Guidelines for Data Acquisition and Processing in 3DGS

Only supported in FJD Trion Model Version 205 and above

1. Guidelines for Data Acquisition

1.1 Keep the lens clean

Figure 1. Sample of blurred video captured by unclean camera

Before data acquisition, ensure that the lens of the internal or external camera are clean.

1.2 Multi-view acquisition

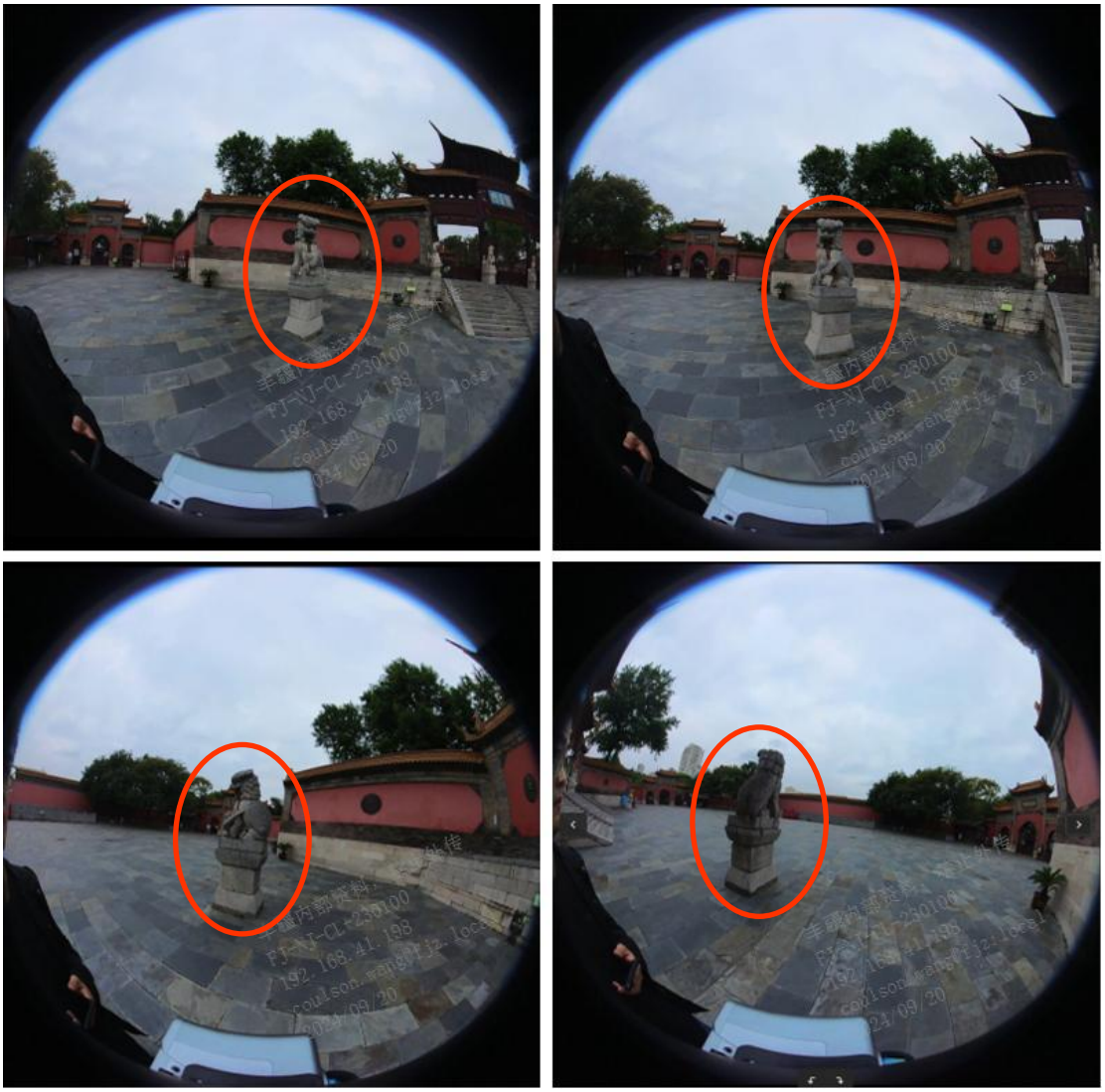


Figure 2. Capture a target in multi-view

For objects such as statues which are main target seen in final result, surround acquisition can be performed to capture multi-view images (front, top, left, right, back), which helps improve the target quality of 3DGS reconstruction.

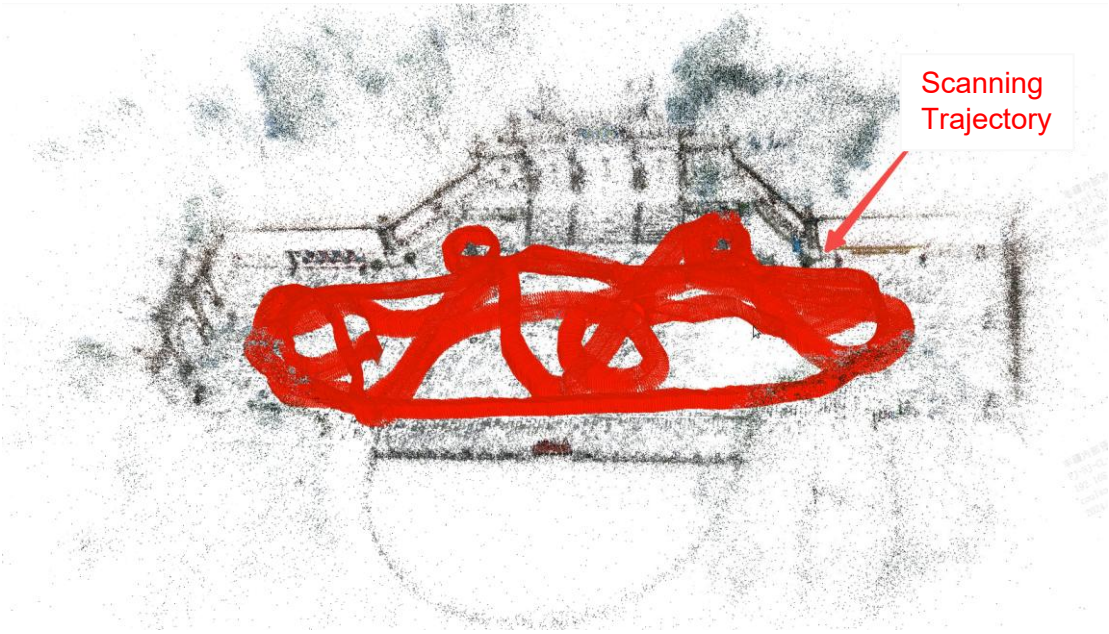
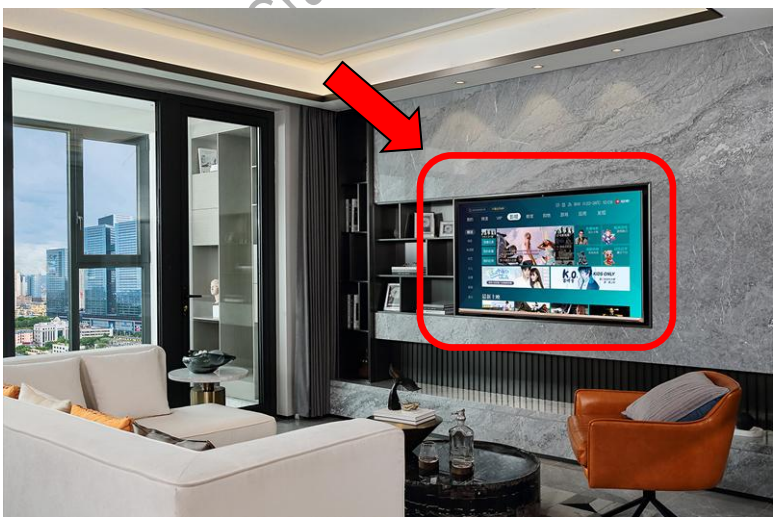


Figure 3. Curve-path acquisition

Curve-path acquisition enhances the depth constraints in 3DGS reconstruction, which helps improve the quality.

1.3 Avoid moving objects



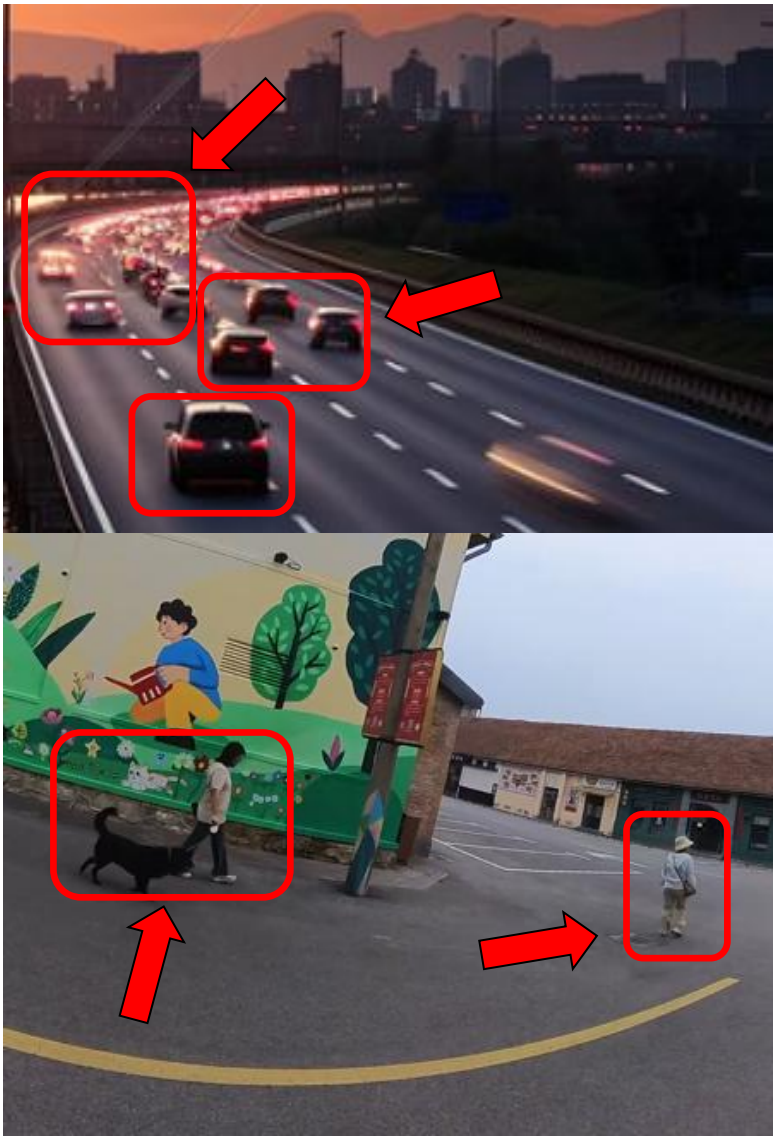


Figure 4. Avoid moving objects

Avoid crowds, vehicle flow, dynamic display screens, and swaying trees in strong winds. These can cause scene inconsistencies across different perspectives, preventing a high-quality 3DGS model.

1.4 Avoid strong light and low light.

Figure 5. Avoid strong light and low light

Image quality has a decisive impact on 3DGS reconstruction quality. Therefore, avoid strong light and low light to prevent overexposure and underexposure of images.

1.5 Ensure image clarity

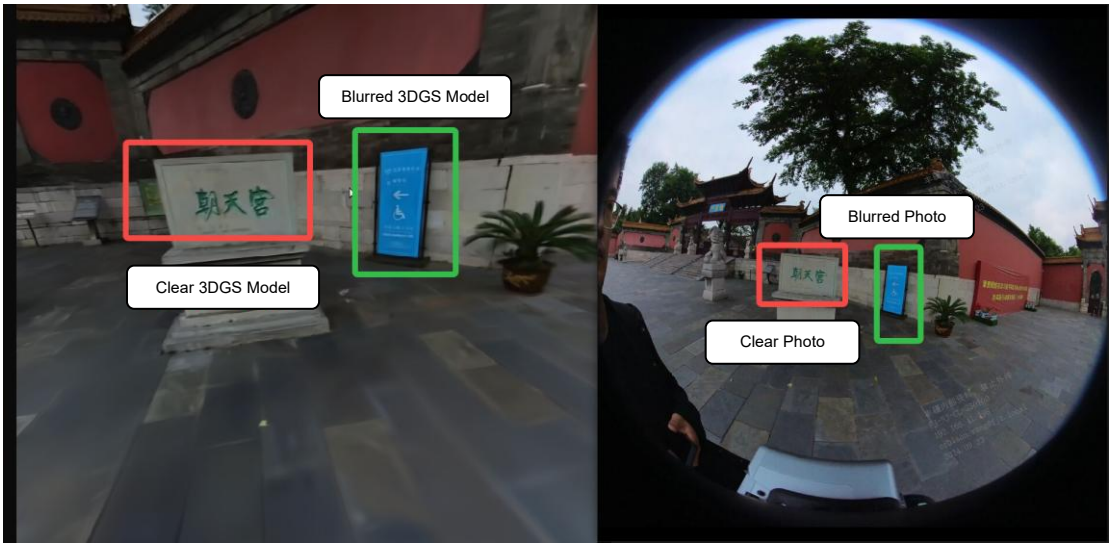


Figure 6. Image clarity affects 3DGS clarity

Image clarity affects the clarity of 3DGS models. To ensure clear details in 3DGS models, you can get closer to the target objects to keep the images sharp and clear. (Don’t worry about the LiDAR. Focus on the camera.)

Figure 7. Fast turning causes motion blur

During acquisition, move slightly slower to reduce motion blur. Turning too fast is more likely to cause motion blur, as shown in the blurred image in Figure 7. Therefore, you can slow down further when turning.

1.6 Ensure that the scene features are clear and continuous

Figure 8. Less features and more features scenes

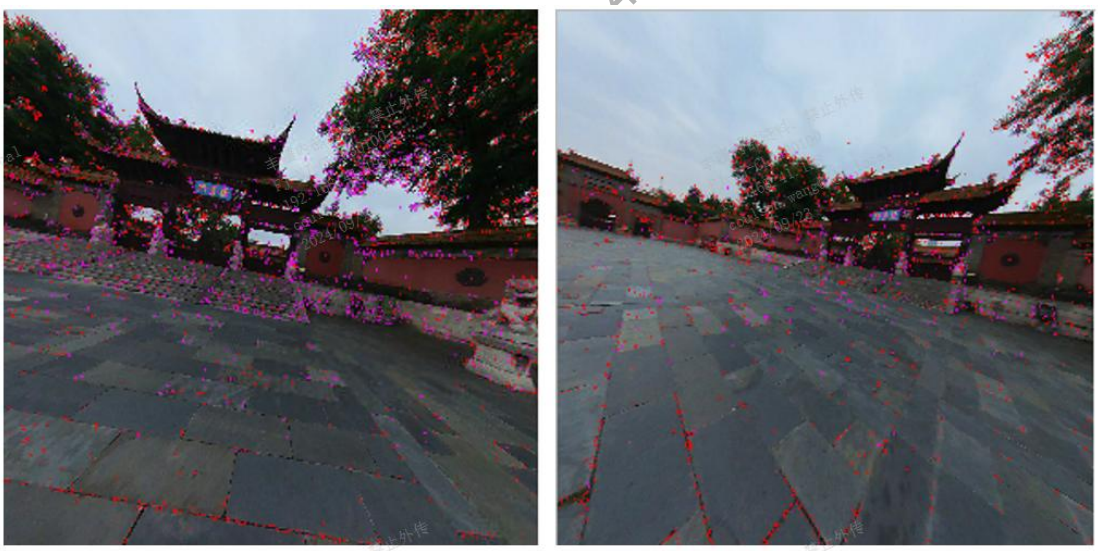


Figure 9. Constraits on scenes

Image registration is required prior to 3DGS reconstruction. This process relies heavily on the extraction and matching of image feature points (e.g., corner points). To enhance the accuracy of image registration, ensure that each image contains an adequate number of such feature points. Avoid scenarios where images consist entirely of weak textures.

During acquisition, refrain from moving or rotating the camera too quickly. Ensure adjacent image frames have sufficient overlapping areas—ideally over 50%—as this facilitates better image registration.

PS: Low features in image specifically refers to areas in an image that lack distinct details (such as solid-color walls and smooth tabletops). These areas make it difficult to *extract* feature points, which will affect registration accuracy. Therefore, images with higher color richness are required—the more, the better. Avoid having an excessive number of images with solid colors or similar colors regions in the video.

2. Guidelines for Data Acquisition

2.1 S1 and P1 Acquisition notes

Figure 10. S1 and P1 camera structure (S1 and P1 only use front camera)

For the S1 camera, if it is tilted upward and the key objects for 3DGS modeling are at a lower position, the S1 front camera should face toward the lower area during data acquisition.

Figure 11. P1 Dual cameras capturing sample (Front and rear)

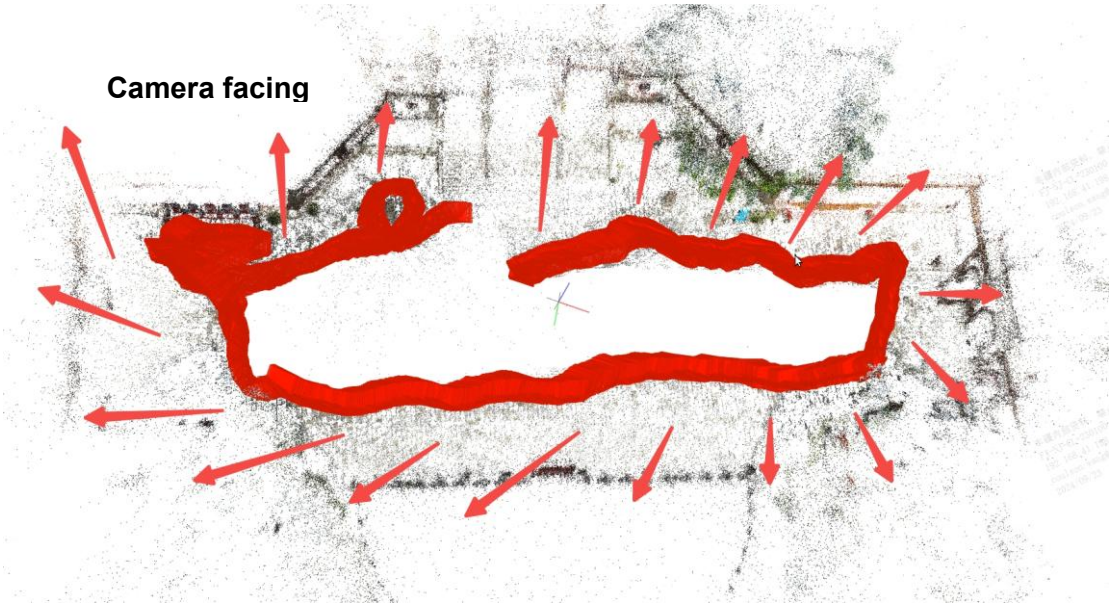


Figure 12. A negative sample of 3DGS collecting

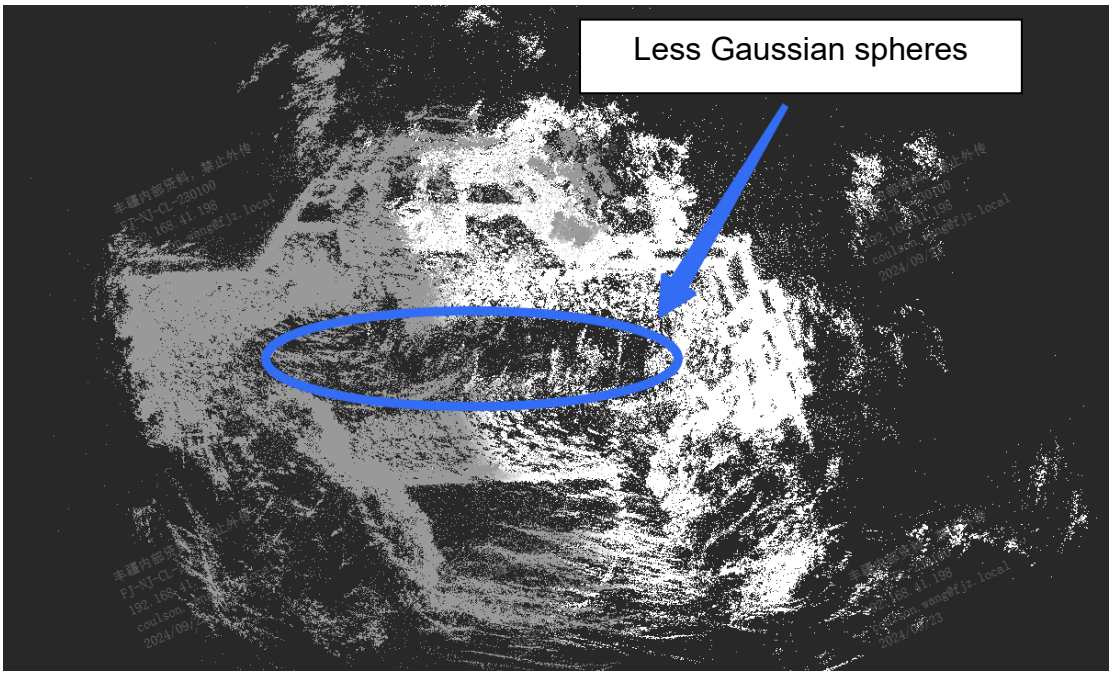


Figure 13. Display in the form of Gaussian sphere point cloud

The S1 and P1 scanners have dual cameras mounted on the front and rear. The camera on the side with the screen has human figures, and the removal of these figures cannot be guaranteed to be 100% accurate—residues from incomplete figure removal may affect the reconstruction results. Currently, the algorithm only uses the front camera on the side without the screen.

Therefore, it is necessary to ensure that front camera captures the reconstruction area sufficiently.

Figure 12 and 13 serve as a clear negative example: during acquisition, the scanner was moved around a square with the front-facing camera directed outward, resulting in minimal coverage of the square’s center. When reconstructing with 3DGS, very few Gaussian spheres were generated in the central area, leading to poor results.

2.2 S2 Acquisition notes

Figure 14. S2 camera structure (use dual cameras)

Figure 15. S2 dual cameras capturing diagrams

When collecting data with S2, hold the device directly in front of user. This way, the user will appear at the edge of the photo. Since 3DGS modeling uses the central region of the photo, the reconstruction result will be better.

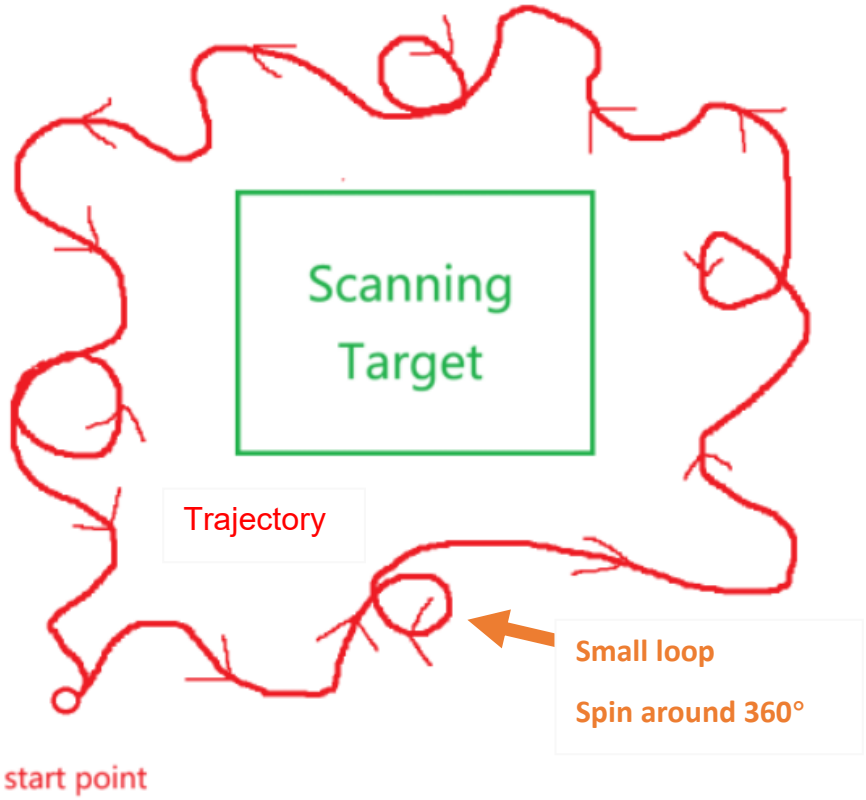


Figure 16. S2 acquisition advice

During the scanning process, user can add some small loops, which helps both cameras capture the same scene and avoids situations where only one side of the camera is used for modeling. (It’s like making the left eye see what the right eye sees, and the right eye see what the left eye sees, thereby forming an overlapping field of view.)

3. Hardware configurations

3DGS Recommended Configuration
Processor: Intel Ultra 7 265KF, AMD Ryzen 7 9700X or higher Memory: 64 GB DDR 5 Graphics Card: NVIDIA Geforce RTX 5070Ti 16 GB Hard Drive: 1 TB (SSD preferred)
3DGS Minimum Configuration
Processor: Intel i5-11500, AMD Ryzen 5 5600 Memory: 32 GB DDR 4 Graphics Card: NVIDIA Geforce RTX 3060 or higher (NVIDIA GPU only, with a minimum of 8 GB VRAM); AMD GPU Does NOT support Hard Drive: 512 GB (SSD preferred)

Chart 1 Configuration

Hardware	Model	Remarks
CPU	Intel i5-11500 or AMD Ryzen 5 5600 or higher	Impact of not meeting these requirements: Processing time will increase a little, but it won’t cause modeling failure.
GPU	NVIDIA RTX 3060 or higher (AMD NO)	Impact of not meeting these requirements: (1) Processing time will increase; (2) In large-scale scenarios, insufficient video memory may occur, leading to modeling failure.
RAM	32 GB or higher	Impact of not meeting these requirements: Insufficient memory may occur, leading to modeling failure or software crash. DDR 5 is recommended.
Disk	512 GB or higher SSD or HDD	It is recommended to use SSD to reduce file reading/writing time.