How to take pictures for Gaussian

1. Core principles for Gaussian splats

Across different guides and tools, the same 3 rules keep coming back:

1. **Consistency**
    - Fixed focal length.
    - Lock exposure, ISO and white balance.
    - Avoid auto focus hunting; ideally use manual focus once and keep it.
2. **Clarity**
    - No motion blur: use fast shutter (e.g. 1/250+ on handheld stills, higher for video).
    - Depth of field (f/5.6–f/11 on crop/FF, or "everything in focus" on phone).
    - No rolling-shutter wobble from whipping the camera around.
3. **Coverage & parallax**
    - Move the camera through space, don't just rotate in place.
    - Loads of overlapping views from different positions and heights.
    - Include some background/room context, not just the object.

2. Camera settings (DSLR / mirrorless / phone)

Based on Reflct's 3DGS capture tips, SmartDataScan's gsplat tutorial, and Volinga's field guide:

Mode

- Shoot stills if you want best quality (less motion blur, more control).
- Use video + frame extraction if you want speed or are walking a long street. Record at 60 fps if possible and later extract 1 sharp frame every ~0.5 s

Manual settings (ideal)

- **Focal length**: moderately wide (full-frame equiv. ~24–35 mm). Avoid extreme wide.

- **Aperture**: keep the scene sharp:
    - APS-C / FF: around f/5.6–f/11.
- **Shutter**: as fast as light allows:
    - Handheld stills: ≥1/250 s (slower only if you use a tripod).
    - Video: shutter ~2× frame rate (1/120 s for 60 fps) to avoid smear.
- **ISO**: pick a fixed value (ex: 100–800); NO auto ISO.
- **White balance**: lock WB (ex: daylight / cloudy / 4500 K), never auto.
- **Focus**:
    - Prefer manual focus: pre-focus on your subject and leave it.
    - If you must use AF, turn off continuous refocus and refocus only occasionally.

Phone-specific hacks

If using a smartphone:

- Turn off "night mode," HDR bursts or any fancy multi-frame modes if they cause ghosts.
- Lock exposure and WB if the camera app allows.
- Move very smooth and slow because phones add rolling-shutter wobble.

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3. How much overlap & how many images?

Different sources give slightly different numbers:

- SmartDataScan: 20–30% overlap minimum between adjacent shots.
- Reflct (for stills): recommends 70–80% overlap for robust parallax.

You can think of it like this:

- **Video**: you automatically get tons of overlap, so just move steadily.

- **Stills**: aim for something in the 50–80% overlap range; it's practically "small steps, lots of redundancy".

Typical image counts from real 3DGS capture guides:

- Small object: approx. 100–200 images.
- Small room: approx. 150–300 images, depending on clutter.
- Larger street corner / façade: often 150–400 images.
- More is not always better! Thousands of near-identical frames can hurt (overfitting, longer training). Reflct warns about >80% overlap and redundant views.

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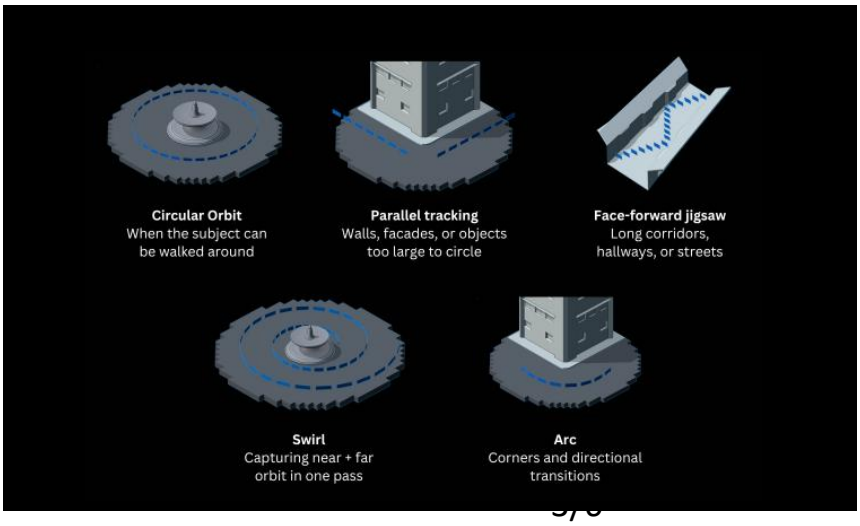
4. Movement patterns (this is where it differs from "single orbit" photogrammetry)

From Volinga and Reflct: you must translate, and you must create parallax.

- Don't stand in one spot and just pan.
- Move the camera through space:
    - Walk paths.
    - Change height.
    - Mix near and far distances.



Think in layers instead of a single orbit:

- One circle rotation closer, one mid, one further away.
- Some shots from above, some from lower angles.
- Some tangential/oblique views of edges and corners.

5. Concrete recipes for our use-cases

A. Street corner (about 100–300 images)

Use a walkthrough pattern rather than just circling one object.

1. **Plan the area**
    - Decide what must be perfect (ex: building facade) vs. just context.
    - Avoid rush hour / heavy pedestrian traffic, if possible, the scope is obtaining a static scene.
2. **Main pass:** building side A
    - Start 5–10 m away from the building, camera at eye-level.
    - Walk parallel to the facade, taking a shot every around 0.5–1 m (or record video).
    - Slightly angle the camera toward the building so it's always in frame.
3. **Second pass:** opposite side / diagonals
    - Cross the street (if safe) and repeat, so you have a second viewpoint band.
    - Add a third pass where you walk diagonally across the corner, to give strong parallax on the corner edges.
4. **Height variation**
    - Do another lap while holding the camera higher above your head, and one with the camera slightly lower (chest/stomach level).
    - Tilt up/down a bit to cover windows, roofline, and ground.
5. **Detail passes**
    - Move closer to important features (doorway, statue) and do a tight mini orbit around them while keeping some background visible for COLMAP.

IMPORTANT

- Avoid cars/people moving through the frame; if someone walks through, just skip that frame when you build your dataset.
    - Try not to have big glass surfaces dominating every frame

B. Small room (about 160+ images)

Combining a three-row eye-level strategy with Reflct's room recipe:

1. **Perimeter passes**
    - **2–3 loops around the room** close to the walls:
        - Loop 1: camera at chest height, lens facing the wall, distance something around 1–2 m.
        - Loop 2: camera higher (eye / above head), angled slightly down.
        - Optional Loop 3: camera lower, angled slightly up.
    - Take a shot every 0.5–1 m along the wall.
2. **Center passes**
    - Stand near the middle, then walk small arcs while looking toward each wall.
    - Mix distances: some shots closer to furniture, some more centered.
    - This gives cross-room parallax, not just "wall-hugging" shots.
3. **Floor and ceiling**
    - For floor: hold the camera high, point it down 30–60°, and walk a grid.
    - For ceiling: hold it lower, point up, and repeat a grid-like walk.
    - There is no need for crazy density, but there must be enough shots, so the model sees from above/below, not only horizontally.
4. **Deal with white / plain walls**
    - Textureless walls are hard for COLMAP and Gaussian splats (they mention this explicitly).
    - Add subtle texture: posters, painter's tape markers, or let some furniture overlap into the wall shots.

160 images are totally reasonable for a modest room with this pattern.

6. Lighting:

All the serious guides say the same thing: even, soft and boring light is the best.

- Cloudy daylight, shade, or diffused artificial light.
- Avoid:
    - Strong directional sunlight.
    - Moving shadows (people, trees, traffic).
    - Flickering neon / LED patterns.
- Indoors: Avoid tiny bright windows + dark corners (huge dynamic range). Either add fill light or choose a time of day with more balanced light.

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7. Differences vs the classic photogrammetry "orbit"

1. **Don't stop at one orbit**
    - Do multiple rings at different heights and distances instead of one perfect circle.
2. **Think "environment," not just "object"**
    - 3DGS shines when you include surroundings: floors, ceilings, background buildings, etc.
3. **Be stricter with consistency**
    - For Gaussian splats, inconsistency with auto exposure/WB often shows up as weird color/noise artifacts in the final scene.

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8. References

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