



REALITYCAPTURE
EXPERTS

RCE Matterport Support: Alignment

What is alignment?

Every Matterport Space is a set of scans. Each scan is a set of 2D and 3D data from one physical position. 3D data from all the scans are combined to create a complete 3D Space.

The first scan is a single point in space. Every scan after that is aligned to a previous scan. A properly aligned scan means it is in the same position in software as in real life.

Generally, the Matterport Capture app aligns by overlapping the 2D and 3D data and searching for areas of high similarity. No GPS data is used for alignment.

Issues

If the scan reports aligned, but did so incorrectly, this is a misalignment. The most common reasons for a misalignment are:

- Mirrors not being marked. The camera doesn't "see" it as a wall, but instead another room.
- Repetitive geometry such as a long hallway or empty warehouse.
- Starting a new floor in Capture far away from the last scan made on the previous floor

If there is no overlapping 3D data, this is an alignment error. The most common reasons for no alignment are:

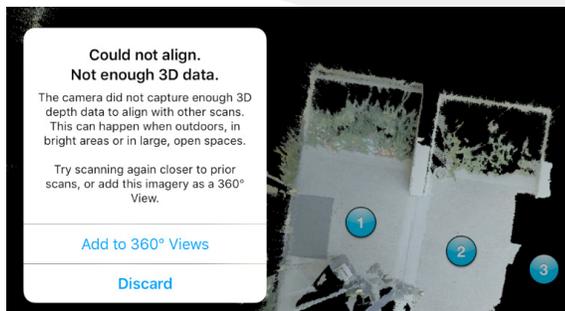
- Scan distance too far apart
- No line of sight to a previous scan
- Doors opened in one scan, but closed in another

To avoid both problems the general advice is to:

- Mark windows and mirrors as soon as you scan them.
- Leave doors either opened or closed. Reduce the distance between scans.
- Avoid direct sunlight and scanning outdoors.
- Keep line of sight from a previous scan.
- Start your new floor right next to where you left off on the previous floor.

Alignment Errors

An alignment error is when the Matterport Capture app cannot align the current scan to your previous scans. In this case, Matterport Capture will immediately tell you something is wrong.



To recover from an alignment error, reduce the distance from a previously completed scan by half and try again. If this doesn't work, delete the previously completed scan and scan over that spot again. Repeat this process of deleting and rescanning until you have recovered alignment.

Misalignment

A misalignment is when the Matterport Capture app thinks it aligned the scan, but it actually placed the scan in the wrong spot. For this reason, there is unfortunately no error message available.

For example, scan 7 was placed between scan 5 and scan 6 in the app. However, in real life scan 7 was where the orange circle is. Scan 7 was a misalignment.



Misalignments can cause navigation problems after the model is processed. Misalignments can also stack on each other. Too many misalignments can make the model unusable.

Check the iPad after every scan to make sure the scan is in the correct place (location on iPad matches location in real life). You may have to zoom in to find the most recent scan. Misalignments can be easy to miss if you have been scanning for several hours.

To recover from a misalignment, first, delete the misaligned scan. Then half the distance to the previous scan and try again. If this was successful, continue at the normal distance.



If this doesn't work, delete the two previous scans and scan again over the last scan position. So if scan 10 results in a misalignment, then delete scans 10 and 9 and scan again over scan position 8.

Continue at a slower pace (half the normal distance) or lower the tripod until you regain alignment. Remember to hide extra scans in Workshop later.



Misalignment tutorial

WHAT IS ASSISTED ALIGNMENT?

Assisted Alignment is a feature that makes it easier for you to scan places with **empty or repetitive architecture**.

Examples of such places include:

1. Large, open areas

- Empty factories, empty storerooms, empty convention centers and ballrooms.

2. Long uniform hallways

- In schools, hotels, and rental storage units.

3. Areas with uniform, repeating architecture

- Like an environment with evenly spaced columns (see the image below)

4. Architecture, engineering and, construction models

5. Commercial Real Estate Spaces

- Especially properties that are empty for the most part (i.e. don't have any furniture).

WHAT ASSISTED ALIGNMENT DOES

While you are scanning, the Matterport Capture app looks at your 2D panorama images and recognizes these markers. The Capture app then uses visual information such as the size and location of the marker to help place the scan in roughly the correct location and then uses depth information to fine-tune the alignment.

Markers **will appear** in the final Matterport Space and will not be edited out. If you are capturing mainly for 3D data such as the point cloud, then this is not an issue. If you care strongly about the **visual quality of the Space**, we suggest you continue to use *appropriate 3D objects such as plants, chairs, and boxes* to blend into the Space, while simultaneously giving the Capture app something to latch onto when aligning with previously scanned positions. You can also create your own branded markers.

Assisted Alignment with Matterport is based on April Tags from the [APRIL Lab at the University of Michigan](#). Special thanks to Professor Olson and his team.

HOW TO USE ASSISTED ALIGNMENT

To use Assisted Alignment, you'll need to print out markers like the one pictured below, then tape them to key locations on-site. Before scanning, confirm the Assisted Alignment toggle is turned on in the Capture app.



I. DOWNLOAD AND USE MARKER SETS

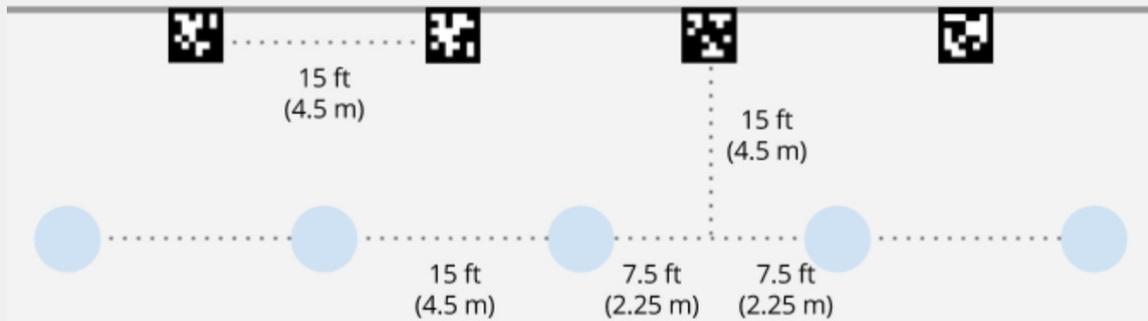
1. Download the set of markers based on your paper size
2. Print the markers at 100% scale
 - Do not expand the markers to poster-size, or to fit the page.
 - Make sure to take the markers with you when you visit the site.
3. Decide which tags to use
 - Though we've included a set of 100 tags, you will not need to use all 100. The exact amount to use is your decision, and should be carefully made by looking at the size of the Space you're scanning, and its unique characteristics.
4. Take more markers than you think are necessary
 - Remember, **you cannot reuse markers within a single Matterport model** - bring extra!

SWITCH ON ASSISTED ALIGNMENT IN MATTERPORT CAPTURE

1. Open the Matterport Capture app on your mobile device.
2. Hit the "More" button at the top-left of the screen.
3. In the window that appears, tap "Settings & Privacy".
4. Under "Assisted Alignment", toggle the switch to "On".

II. PLACE YOUR MARKERS

1. Upon arriving on-site, place the markers to prepare your scan.



- Markers should be placed at eye-level, and should be spaced about 15 feet (or 4.5 meters) apart - this distance is not a requirement, but a general guide.
- For reference, 15 feet is about the length of a typical four-door passenger sedan.

2. Choose the order of your marker placement

- Markers can be placed and scanned at any order on the job site - that being said, it's important to note that you cannot reuse or move markers once they are placed.
 - ▶ **Example:** You've printed out ten markers, and scanned all ten. After scanning you pick up marker #1 and move it to a new spot - **this will confuse the Capture app and potentially ruin your scan.** Instead, print out new markers (say, #11 - #50), and place them in the additional scan points.

3. Physically place your markers

- Apply markers to flat surfaces like walls, columns, and floors.

4. Tape all four corners of your marker

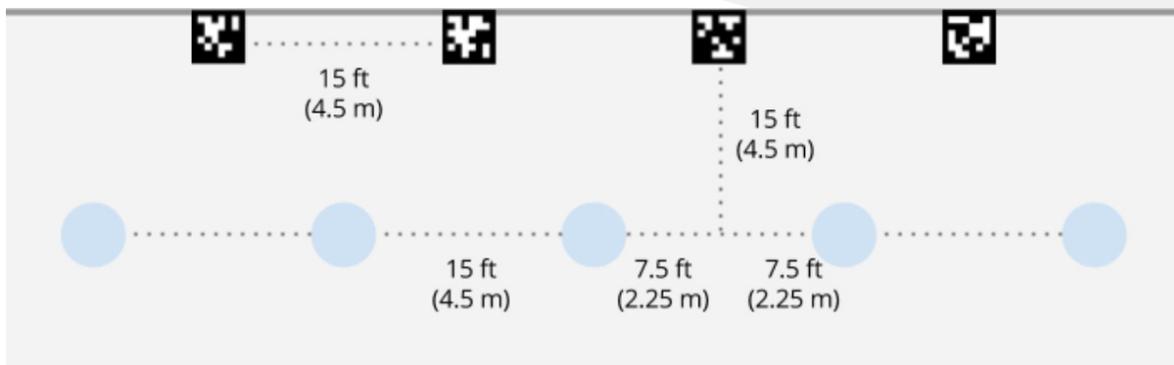
- This will ensure the markers are entirely flush with the surface they're on - if they're not (and curling or flapping occurs), the markers will not be recognized as 3D data. This will interfere with the point cloud or 3D mesh you'll want to export later in the process.

5. Try to maintain “head-on” angles

- The best places for markers are walls, as they will appear to be a symmetrical shape. As mentioned above, you can place markers on the floor or ceiling as well, but these may be harder for the camera to recognize (because they may appear at an oblique angle).

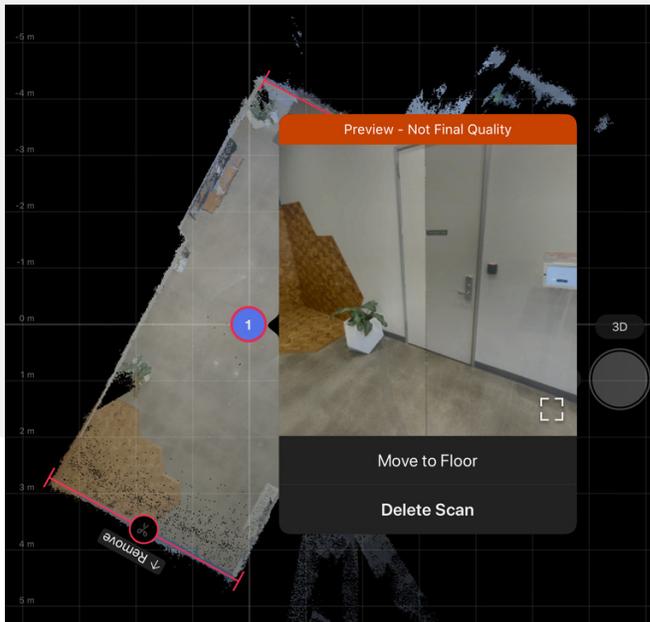
III. SCAN YOUR MARKERS

1. Open the Matterport Capture app on your mobile device.
2. Hit the “More” button at the top-left of the screen.
3. In the window that appears, tap “Settings & Privacy”.
4. Under “Assisted Alignment”, toggle the switch to “On”.
 - Assisted Alignment will add two to three seconds to your scan times - keep this in mind for future models, as turning it off will allow you to scan a bit faster.
5. Connect to the camera and take your scan.



- The scanning process is no different usual - Assisted Alignment works with all Matterport Pro series cameras, so the same rules apply:
 - ▶ Each scan position should be about **15 feet (or 4.5 meters) apart, and have a direct line-of-sight to the previous scan and marker.**

6. Find your markers in Capture.



- Markers will not appear explicitly in the minimap, however you can tap on scan number and tap "Preview Scan" to visually identify each of your mark

7. Upload your model for processing.