for selected portions of the capture. This can reduce the operator's presence in the panoramic imagery. A selfie pole or compatible vest/backpack mounting accessory can also be used to hold the scanner above the operator while providing a more comfortable and consistent elevated position. Whether handheld or accessory-mounted, maintain smooth, stable scanner movement and avoid abrupt changes in height or orientation.

Freestanding objects: Capture the object from multiple elevations by making separate lower, middle, and upper surround passes. Where practical, add elevated views angled downward toward the object at approximately 45° to capture upper surfaces that may not be visible from the surrounding passes.

High-detail planar surfaces: Where unusually high visual detail is required on a relatively flat surface, Feima guidance allows supplementary capture at approximately 0.2 m (8 in) from the target. Move the scanner slowly across the surface from multiple directions to obtain additional close-range imagery. This is a specialized detail-capture technique rather than the normal working distance for general scene acquisition.

Point-cloud-only capture: When the project requires only LiDAR point-cloud data and panoramic imagery or 3DGS output is not needed, the capture path can be simplified. In addition to the preferred S-shaped or serpentine route, Feima guidance allows straight-line travel while slowly varying the scanner height up and down to provide observations from different elevations. Height changes should be gradual and controlled rather than abrupt.

6.8 Field Best-Practice Summary

1. Plan the capture and final deliverable.
2. Initialize deliberately and complete the alignment motion and starting sweep.
3. Establish the overall scene first.
4. Maintain stable, controlled movement.
5. Maintain useful overlap and route geometry.
6. Add detail intentionally.
7. Adapt to special conditions such as corridors, doorways, ground occlusion, and reflective surfaces.
8. Control dataset growth and processing workload.
9. Verify critical coverage before leaving the site.

Best practice principle: Collect complete, stable, purposeful data. More capture is useful only when it adds information that improves coverage, reconstruction, or the final deliverable.

7 Data Transfer and Project Preparation

Before a Pocket 3D project can be processed in SLAM GO POST Pro, the collected data must be transferred to the processing computer and organized into a complete project. This involves copying the project data from the Pocket 3D microSD card, transferring the corresponding panoramic-camera recording from the camera, and placing the camera data into the appropriate Pocket 3D project folder. Once these files have been brought together in the required folder structure, the project is ready to open in SLAM GO POST Pro.

7.1 Copy the Raw Pocket 3D Data to the Processing Computer

Pocket 3D stores collected project data on its internal TF (microSD) card. After completing field data collection, transfer the scanner data to the computer that will be used for processing.

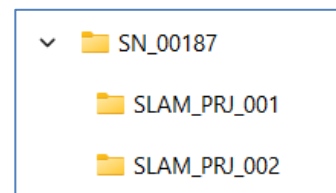
1. **Power off Pocket 3D.** Always shut down the scanner before removing the microSD card.
2. **Remove the microSD card from Pocket 3D** and insert it into the processing computer using the supplied card reader or another compatible reader.
3. **Locate the scanner session folder.** Each time Pocket 3D is powered on, it creates a new top-level scanner session folder using the naming format SN_nnnnnn, for example SN_00187.
4. **Copy the complete scanner session folder** to an appropriate working location on the processing computer. Do not process the project directly from the Pocket 3D microSD card.

Each scanning session performed while the scanner remains powered on is stored as a separate scan project folder within the scanner session folder. These folders use the format **SLAM_PRJ_nnn**, beginning with **SLAM_PRJ_001** and incrementing for each new acquisition.

For example, if Pocket 3D was powered on and two separate scans were collected, the resulting structure would be as shown in the diagram. =>

In this example, **SN_00187** represents the scanner operating session, while **SLAM_PRJ_001** and **SLAM_PRJ_002** are two separate scan projects collected during that session.

Keep this folder structure intact during the initial transfer. The panoramic-camera recordings will be added to the appropriate scan project folders in the next step.



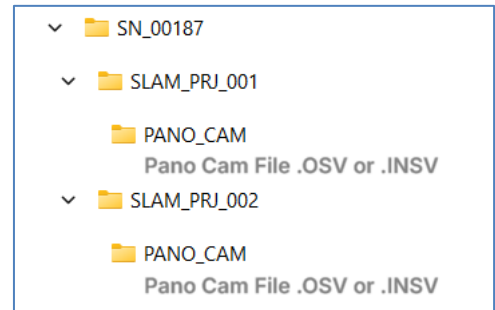
7.2 Match Panoramic Camera Recordings to Project

Each Pocket 3D scan project collected with a panoramic camera has a corresponding camera recording. Before processing, the correct camera recording must be transferred to the processing computer and placed in the **PANO_CAM** folder within its matching **SLAM_PRJ** project folder.

Transfer the panoramic-camera recordings from the camera to the processing computer. Depending on the camera, this can be done by removing its memory card and using a card reader or by connecting the camera directly to the computer with a USB cable.

For each scan project:

1. Identify the panoramic-camera recording that corresponds to the Pocket 3D scan.
2. Open the matching **SLAM_PRJ_nnn** folder copied from the Pocket 3D microSD card.
3. Locate the **PANO_CAM** folder within that scan project folder.
4. Copy the corresponding panoramic-camera recording into **PANO_CAM**. Do not rename the camera files.



For example, if two scan projects were collected during the scanner session shown in Section 7.1, the completed project structure would look like this:

Be careful to place each camera recording in the **PANO_CAM** folder for the scan during which it was recorded. When several scans and camera recordings were collected during the same field session, their acquisition times can be used to identify the correct pairing.

When the panoramic camera was controlled through SLAM GO, each scan produces a corresponding automatically started and stopped camera recording, this provides a very consistent start/stop time offset for camera and scanning files, simplifying identification of the recording associated with each scan project.

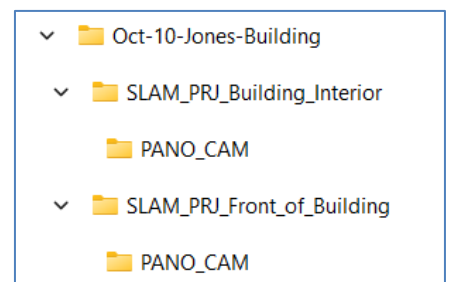
7.3 Rename Folders (Suggestion)

Pocket 3D automatically assigns numbered names to scanner session and scan project folders. These names are useful during data collection but can become difficult to identify later, particularly when multiple projects are stored on the processing computer.

After the scanner data and corresponding panoramic-camera recordings have been transferred and organized, it is recommended that you rename the folders using descriptive project names.

The top-level **SN_nnnnnn** scanner session folder can be renamed to identify the overall project or field session. For example: **SN_00187** → **October-10-Jones-Building**

The individual **SLAM_PRJ_nnn** folders can then be renamed to describe the area or portion of the project captured during each scan. Retaining the **SLAM_PRJ_** prefix makes these folders easy to recognize as Pocket 3D scan projects.



7.4 Project Directory and File Reference

Once the scanner data and panoramic-camera recordings have been organized as described above, the project is ready for use with SLAM GO POST Pro. The following files and folders are part of the Pocket 3D project structure and are provided here as a reference.

IMPORTANT: Preserve the original contents and internal folder structure of each **SLAM_PRJ** project folder. Other than renaming the project folders as described in Section 7.3 and adding the appropriate camera files to **PANO_CAM**, do not rename, move, or delete files within the project structure. When practical, retain an unchanged copy of the original field data until the project has been successfully processed.

File /Folder	Description
*.fmlidar	Raw Pocket 3D LiDAR/SLAM acquisition data
*.fmmark	Control-point data, when control points were collected
Description_File.txt	Project information, including acquisition timing used to help identify the corresponding camera recording
slam_calib.yaml	Scanner calibration information
PANO_CAM	Folder for the panoramic-camera recording associated with the scan project
*.OSV	DJI Osmo 360 camera recording
*.INSV	Insta360 camera recording

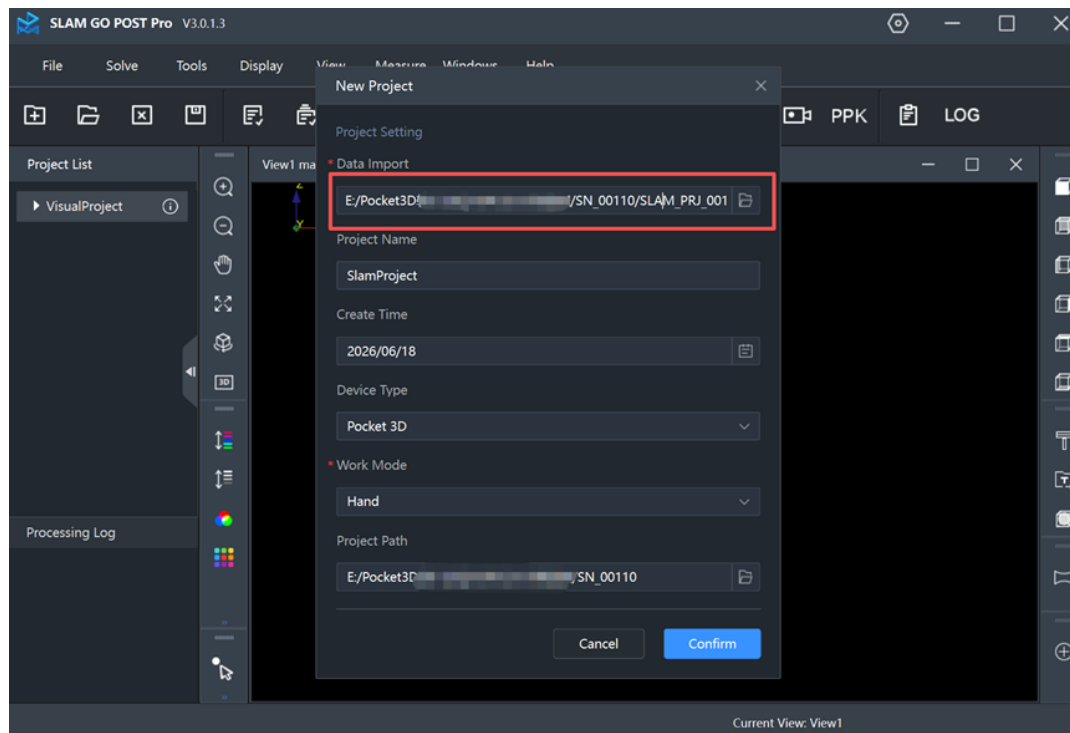
8 Processing in SLAM GO POST Pro

8.1 Processing Overview

SLAM GO POST Pro can generate point clouds, optimized point clouds, panoramic imagery, colored point clouds, and 3DGS results. Processing can be performed without control points or with control points for oriented/georeferenced output. When control points are used, the correspondence between the surveyed control points and the points recorded during acquisition must be verified as part of the processing workflow.

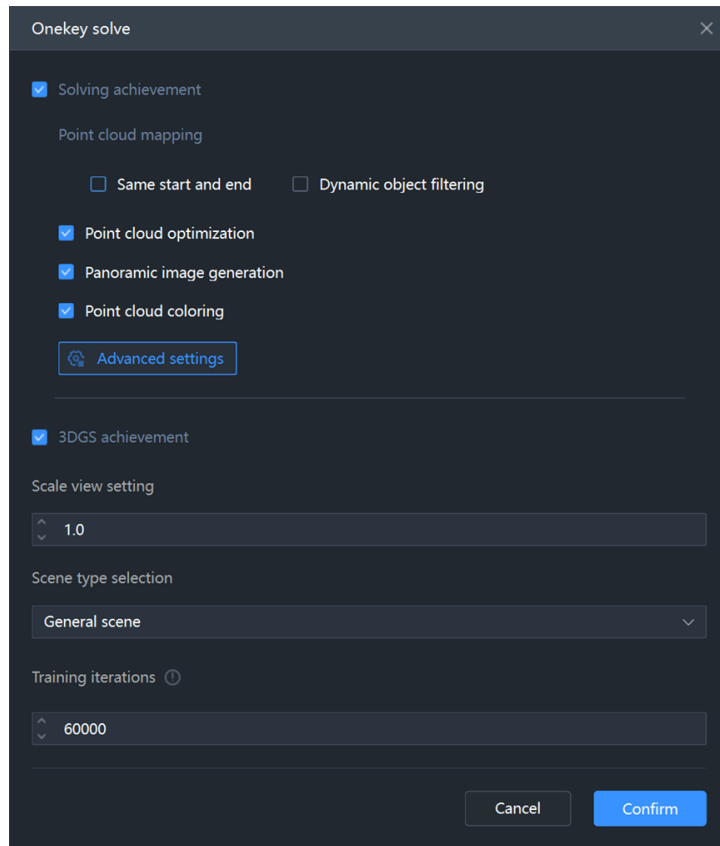
8.2 Create a Project

Choose File > New Project and select the organized raw project folder. The software identifies the device model and allows the project name and project path to be changed.



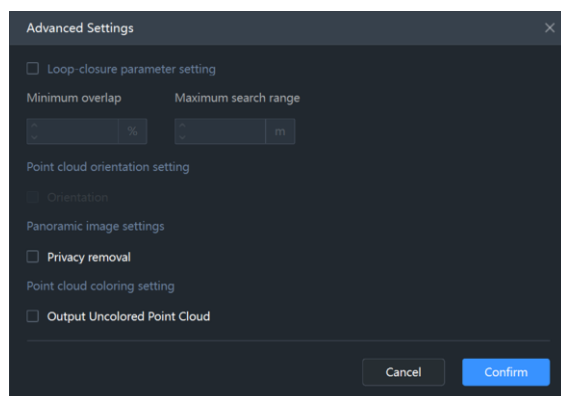
8.3 One-Click Solve - No Control Points

Choose Solve > One-click Solve. Available options include Point Cloud Mapping, Dynamic Object Filtering, Point Cloud Optimization, Panoramic Image Generation, Point Cloud Coloring, and 3DGS result settings.



8.4 Important Processing Settings

- Same Start and End - use only when the acquisition actually started and ended at the same location.
- Dynamic Object Filtering - filters moving objects such as pedestrians and vehicles.
- Panoramic Image Generation - generates imagery for scene roaming.
- Point Cloud Coloring - uses panoramic imagery to color the point cloud.
- Fisheye color mapping requires a valid panoramic-camera calibration.
- For DJI Osmo 360 3DGS output, the Feima source specifies colored point-cloud output with fisheye selected as the color-mapping image type.
- Set the panoramic-camera installation orientation to match the physical installation.



8.5 Point Cloud Optimization

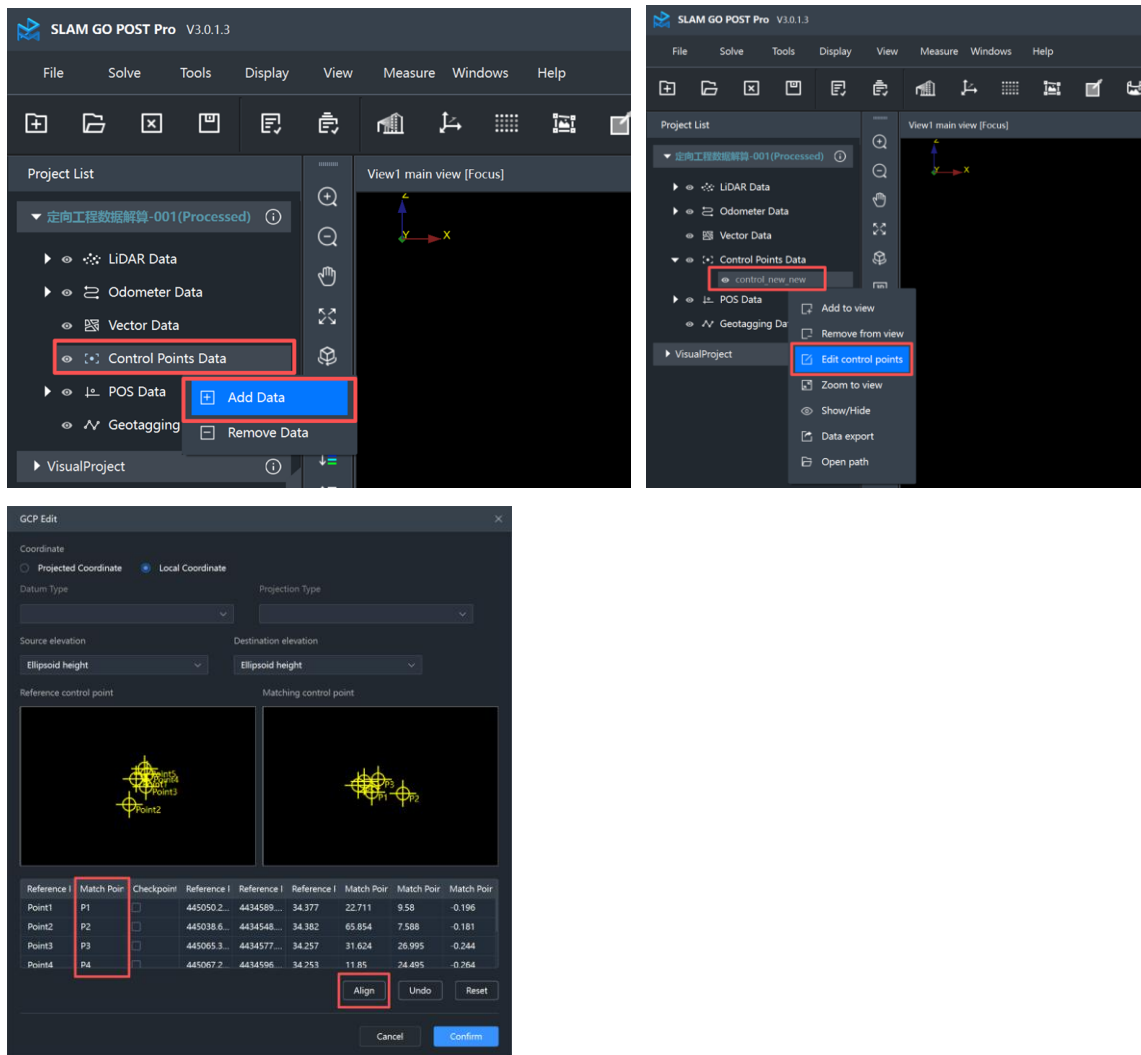
Point-cloud optimization is an optional secondary processing step and is not required for every project. First process and inspect the normal point-cloud result. If the point cloud shows local layering, misalignment, or similar registration problems, use Point Cloud Optimization in SLAM GO POST Pro and review the optimized result.

8.6 Processing with Control Points

Import the surveyed control-point data by right-clicking Control Point Data in the project tree and selecting Add Data. The number of imported control points must correspond to the control points collected during field acquisition.

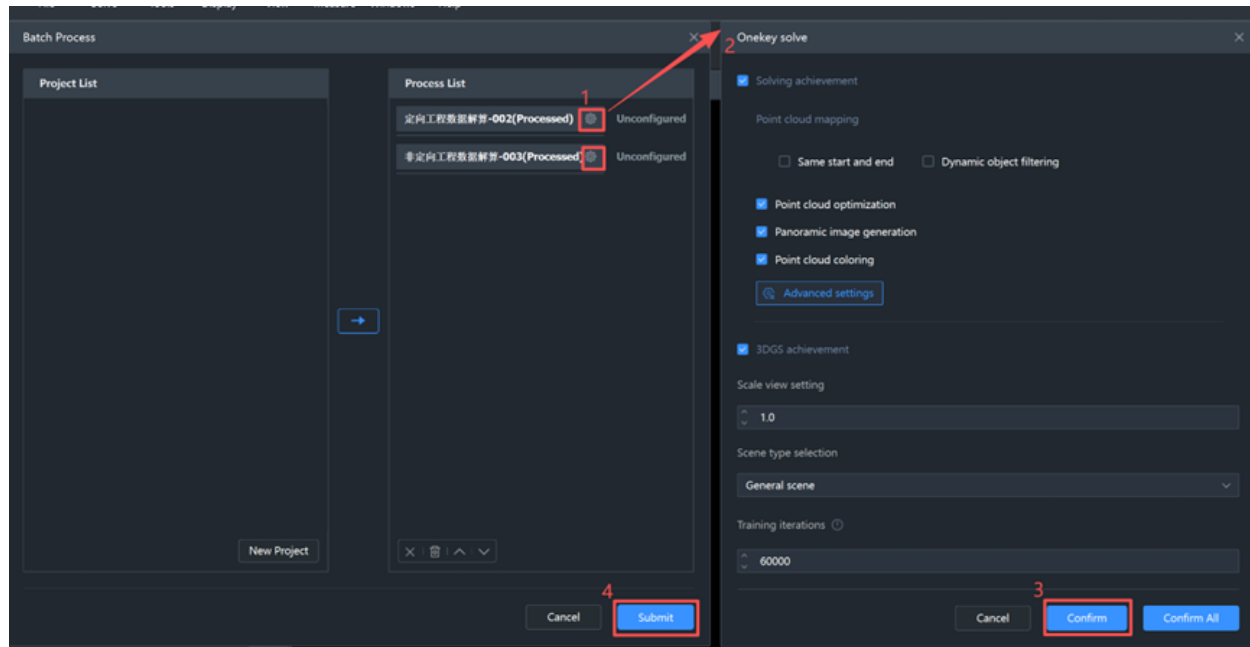
SLAM GO POST Pro automatically attempts to match the imported control points with the control points recorded by Pocket 3D. Verify these point correspondences before relying on the oriented/georeferenced results. Automatic matching may be incorrect when control points are closely spaced or when the distances between multiple control points are similar.

For greater control over the process, run Point Cloud Mapping first, then right-click the imported control-point data and select Edit Control Points. Review the automatically assigned matching-point serial numbers. If a correspondence is incorrect, reset or manually assign the correct matching point number, then confirm the control-point editing and process the remaining outputs.



8.7 Batch Processing

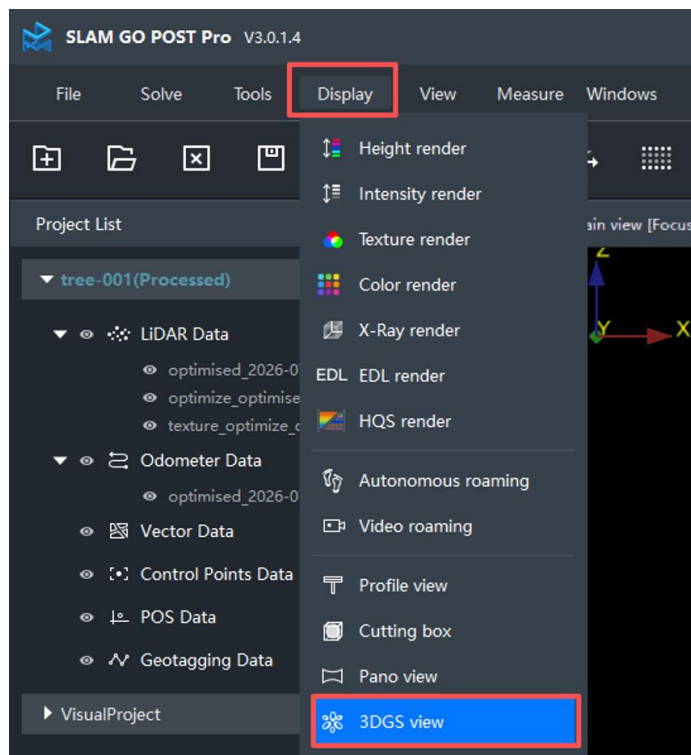
Use Solve > Batch Process to create multiple projects, move configured projects into the processing list, apply solving configurations, and submit them to the processing queue.



9 Viewing and Working with Results

Point cloud and pano view is done in the main window. Right click the optimized point cloud in the project list and "Add to View" to display.

More complete instructions pending in the next version.



9.1 3DGS Viewer

Choose Display > 3DGS view to open the 3DGS browser for the active project. The 3DGS data for the active project loads automatically.

Control		Action
Left mouse		Rotate View
Right mouse		Pan View
Mouse wheel		Move Forward / Backward
W/A/S/D		Move Forward / Move Left / Move Backward / Move Right
Q/E		Descend / Ascend
Shift		Fast Movement
Alt		Slow Movement
Shift+F		Reset Camera

For more keyboard shortcuts, refer to Help > Keyboard Shortcuts in the browser menu bar.

10 Open Data and Advanced Export

SLAM GO POST Pro can expose intermediate and processed data for third-party workflows, including colored point clouds, optimized odometry, fisheye video frames and masks, camera POS data, COLMAP-format data, XML/BlocksExchange data, MipMap configuration files, and masked undistorted images.

SLAM GO POST Pro can generate and expose processed results and intermediate data for use in third-party photogrammetry, mesh-modeling, and 3D Gaussian Splatting (3DGS) workflows. This section describes the principal open-data outputs identified in the Feima source manual, where they are stored, and the additional processing steps used to prepare selected third-party datasets.

10.1 Open Data Outputs and Required Processing

The availability of each output depends on which processing steps have been completed. The Feima source identifies the following data products and related processing requirements.

Data product	Required / related processing
Colored point cloud	Point-cloud mapping and point-cloud coloring
Odometer	Point-cloud mapping
Panoramic-camera video frames	Point-cloud mapping; fisheye frames may also be used for coloring and 3DGS
Panoramic-camera video-frame masks	Point-cloud mapping; used with fisheye imagery and 3DGS workflows
Panoramic-camera POS data	Point-cloud mapping; associated with camera video frames
COLMAP-format data	Point-cloud mapping and 3DGS training/pre-training; also used for masked-image workflows
MipMap configuration	Point-cloud mapping and 3DGS training/pre-training
XML / BlocksExchange file	Point-cloud mapping, 3DGS training/pre-training, and XML export
Masked undistorted images	Point-cloud mapping, 3DGS training/pre-training, and masking of undistorted images

10.2 Colored Point Cloud

After point-cloud coloring is completed, the colored point-cloud result is stored in the processing project directory:

/texture

The colored point-cloud files are stored as files with the .fmi suffix.

10.3 Odometer Data

Optimized odometry is stored in:

/odometer/optimised_odometry.txt

The odometry record fields are:

ID, time, x, y, z, roll, pitch, yaw, Qx, Qy, Qz, Qw

10.4 Panoramic-Camera Video Frames and Masks

Camera video-frame data generated for 3DGS processing is stored in:

/3DGS/3DGS/images

Folder /0 contains video-frame data from the left fisheye lens.

Folder /1 contains video-frame data from the right fisheye lens.

The corresponding video-frame masks are stored in:

/3DGS/3DGS/mask

Folder /0 contains masks corresponding to left-fisheye video frames.

Folder /1 contains masks corresponding to right-fisheye video frames.

10.5 Camera POS Data

POS data corresponding to the panoramic-camera video frames is stored in:

/3DGS/3DGS/sfm_pos/sfm_data_double.txt

The record fields are:

image_name, time, x, y, z, Qw, Qx, Qy, Qz

10.6 COLMAP-Format Data

COLMAP-format data is stored in:

/3DGS/3DGS/sfm_pos/3DGS

The directory contains:

images - undistorted images

masks - mask files corresponding to the undistorted images

sparse - sparse reconstruction data

cameras.txt - camera intrinsic parameters, including focal length, principal-point coordinates, distortion model, and related camera information

images.txt - image exterior-orientation elements and extracted 2D feature points

points3D.txt - reconstructed 3D-point coordinates, colors, and reprojection errors

10.7 XML / BlocksExchange Data

The XML aerotriangulation file is a BlocksExchange-style exchange file used to transfer photogrammetric aerotriangulation information. The Feima source describes it as containing camera internal parameters, image exterior-orientation elements, tie/control information, and spatial-reference information.

The XML file is written to a user-selected output location.

10.8 MipMap Configuration Data

MipMap-related files are stored in:

/3DGS/3DGS/sfm_pos

mipmap.mpl - records information related to the colored point cloud, fisheye-camera video frames, and corresponding mask files.

sfm_data_mipmap.txt - records fisheye-camera video-frame pose data in a format identified by the Feima source as compatible with MipMap.

The pose-data fields are:

image_name, time, x, y, z, Qw, Qx, Qy, Qz

10.9 Masked Undistorted Image Data

Masked undistorted-image output is written to a user-selected location. The resulting dataset includes an images folder containing masked, undistorted images and a sparse folder containing the associated sparse reconstruction.

10.10 Prepare Data for Third-Party Workflows

Before using the third-party workflows described in Section 11, the panoramic camera must be installed and calibrated and the required Pocket 3D and panoramic-camera data to be organized for processing.

10.10.1 Basic Calculation

Organize the raw scanner project and panoramic-camera data and import them into SLAM GO POST Pro. Run the required point-cloud calculation and 3DGS preparation steps to generate the outputs needed by the intended third-party workflow.

Use:

Solve > One-click Solve

Select the required processing steps. If fisheye imagery from the panoramic camera is to be used for point-cloud colorization, select fisheye as the coloring image type in the advanced coloring settings.

Advanced Settings > Image Coloring Type > Fisheye

10.10.2 3DGS Pre-Training

After the required one-click calculation is complete, run 3DGS Pre-Training. The Feima source describes the following settings:

Panoramic Camera Folder - defaults to the PANO_CAM folder in the original project directory.

Panoramic Camera Installation Orientation - set this manually to match the actual physical camera installation.

Scene Type Selection - General Scene for most environments; Open Scene for feature-poor environments such as golf courses and lawns; Night Mode for low-light environments such as underground garages and museums.

Zoom View Setting - default 1.0; the source states that modification is normally not required.

10.10.3 Export XML

After completing the required calculations, select:

Tools > Export XML

These are the available settings:

3DGS Directory - defaults to Solver Project/3DGS/3DGS/sfm_pos/3DGS/temp and is automatically recognized by the software.

Output File Path - select the desired location for the exported XML file.

The resulting XML is intended for exchange of aerotriangulation information with compatible third-party applications.

10.10.4 Mask Undistorted Images

There is an additional image-processing utility, image_processing_gui.exe, for applying masks to undistorted images before certain third-party workflows.

Input Directory - set to SolverProject/3DGS/3DGS/sfm_pos/3DGS.

Output Directory - create and select a new output folder. The result includes an images folder containing masked undistorted images and a sparse folder containing sparse reconstruction data.

After the utility reports that image processing is complete, the source instructs the user to use a rename tool to change the image-file extensions in the output images folder to ".jpg".

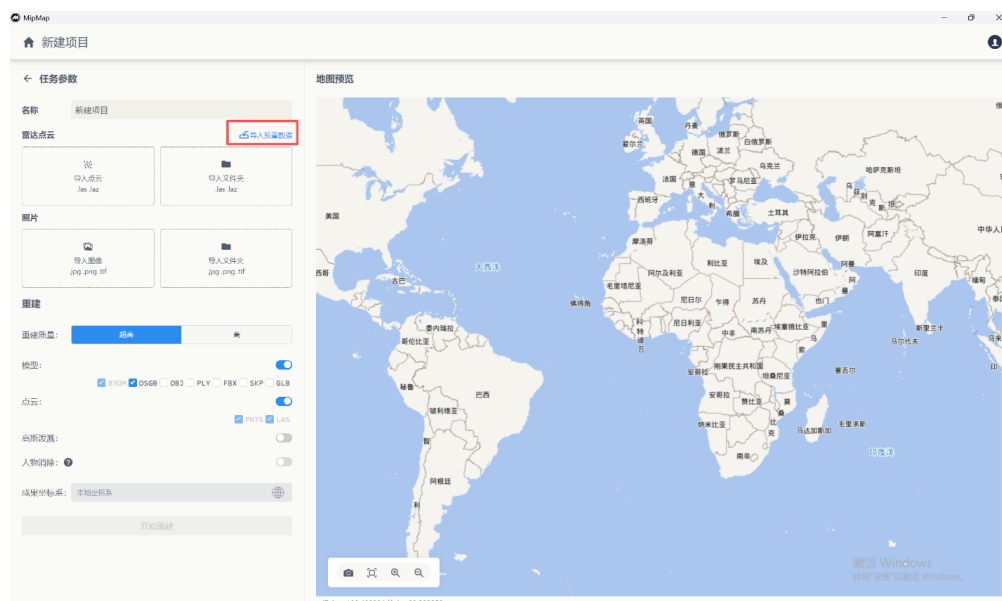
10.10.5 Relationship to Third-Party Software

The outputs described in this section provide the source data used by the third-party workflows in Section 11. Depending on the application, those workflows may use the MipMap configuration files, BlocksExchange XML, colored point cloud, odometry, camera POS, masked undistorted images, COLMAP-style sparse reconstruction, or combinations of these outputs.

11 Third-Party Software Workflows

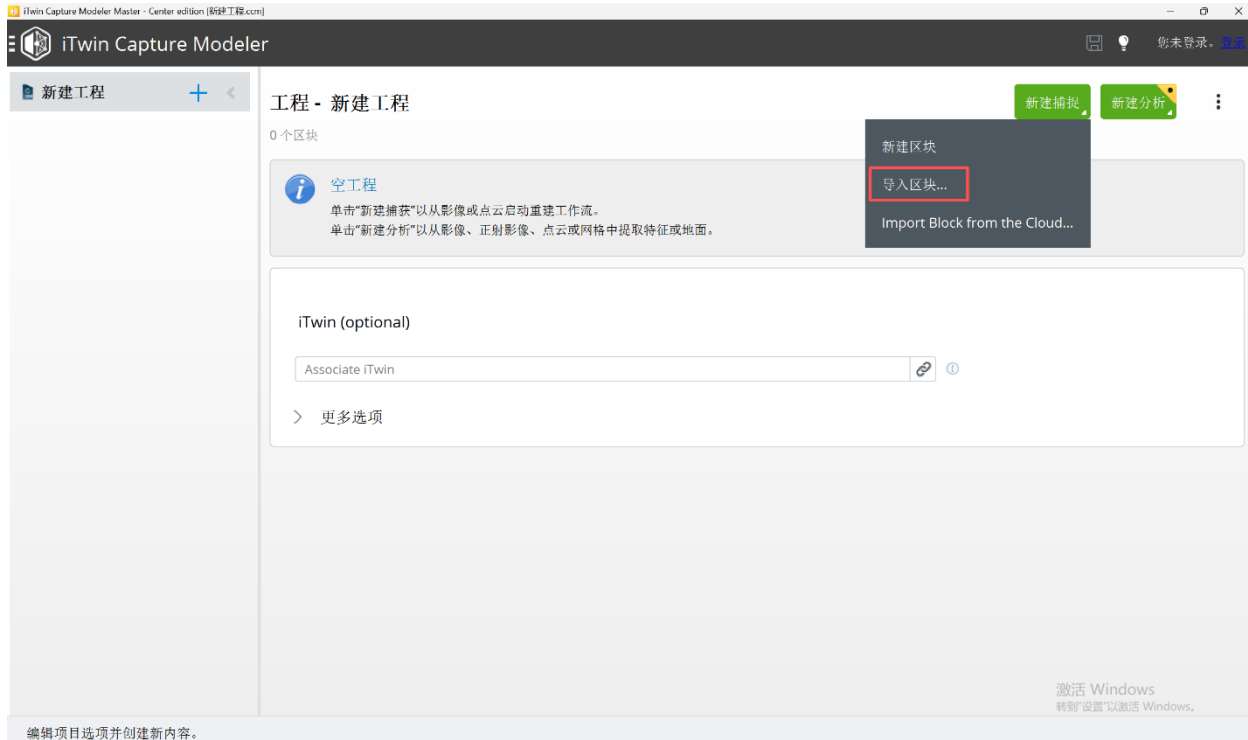
11.1 MipMap

After creating a LiDAR project, click [Import Preset Data], and import the mipmap. mpl file (for details, see [Open Data Access and Definition/MipMap Software Configuration File](#)), then you can proceed with Mesh model production.



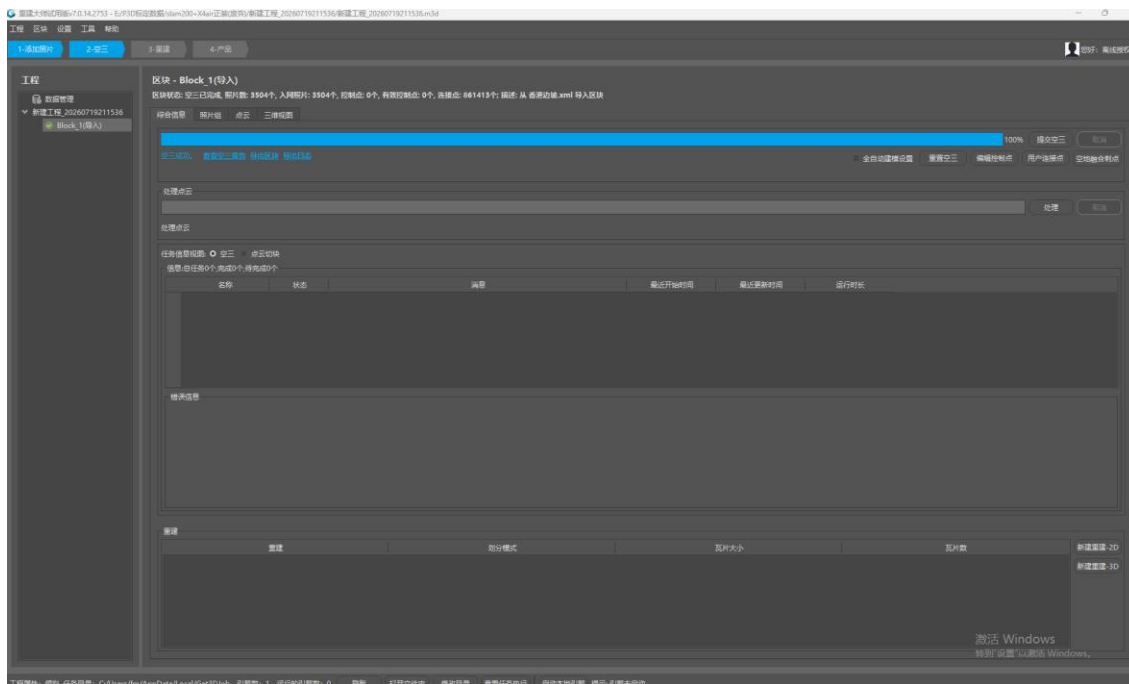
11.2 iTwin Capture Modeler (ContextCapture)

After creating a project, click [New Capture] - [Import Block], and after importing the XML file (for details, see [Open Data Access and Definition](#)), you can proceed with Mesh model production.



11.3 Reconstruction Master (重建大师)

After creating a project, click [Block] - [Import Block], import the XML file (for details, see [Open Data Access and Definition](#)), then import the colored point cloud file and odometry file (for details, see [Open Data Access and Definition](#)), and you can proceed with Mesh model generation.

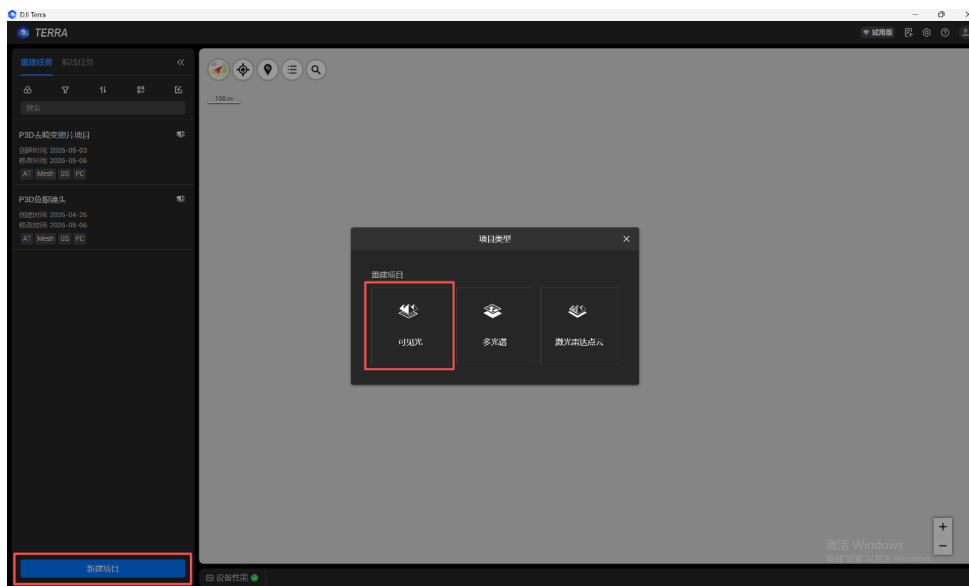


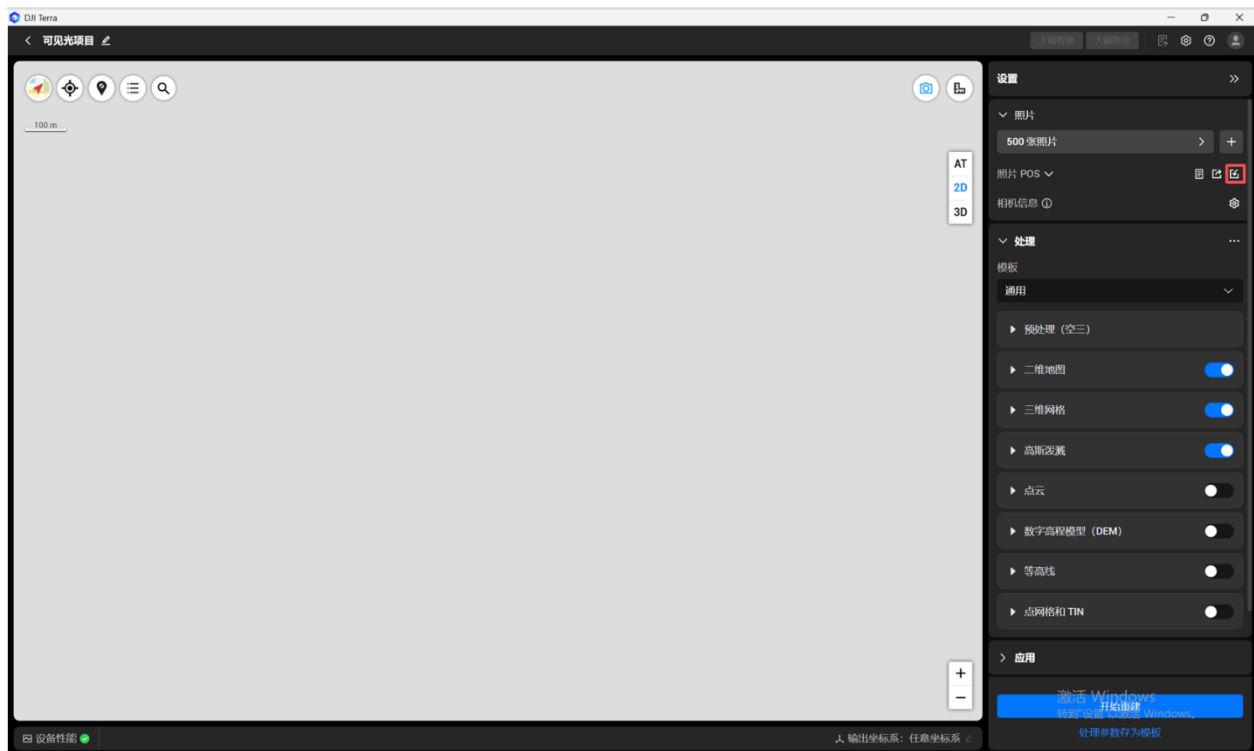
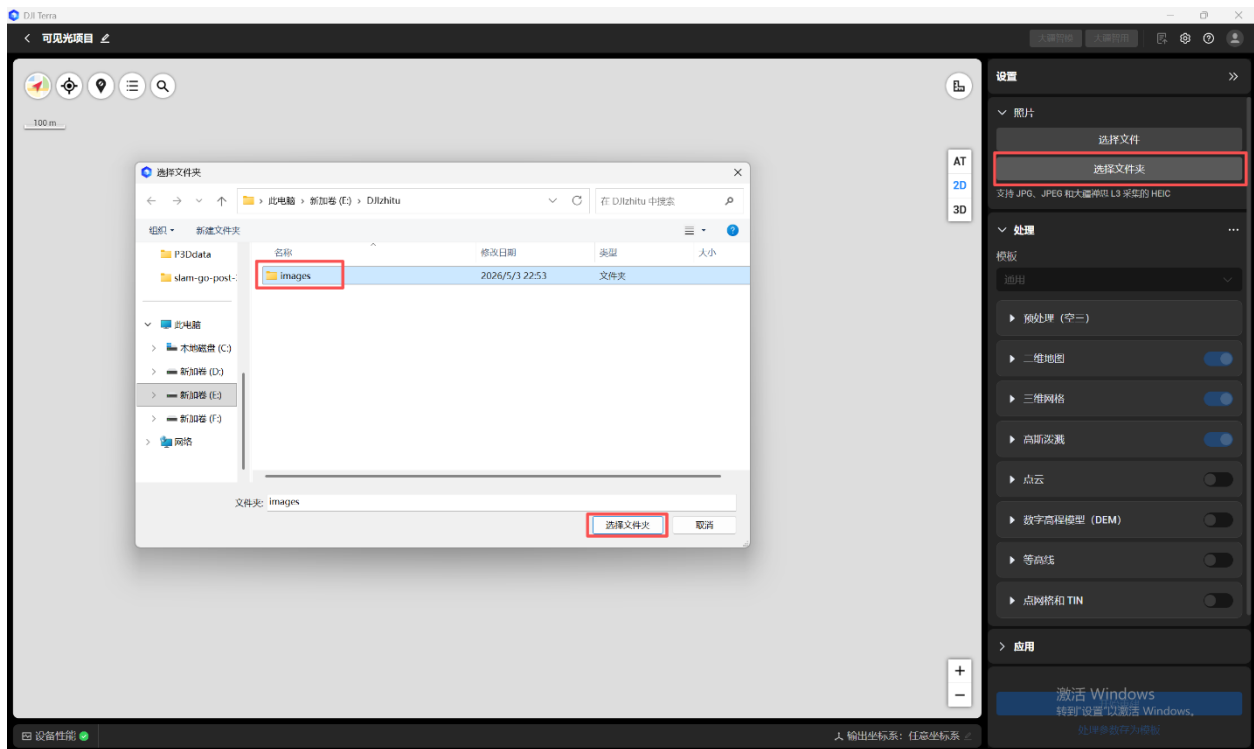
11.4 DJI Terra(大疆智图)

- Create a "visible light" project in the DJI Terra software.
- Import photos: Import the organized folder "images" containing mask-removed and distortion-corrected images into the software;
- Import Photo POS: Import the POS data corresponding to the video frames of the panoramic camera into the software;
- Edit camera information: set the 35mm equivalent focal length, set the lens type to "Standard", set the internal parameter unit to "px", set the fixed parameter to "Not Fixed", and fill in the camera lens parameters according to the information in{Project Directory}/3DGS/3DGS/sfm_pos/3DGS/sparse/cameras. txt;

Camera Type	35mm equivalent focal length
insta X4	6.7mm
insta X4-Air	6.4mm
insta X5	6mm
OSMO 360	8mm

- Set reconstruction parameters: set the calculation mode of preprocessing (aerotriangulation) to "standalone computing", set the route type to "ordinary scene", set the feature point density to "high", enable the "3D mesh" option, and check other parameters as needed.





格式与属性

文件格式

忽略文件前几行

0

小数分隔符

点 (.)

列分隔符

空格

连续分隔符号视为单个处理

数据属性

POS 数据坐标系

任意坐标系

已知坐标系

姿态角

无

POS 数据精度

使用 Terra 默认精度

文件预览

添加文件

0_pano_000065.jpg 198953.441800000000 -1.293800000000 -0.004300000000 0.869900000000 0.524700000000 -0.76...

1_pano_000065.jpg 198953.441800000000 -1.293800000000 -0.004300000000 0.869900000000 0.167900000000 -0.33...

0_pano_000067.jpg 198954.109100000000 -1.839300000000 -0.013500000000 0.937900000000 -0.471900000000 0.71...

1_pano_000067.jpg 198954.109100000000 -1.839300000000 -0.013500000000 0.937900000000 -0.315900000000 0.40...

0_pano_000069.jpg 198954.776400000000 -2.363000000000 0.072900000000 0.938200000000 -0.366600000000 0.588...

1_pano_000069.jpg 198954.776400000000 -2.363000000000 0.072900000000 0.938200000000 -0.510100000000 0.508...

0_pano_000071.jpg 198955.443599999999 -2.683000000000 0.345900000000 0.958100000000 -0.402200000000 0.608...

1_pano_000071.jpg 198955.443599999999 -2.683000000000 0.345900000000 0.958100000000 -0.497100000000 0.470...

0_pano_000073.jpg 198956.110900000000 -2.948000000000 0.654900000000 1.003800000000 -0.482700000000 0.656...

数据列定义 总行数: 738

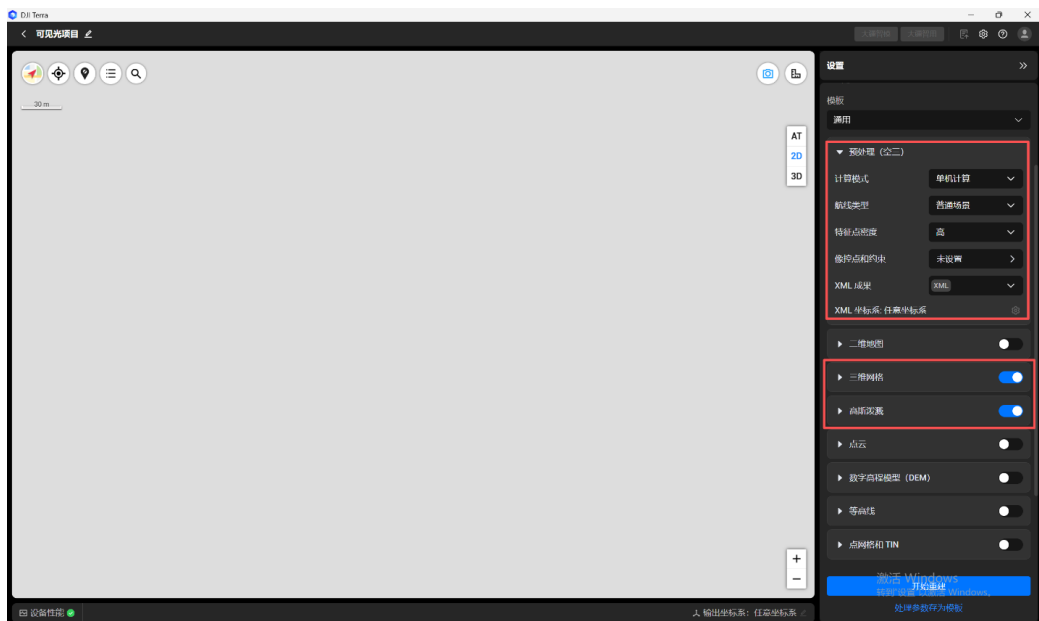
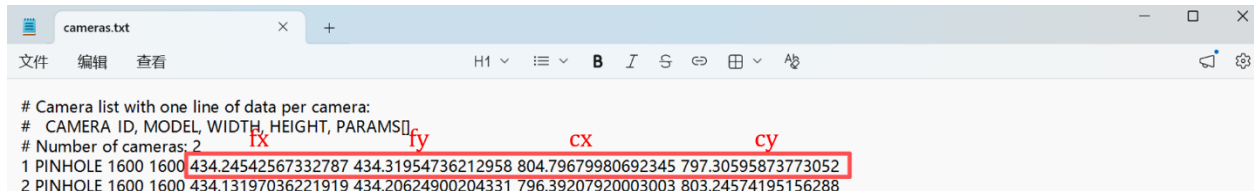
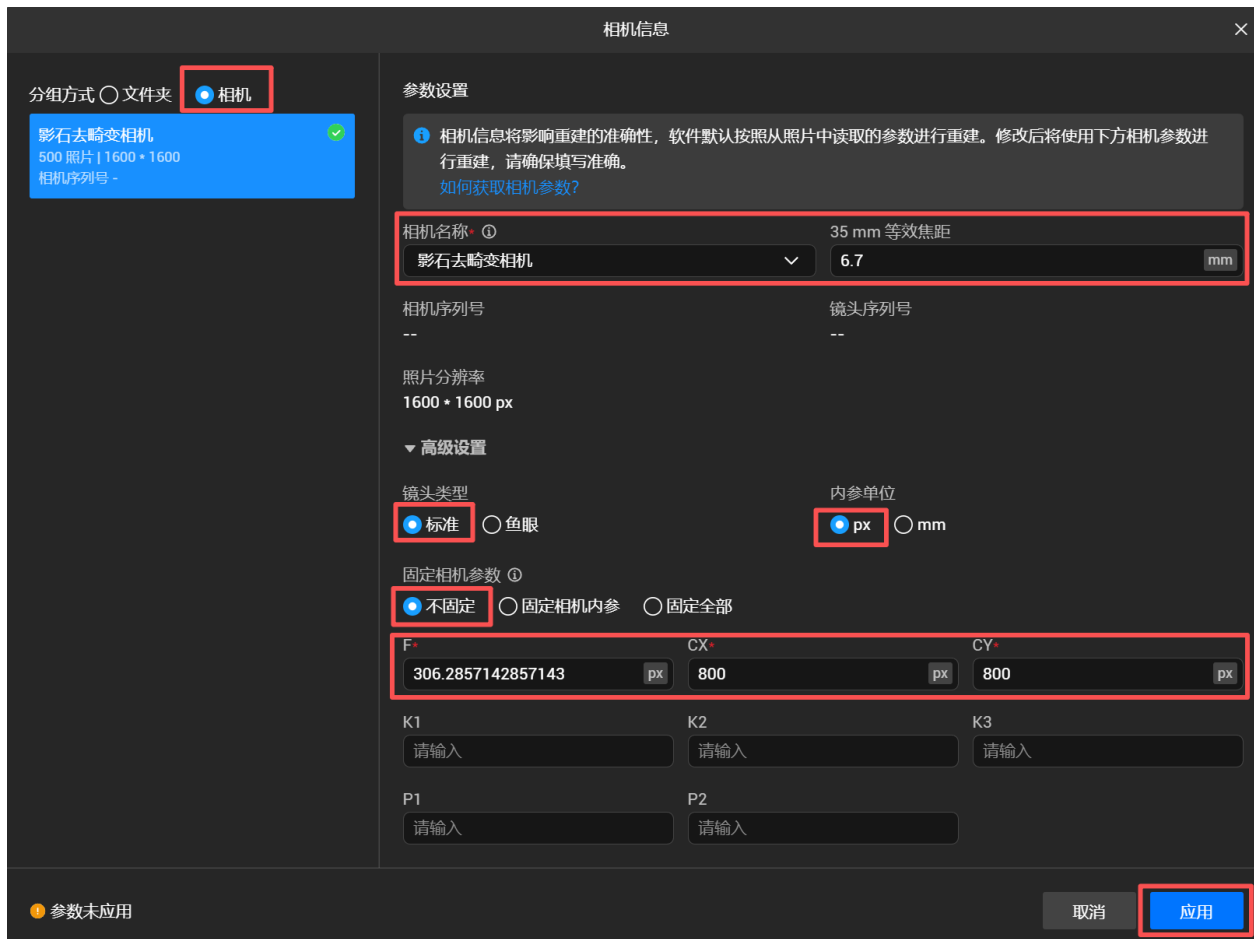
照片名称	未定义	X/E	Y/N	Z/U	未定义	未定义
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1_pano_0000...	198953.4418...	-1.29380000...	-0.00430000...	0.86990000...	0.16790000...	-0.33170000...
0_pano_0000...	198954.1091...	-1.83930000...	-0.01350000...	0.93790000...	-0.47190000...	0.71540000...
1_pano_0000...	198954.1091...	-1.83930000...	-0.01350000...	0.93790000...	-0.31590000...	0.40720000...
0_pano_0000...	198954.7764...	-2.36300000...	0.07290000...	0.93820000...	-0.36660000...	0.58860000...
1_pano_0000...	198954.7764...	-2.36300000...	0.07290000...	0.93820000...	-0.51010000...	0.50890000...
0_pano_0000...	198955.4435...	-2.68300000...	0.34590000...	0.95810000...	-0.40220000...	0.60800000...
1_pano_0000...	198955.4435...	-2.68300000...	0.34590000...	0.95810000...	-0.49710000...	0.47070000...
0_pano_0000...	198956.1109...	-2.94800000...	0.65490000...	1.00380000...	-0.48270000...	0.65630000...
1_pano_0000...	198956.1109...	-2.94800000...	0.65490000...	1.00380000...	-0.40400000...	0.41600000...
0_pano_0000...	198956.7782...	-3.12660000...	1.14030000...	0.98310000...	-0.49600000...	0.67150000...

数据导入正常

取消 预览 导入

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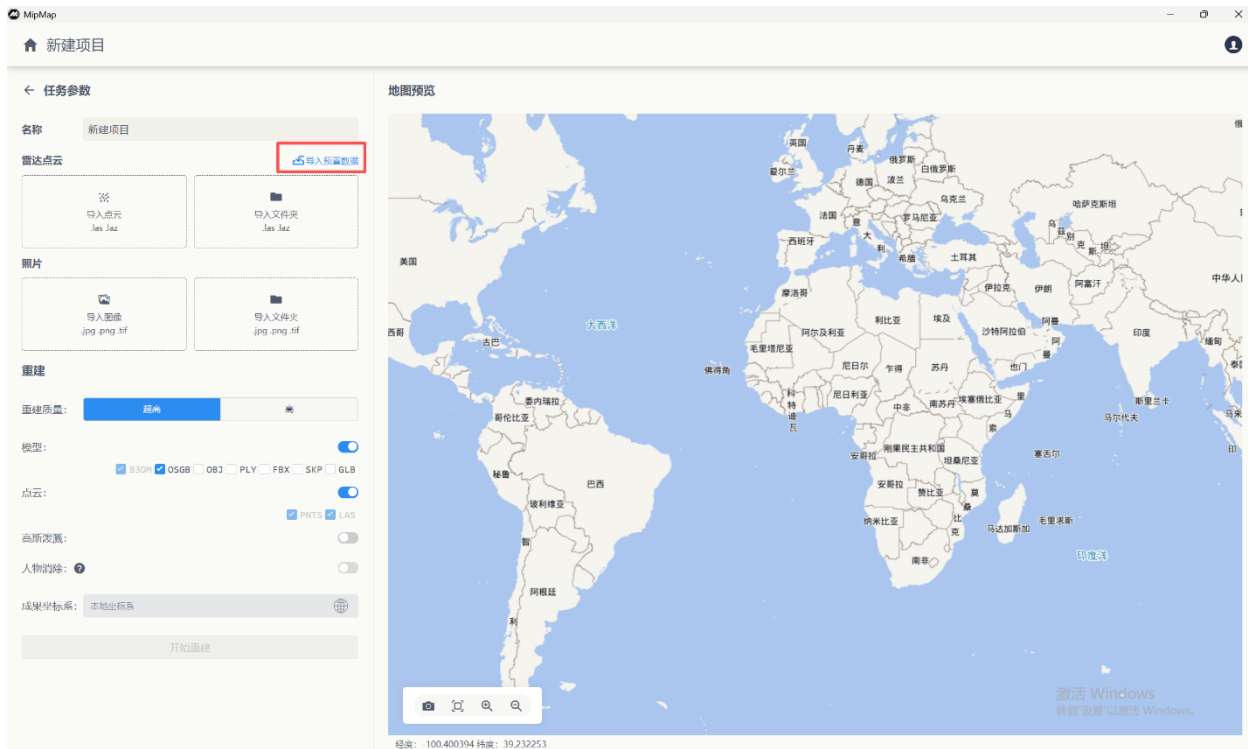
33



11.5 3DGS modeling with third-party software

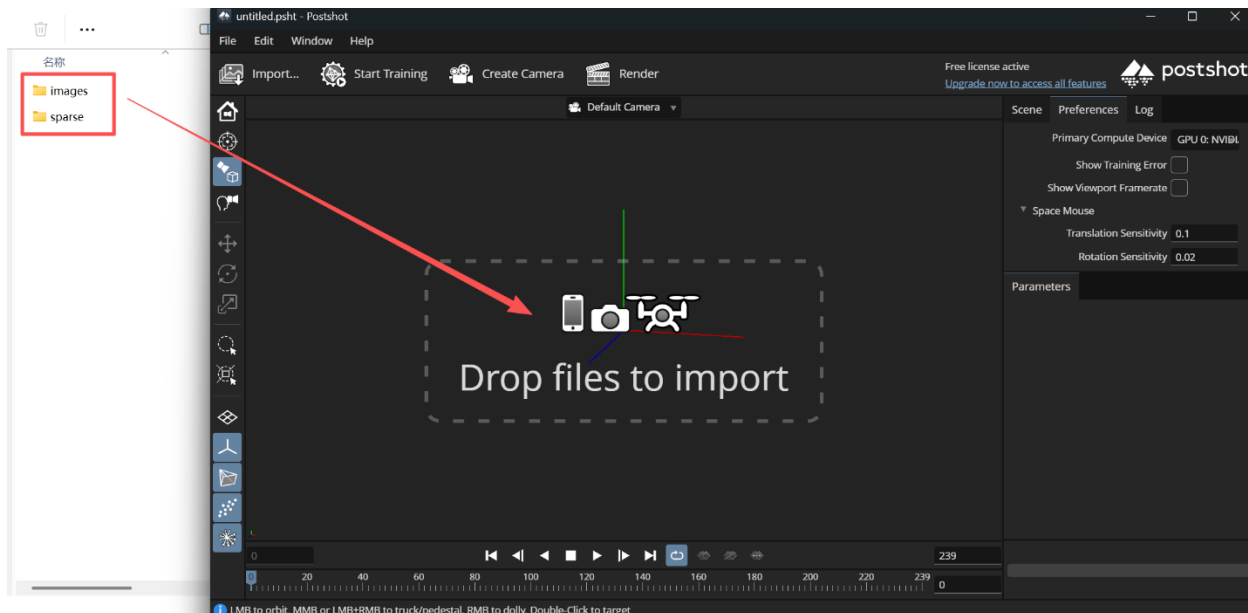
11.5.1 MipMap

After creating a LiDAR project, click [Import Preset Data] and import the /mipmap. mpl file (for details, refer to [Open Data Access and Definition](#)), then you can proceed with 3DGS model production.



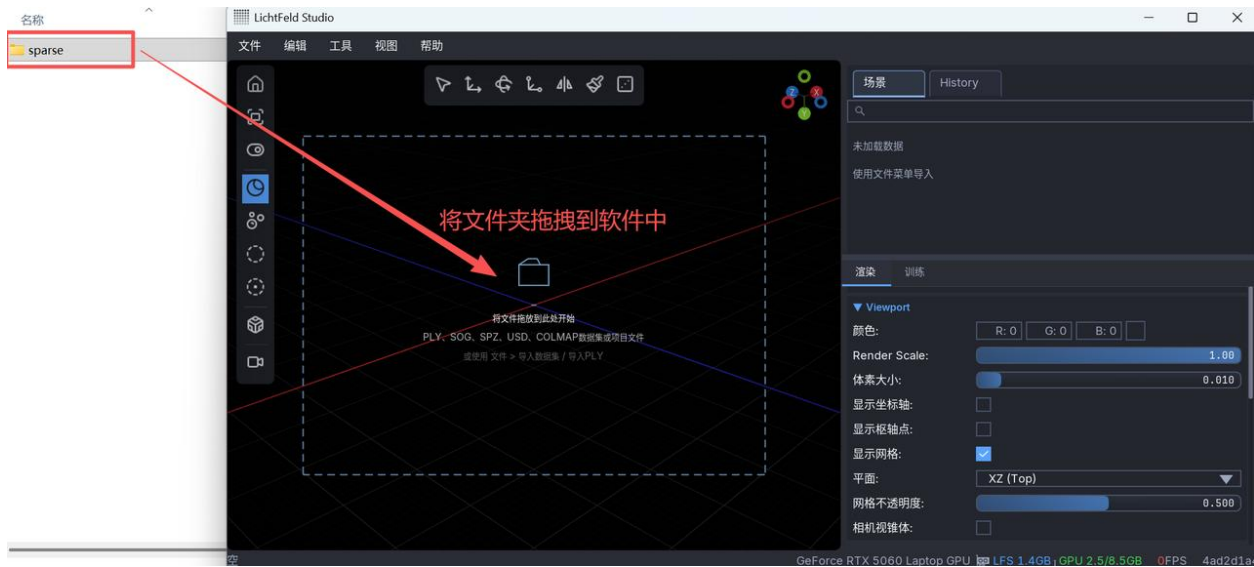
11.5.2 Postshot

Import the organized folder of masked undistorted images and the sparse reconstruction /sparse folder into the software. After configuring the parameters, click the "Import" button, and the software will automatically perform 3DGS Model Training.



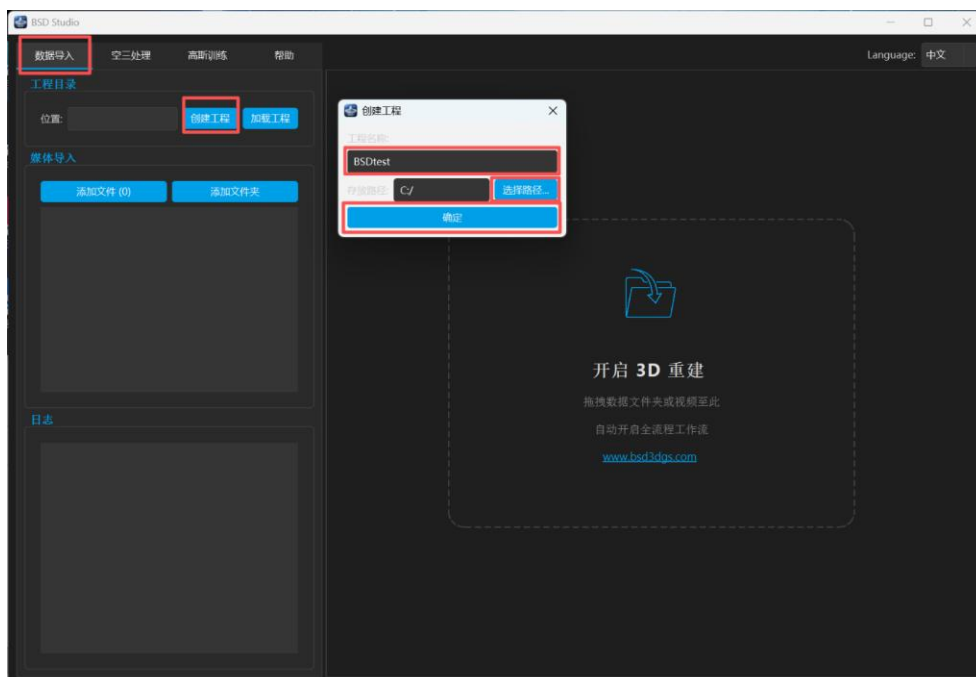
11.5.3 Lichtfeld Studio

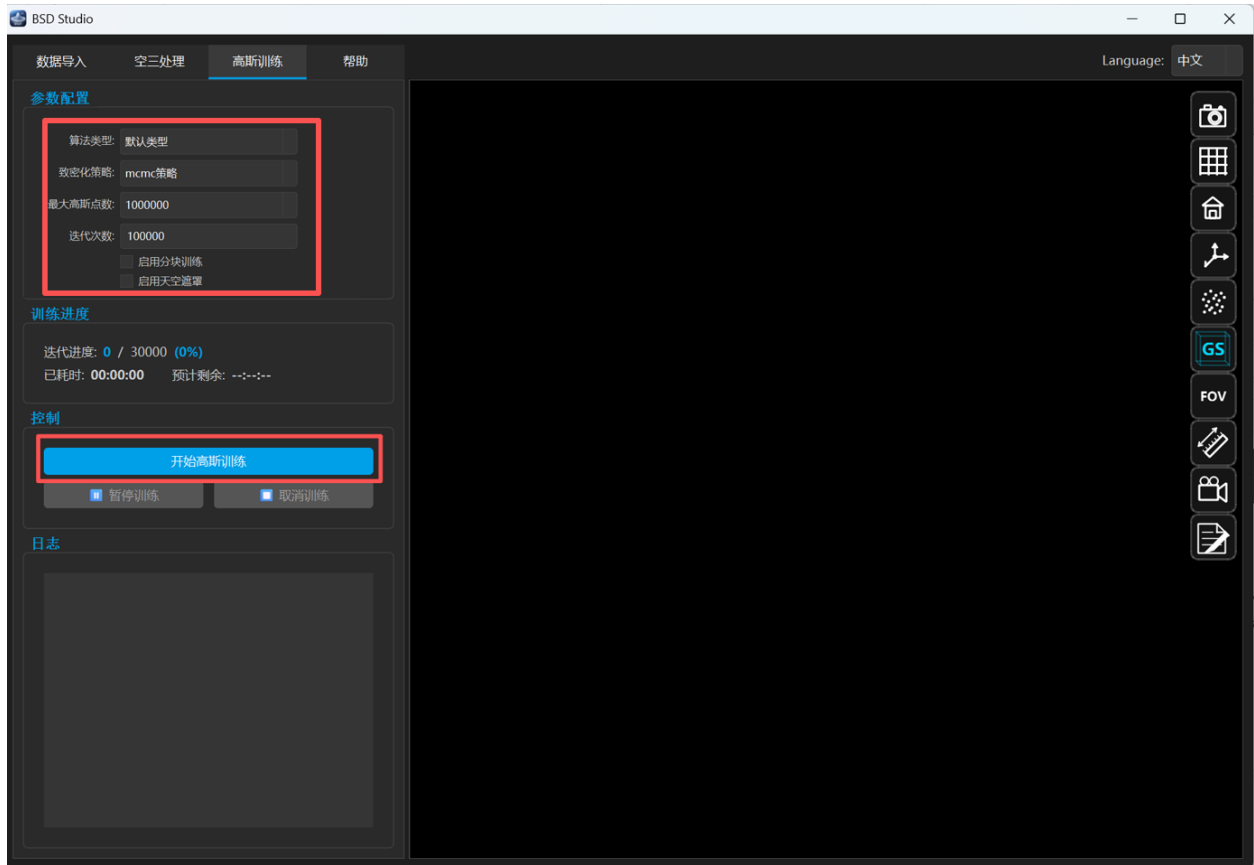
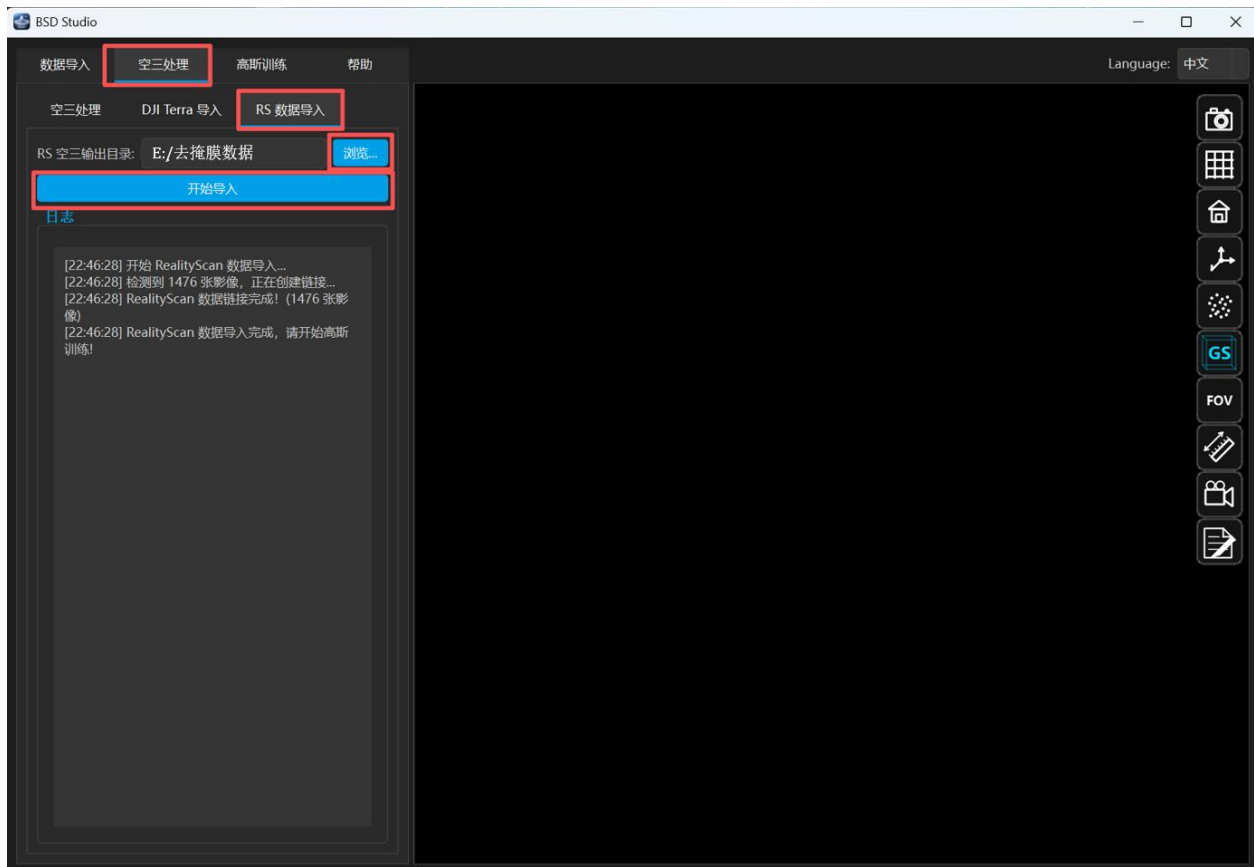
Place the organized masked undistorted images in the /images folder into the sparse reconstruction /sparse folder, then drag the sparse folder into the Lichfeld Studio software, set the output directory and training parameters, and click "Start Training" to generate the 3DGS model.



11.5.4 BSD Studio

- Click "Data Import -> Create Project" and set the project name and storage path;
- Click "Aerial Triangulation -> RS Data Import", and set the path where the sorted results are located (the /images folder and the path where the /sparse folder are located) as the "RS Aerial Triangulation Output Directory", then click "Start Import" to import the mask-removed data results into the software;
- Click "Gaussian Training" to configure the training parameters;
- After configuring the parameters, click "Start Gaussian Training".



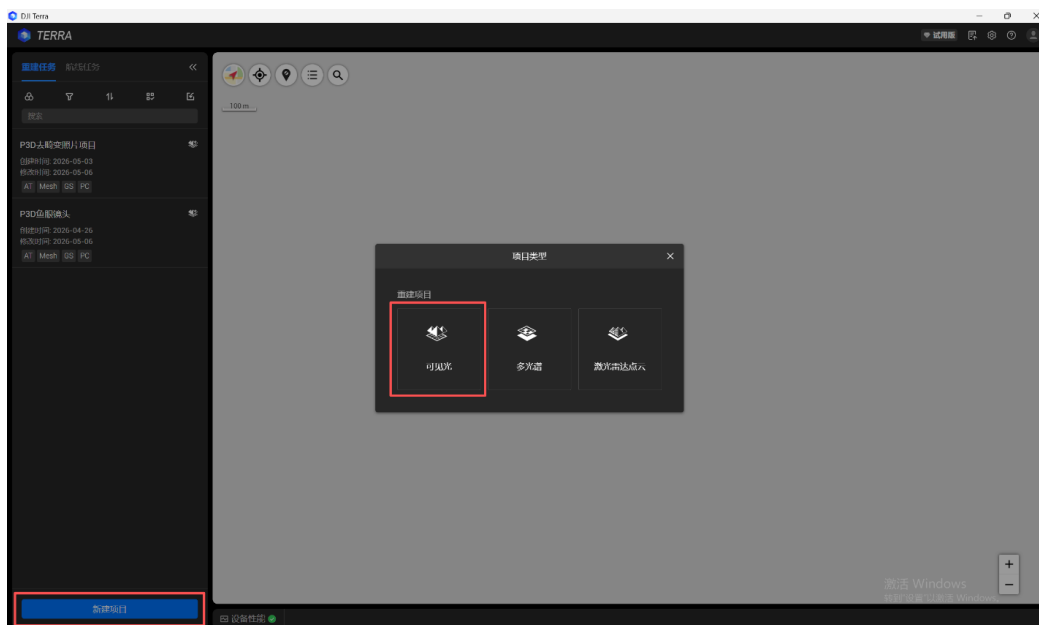


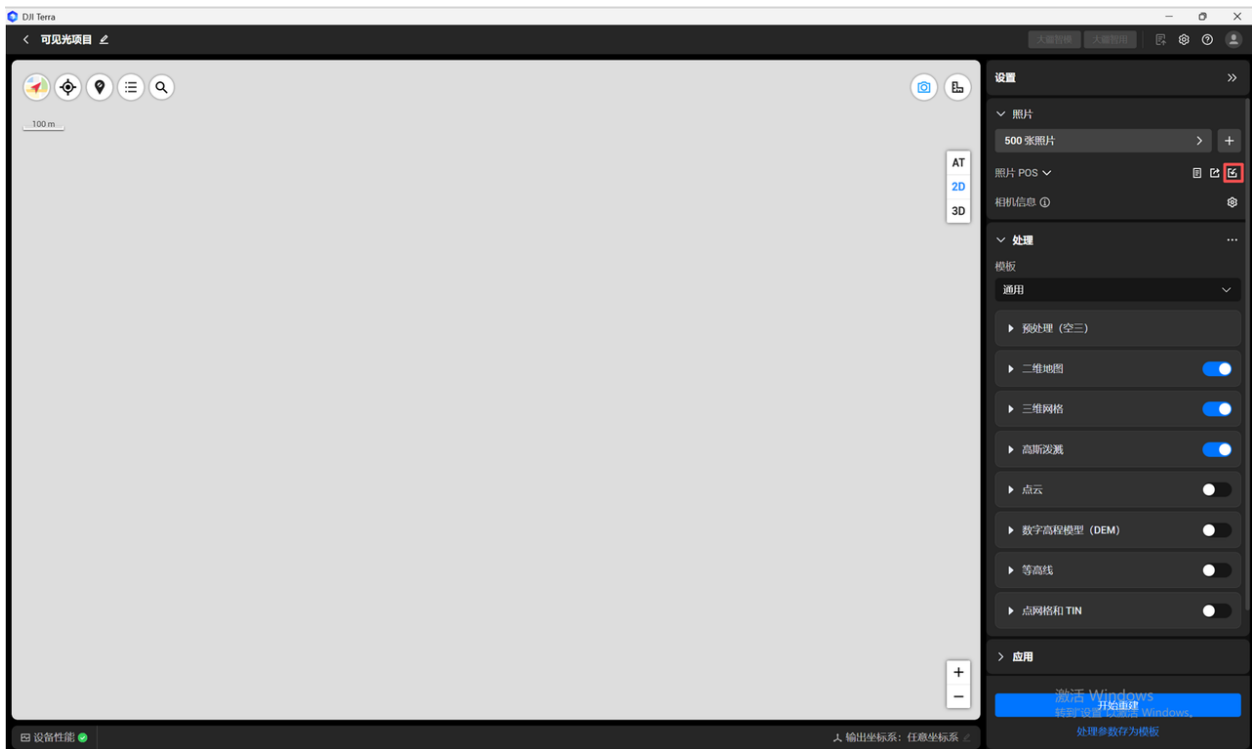
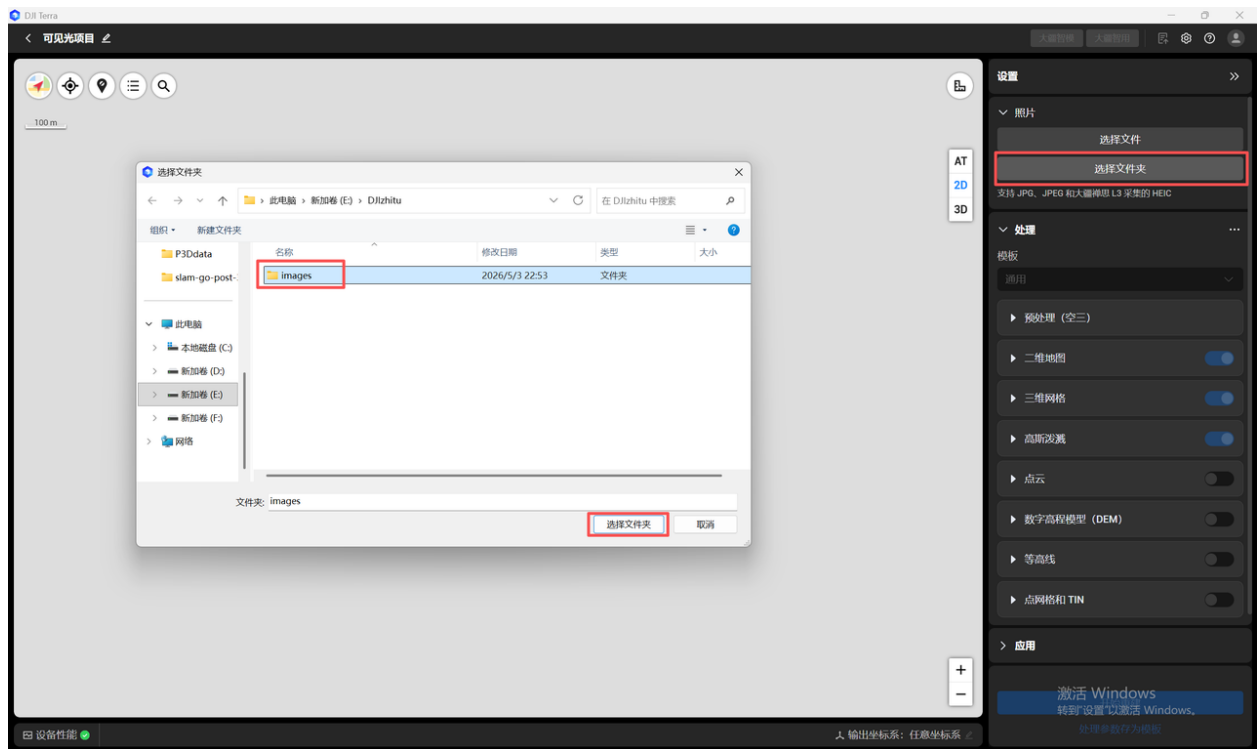
11.5.5 DJI Terra

- Create a "visible light" project in the DJI Terra software.
- Import Photos: Import the organized mask-removed and distortion-corrected image folder /images into the software;
- Import Photo POS: Import the POS data corresponding to the video frames of the panoramic camera into the software;
- Edit camera information: set the 35mm equivalent focal length, set the lens type to "Standard", set the internal parameter unit to "px", set the fixed parameter to "Unfixed", and fill in the camera lens parameters according to the information in{Project Directory}/3DGS/3DGS/sfm_pos/3DGS/sparse/cameras. txt;

相机类型	35mm 等效焦距
insta X4	6.7mm
insta X4-Air	6.4mm
insta X5	6mm
OSMO 360	8mm

- Set reconstruction parameters: set the calculation mode of preprocessing (aerotriangulation) to "standalone computing", set the route type to "common scene", set the feature point density to "high", enable the "Gaussian splatting" option, and check other parameters as needed.





格式与属性

文件格式

忽略文件前几行

0

小数分隔符

点 (.)

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空格

☒ 连续分隔符号视为单个处理

数据属性

POS 数据坐标系

☒ 任意坐标系

☐ 已知坐标系

姿态角

无

POS 数据精度

使用 Terra 默认精度

文件预览

添加文件

0_pano_000065.jpg 198953.441800000000 -1.293800000000 -0.004300000000 0.869900000000 0.524700000000 -0.76...

1_pano_000065.jpg 198953.441800000000 -1.293800000000 -0.004300000000 0.869900000000 0.167900000000 -0.33...

0_pano_000067.jpg 198954.109100000000 -1.839300000000 -0.013500000000 0.937900000000 -0.471900000000 0.71...

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1_pano_000069.jpg 198954.776400000000 -2.363000000000 0.072900000000 0.938200000000 -0.510100000000 0.508...

0_pano_000071.jpg 198955.443599999999 -2.683000000000 0.345900000000 0.958100000000 -0.402200000000 0.608...

1_pano_000071.jpg 198955.443599999999 -2.683000000000 0.345900000000 0.958100000000 -0.497100000000 0.470...

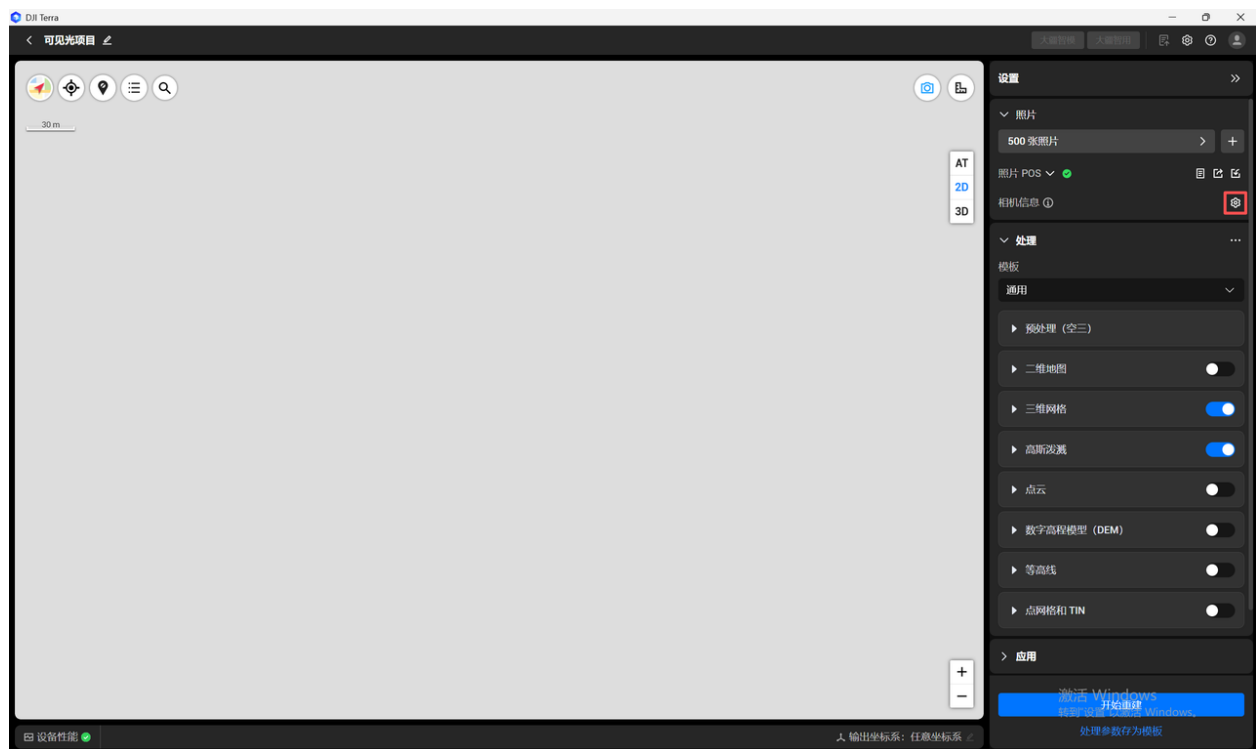
0_pano_000073.jpg 198956.110900000000 -2.948000000000 0.654900000000 1.003800000000 -0.482700000000 0.656...

数据列定义 总行数: 738

照片名称	未定义	X/E	Y/N	Z/U	未定义	未定义
0_pano_0000...	198953.4418...	-1.29380000...	-0.00430000...	0.86990000...	0.52470000...	-0.76580000...
1_pano_0000...	198953.4418...	-1.29380000...	-0.00430000...	0.86990000...	0.16790000...	-0.33170000...
0_pano_0000...	198954.1091...	-1.83930000...	-0.01350000...	0.93790000...	-0.47190000...	0.71540000...
1_pano_0000...	198954.1091...	-1.83930000...	-0.01350000...	0.93790000...	-0.31590000...	0.40720000...
0_pano_0000...	198954.7764...	-2.36300000...	0.07290000...	0.93820000...	-0.36660000...	0.58860000...
1_pano_0000...	198954.7764...	-2.36300000...	0.07290000...	0.93820000...	-0.51010000...	0.50890000...
0_pano_0000...	198955.4435...	-2.68300000...	0.34590000...	0.95810000...	-0.40220000...	0.60800000...
1_pano_0000...	198955.4435...	-2.68300000...	0.34590000...	0.95810000...	-0.49710000...	0.47070000...
0_pano_0000...	198956.1109...	-2.94800000...	0.65490000...	1.00380000...	-0.48270000...	0.65630000...
1_pano_0000...	198956.1109...	-2.94800000...	0.65490000...	1.00380000...	-0.40400000...	0.41600000...
0_pano_0000...	198956.7782...	-3.12660000...	1.14030000...	0.98310000...	-0.49600000...	0.67150000...

数据导入正常

取消 预览 导入



相机信息

分组方式

文件夹

相机

影石去畸变相机

500 照片 | 1600 * 1600

相机序列号 -

参数设置

相机名称

影石去畸变相机

35 mm 等效焦距

6.7 mm

相机序列号

--

镜头序列号

--

照片分辨率

1600 * 1600 px

高级设置

镜头类型

标准

鱼眼

内参单位

px

mm

固定相机参数

不固定

固定相机内参

固定全部

F*

306.2857142857143 px

CX*

800 px

CY*

800 px

K1

请输入

K2

请输入

K3

请输入

P1

请输入

P2

请输入

参数未应用

取消

应用

cameras.txt

文件 编辑 查看

Camera list with one line of data per camera:

CAMERA ID, MODEL, WIDTH, HEIGHT, PARAMS[]

Number of cameras: 2

1 PINHOLE 1600 1600 434.24542567332787 434.31954736212958 804.79679980692345 797.30595873773052

2 PINHOLE 1600 1600 434.13197036221919 434.20624900204331 796.39207920003003 803.24574195156288

3D

2D

AT

设置

通用

计算模式

单机计算

特征点类型

普通特征

特征点密度

高

相机点云的球

未设置

XML 成果

XML

XML 坐标系: 任意坐标系

二重地图

三组网格

高斯决策

点云

数字高程模型 (DEM)

等高线

点网格和 TIN

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12 Equipment Care, Charging, and Packing

This section consolidates Feima guidance for charging, battery care and storage, battery-status indicators, transportation, disposal, and packing Pocket 3D. Follow the safety notices at the beginning of this manual in addition to the procedures below.

12.1 Charging and Power

Pocket 3D charges through its USB-C port and requires a USB-C Power Delivery (USB-PD) charger that supports 20 V output.

Recommended: Use a reputable 30 W or higher USB-C PD fast charger with 20 V output capability.

Minimum requirement: The charger must support USB Power Delivery and provide a compatible 20 V charging mode. A typical phone charger that provides only 5 V USB output is not suitable.

Many modern chargers marketed as USB-C Fast Chargers or USB-C PD Chargers meet these requirements. Check the output specifications printed on the charger for 20 V support rather than relying only on the advertised wattage.

Use a good-quality USB-C cable rated for the charger's power output. Underrated cables can result in slow or unreliable charging and may generate excessive heat.

Pocket 3D is powered by the SP20 intelligent battery handle. Feima specifies an operating voltage of 7.2 V, approximately 180 minutes of continuous operation per battery under normal conditions, and at least 500 charge-discharge cycles under normal maintenance and use.

12.2 Charging Safety and Temperature

- After operation, if the battery is hot, allow the intelligent battery handle to cool to room temperature before charging.
- Feima specifies an ambient charging-temperature range of +5°C to +40°C (41°F to 104°F).
- Charge in an isolated area away from flammable materials.
- Do not open or disassemble the charger.
- Do not use inferior, unidentified, damaged, or parameter-mismatched charging equipment.

12.3 Routine Battery Maintenance and Storage

- Recharge the battery promptly after operation. Do not leave the battery at a low state of charge for an extended period.
- For long-term storage, charge the battery to more than 50% and perform charge-discharge maintenance approximately every three months.
- Store the battery out of reach of children and pets.
- Store in a cool, dry location protected from direct sunlight and heat sources. Feima identifies 22°C to 28°C (72°F to 82°F) as the ideal storage range and states that the battery should never be stored above +45°C (113°F).
- Avoid storage environments that repeatedly alternate between high and low temperatures.
- Do not store a fully charged battery in a shipping container when the battery temperature exceeds +45°C (113°F).
- Do not store the battery for an extended period after it has been fully discharged. Long-term low-charge storage can cause over-discharge and may result in battery failure.

- Keep sharp objects away from the battery. Do not puncture, drop, or subject the battery to impacts.

The Feima source additionally states that batteries should be stored in an explosion-proof box in a cool, dry location. This requirement is reproduced here from the source guidance.

12.4 Battery Status LEDs

The intelligent battery handle uses four LEDs to indicate charging progress, remaining charge, and protection/fault conditions.

12.4.1 Charging Display

Battery level	LED1	LED2	LED3	LED4
0-24%	LED1->LED4 marquee	LED1->LED4 marquee	LED1->LED4 marquee	LED1->LED4 marquee
25-49%	Steady on	Steady on	LED2->LED4 marquee	LED2->LED4 marquee
50-74%	Steady on	Steady on	LED3->LED4 marquee	LED3->LED4 marquee
75-99%	Steady on	Steady on	Steady on	Blink 1 Hz
100%	Steady on	Steady on	Steady on	Steady on

12.4.2 Battery-Level Display During Discharge / Query

Battery level	LED1	LED2	LED3	LED4
0-12%	Flash 1 Hz	Off	Off	Off
13-24%	On	Off	Off	Off
25-37%	On	Flash 1 Hz	Off	Off
38-49%	On	On	Off	Off
50-62%	On	On	Flash 1 Hz	Off
63-74%	On	On	On	Off
75-87%	On	On	On	Flash 1 Hz
88-100%	On	On	On	On

When battery level is queried by pressing the battery button, Feima states that the LEDs illuminate for six seconds. The first three seconds display battery level. During the next three seconds, a normal battery continues to display the battery level; if a protection condition is present, the LEDs display the applicable protection status.

12.4.3 Battery Protection / Fault Display

Condition	LED1	LED2	LED3	LED4
Discharge - undervoltage	Flash 5 Hz	Flicker 1 Hz	Off	Off
Discharge - low temperature	Flash 5 Hz	Off	Flicker 1 Hz	Off
Discharge - over-temperature	Flash 5 Hz	Off	Off	Flicker 1 Hz
Discharge - overcurrent	Flash 5 Hz	Flicker 1 Hz	Flicker 1 Hz	Off
Discharge - short circuit	Flash 5 Hz	Flicker 1 Hz	Flicker 1 Hz	Flicker 1 Hz
Charging - overvoltage	Flicker 1 Hz	Off	Off	Flash 5 Hz
Charging - low temperature	Off	Flicker 1 Hz	Off	Flash 5 Hz
Charging - over-temperature	Off	Off	Flicker 1 Hz	Flash 5 Hz
Charging - overcurrent	Flicker 1 Hz	Flicker 1 Hz	Off	Flash 5 Hz

12.5 Transportation

During transportation, place batteries in secure protective packaging to prevent contact with liquids and collision with hard objects. Do not immerse the battery in water or allow it to become wet. The Feima source warns that water entering the battery can cause a decomposition reaction that may lead to spontaneous combustion or explosion.

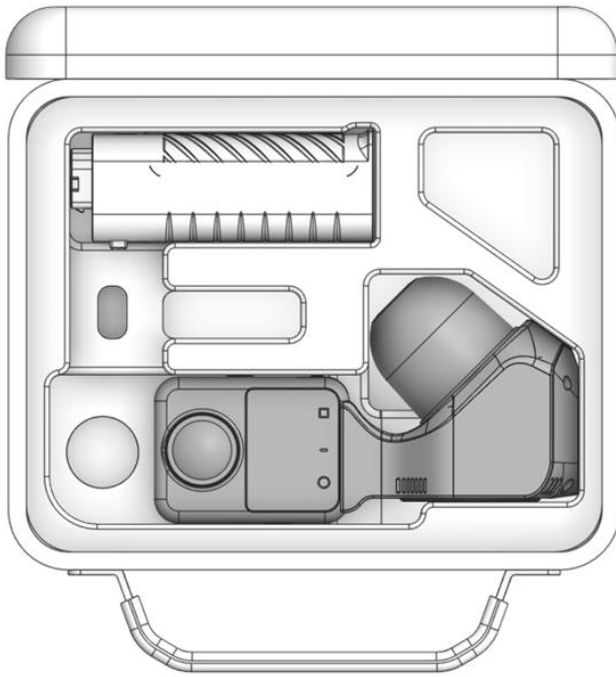
12.6 Battery Disposal

- Do not disassemble, impact, squeeze, puncture, or throw the battery into fire, and do not place it in a high-temperature environment.
- Do not continue using a battery that is swollen, leaking, or has a damaged outer casing. Dispose of it appropriately.
- Follow applicable local laws and regulations for lithium-battery recycling and disposal. Do not discard the battery in ordinary trash.

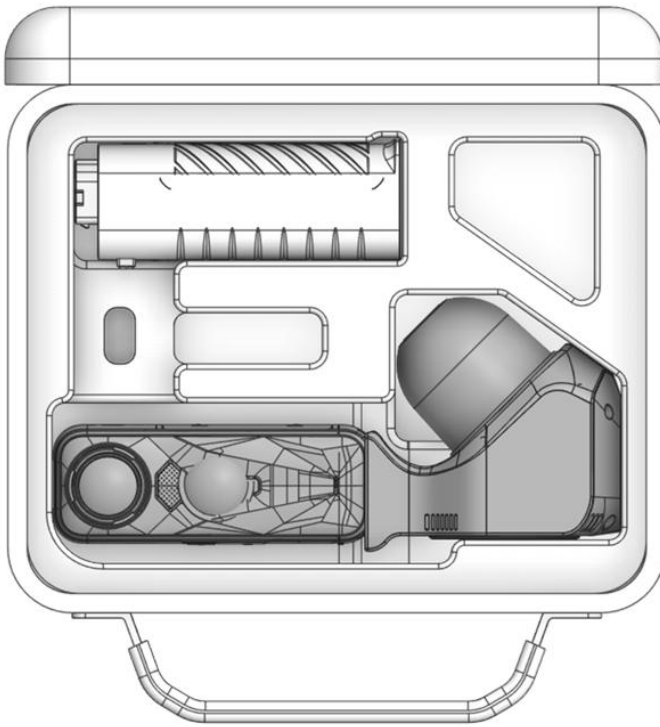
The Feima source instructs users to completely discharge the battery before placing it in a designated battery-recycling bin and, if the battery cannot be fully discharged, to contact a professional battery-recycling company rather than placing it directly in the recycling bin. Local battery-handling requirements may differ; follow applicable local requirements.

12.7 Packing Pocket 3D

The supplied soft case is designed to accommodate Pocket 3D with a supported panoramic camera installed. This allows the scanner to be stored and transported without removing the camera, helping preserve the calibrated relationship between the camera and scanner.



Pocket 3D packed with DJI Osmo 360 camera attached.



Pocket 3D packed with Insta360 camera attached.

12.8 GCP Base Packing

Store the GCP base in the designated compartment in the soft-case lid.

12.9 Shutdown Before Handling

Always shut Pocket 3D down using the power button. Wait until the system/status indicator is completely off before removing the intelligent battery handle, disconnecting external power, inserting or removing the TF/microSD card, or performing card-based data-copy operations.

13 Troubleshooting and Reference

13.1 System/Status Indicator

Indicator	Meaning
Off	Shutdown
Steady red	Powering on
Flashing red	Startup/shutdown process
Steady green	Standby
Fast-flashing green	Initialization
Slow-flashing green	Scanning/acquisition
Flashing yellow	Abnormal condition
Flashing white	System upgrade

13.2 Common Field Problems

Problem	Likely field cause	Corrective practice
Blurred/unclear detail	Movement too fast or abrupt	Reduce speed and keep motion smooth.
Texture discontinuity	Abrupt turns or environmental transition	Change orientation progressively.
SLAM drift / layered point cloud	Weak geometry, long route, poor loop closure	Use blocks, overlap, and shorter loops.
Missing ground appearance	Camera/device occlusion	Plan supplementary lateral coverage.
Poor fine detail	Insufficient proximity or viewpoints	Use slower close multi-view coverage.
Excessive 3DGS processing time	Large or redundant image set	Use logical datasets and dense capture selectively.
Color mapping ghosting	Calibration failure or camera moved	Recalibrate and keep the camera rigidly mounted.

14 Appendix A - Field Quick Reference

Task	Method	Metric / Approx. U.S.	Purpose
Alignment motion	Tilt left/right	45°, 2-3 sec	Camera/IMU time alignment
Starting sweep	Broad body turn / small circle	360°, ~5 sec	Cover starting area and rear blind zone
Close-range block	Overall first, then detail	≤20 m x 20 m / ≤65 ft x 65 ft	Control close-range work
Overall route	S-shaped / serpentine	0.5-1 m/s / 1.5-3 ft/s	Broad scene coverage
Pass spacing	Adjacent route legs	≤5 m / ≤16 ft	Improve visual/ground coverage
Detail	Slow multi-view	≤0.3 m/s; ≥0.3 m / ≤1 ft/s; ≥1 ft	Preserve detail
Corridor	Side orientation	Slow/stable	Improve useful scene geometry
Loop control	Close within blocks	≤200 m / ≤650 ft	Limit accumulated error