

Faking Mixed Reality

Building Reality Simulators



Who am I



A STRANGER GRAVITY



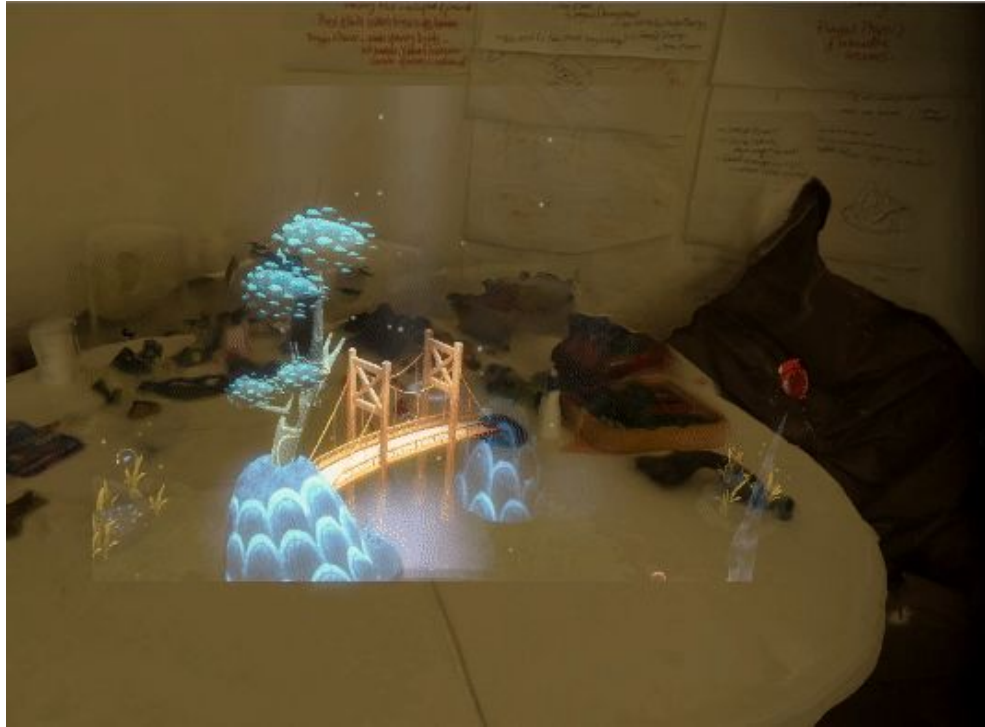


Iteration Time on Experimental Platforms

Very slow.



Solution: Simulate the Magic Leap



What makes a good simulator?

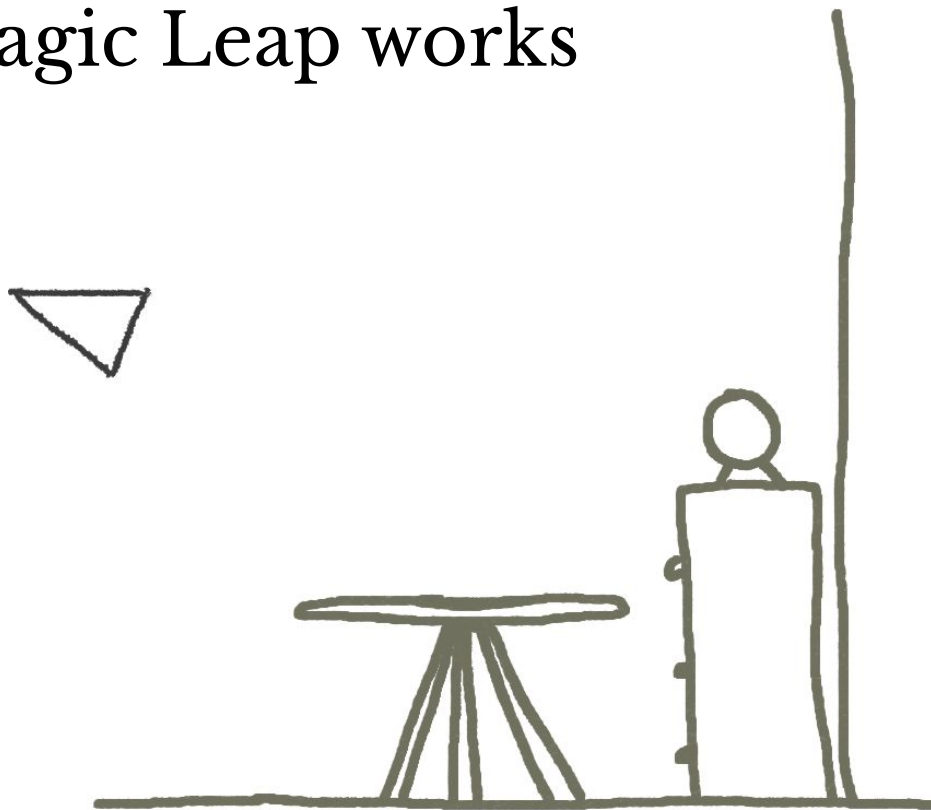
Gives you confidence that the game behaves as you expect on the target device.

The simulator should match:

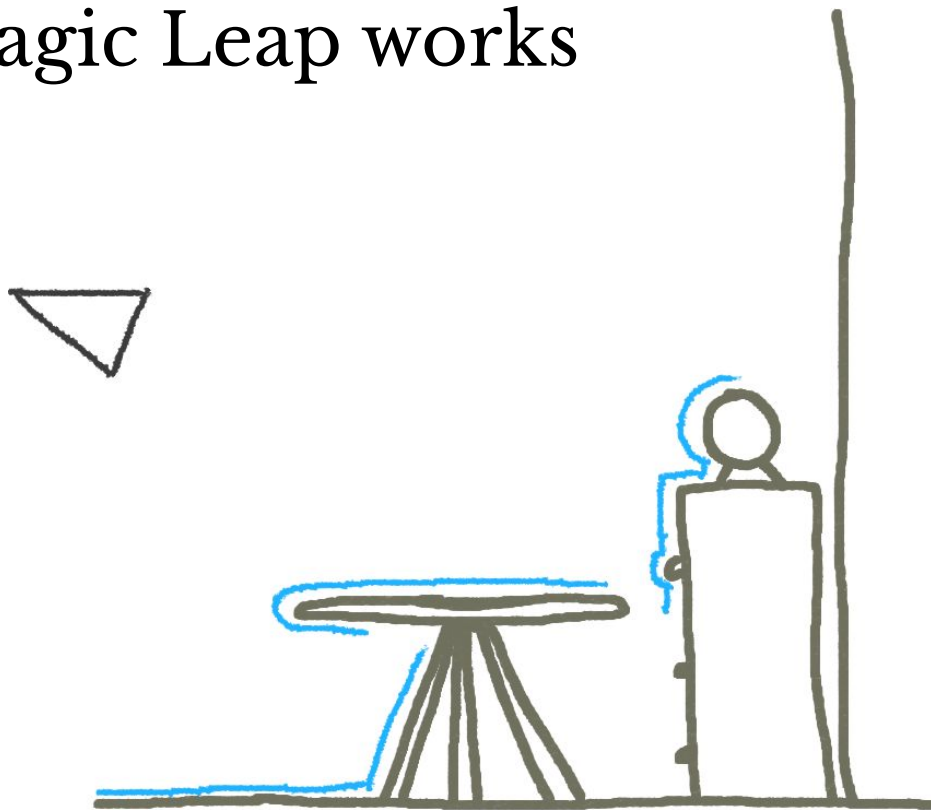
- I. Visuals
- II. Input and affordances
- III. Bugs!



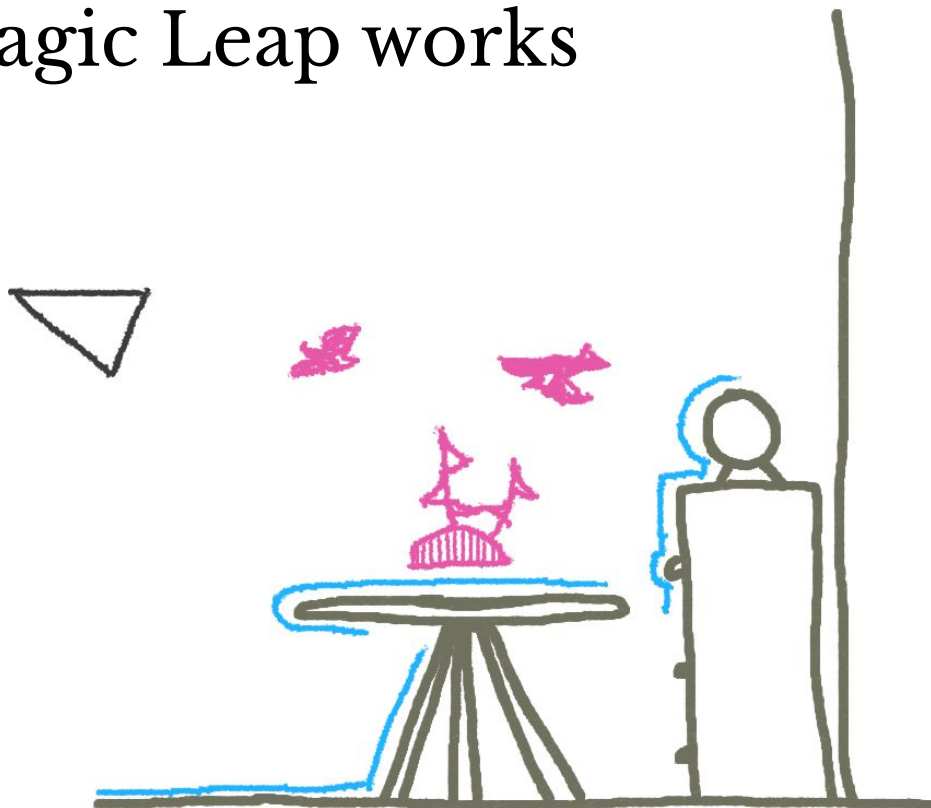
How the Magic Leap works



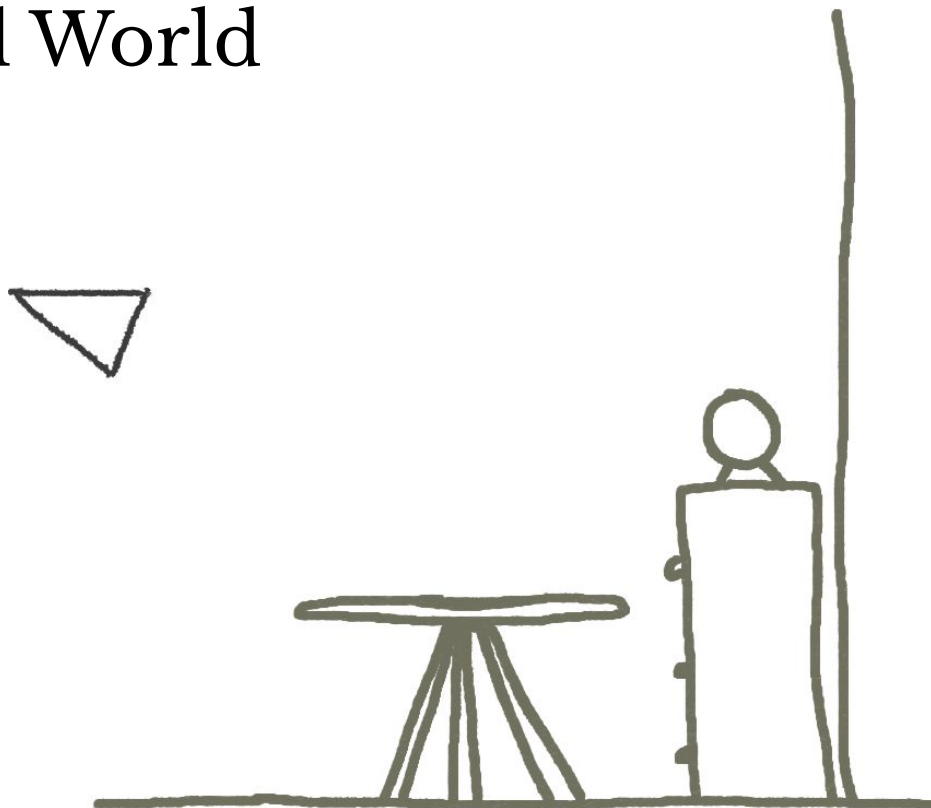
How the Magic Leap works



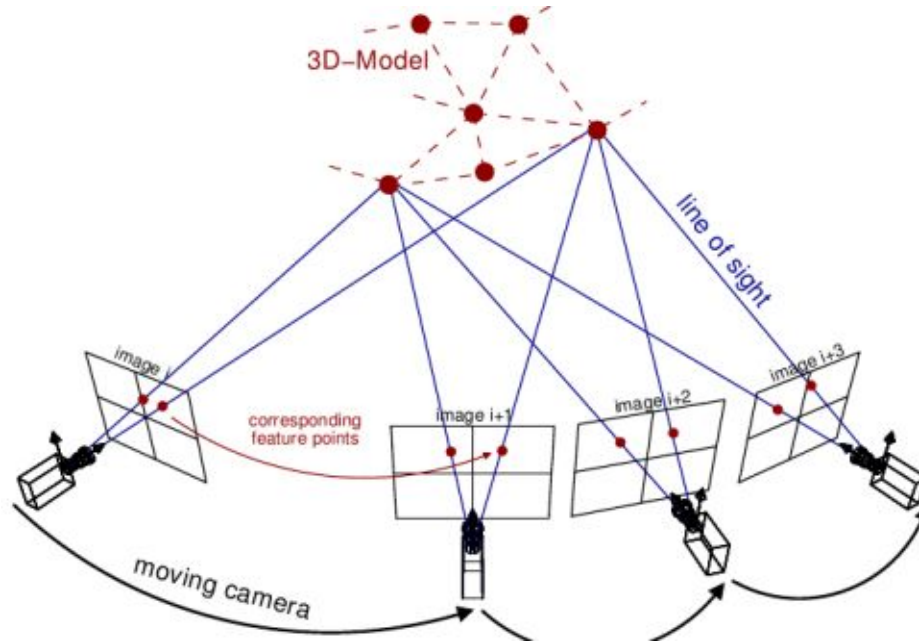
How the Magic Leap works



1. The Real World



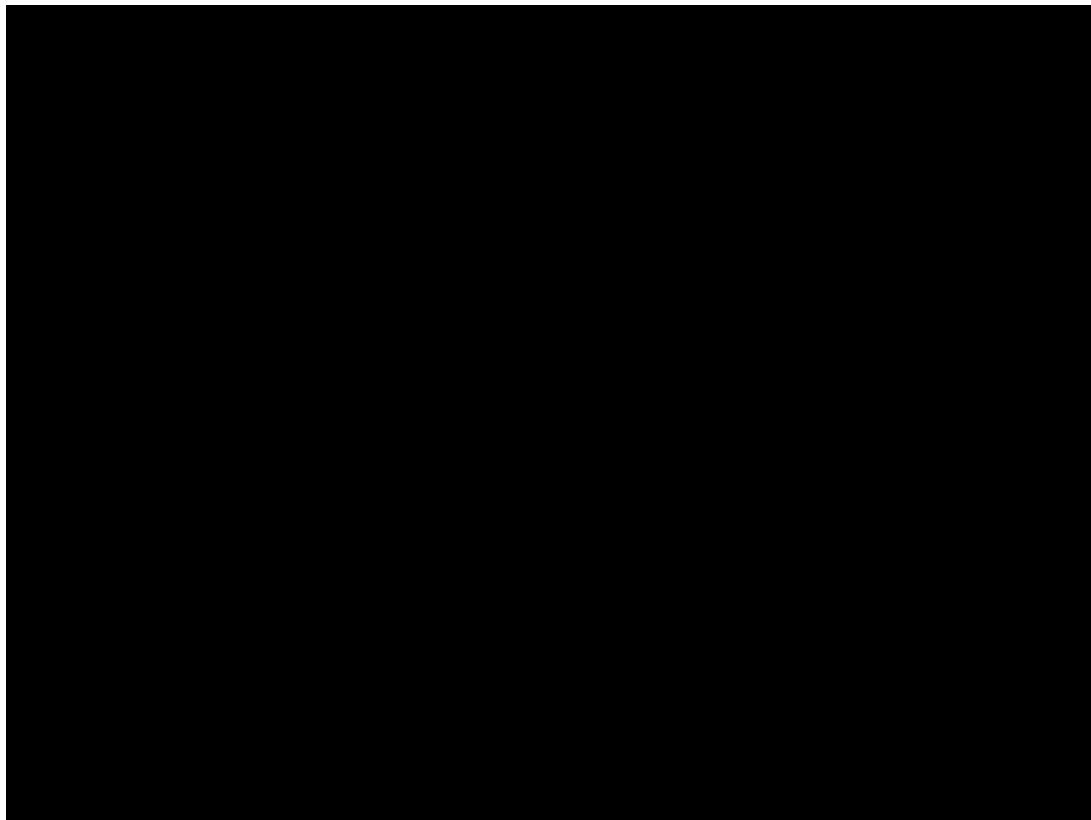
Budget Photogrammetry



<https://www.wur.nl/en/article/MSc-thesis-subject-Importance-of-camera-calibration-for-UAV-based-photogrammetry.htm>

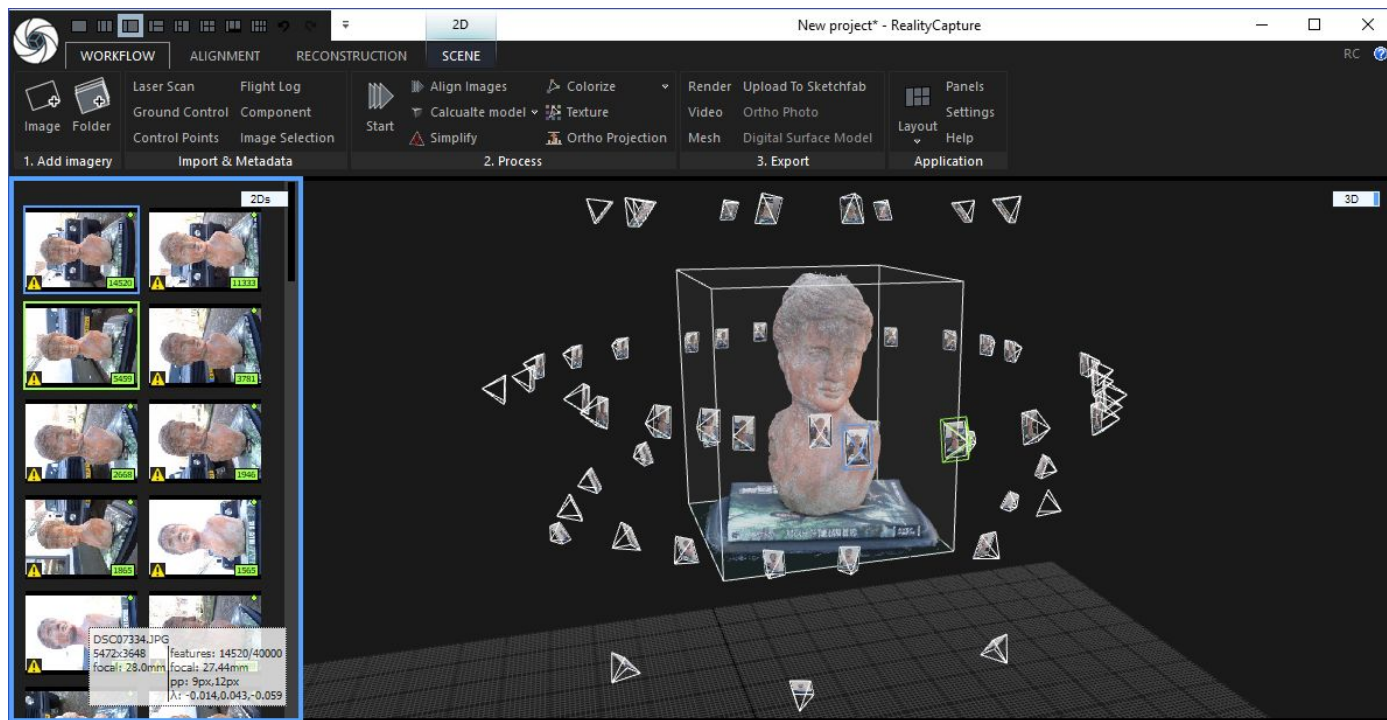
Phone Capture

Camera FV-5
24 FPS





Reality Capture



First Draft



Patching It Up

Manually reconstruct and sculpt the mesh with Oculus Medium.

Thanks to Az Balabanian!
[@Azadux](#)



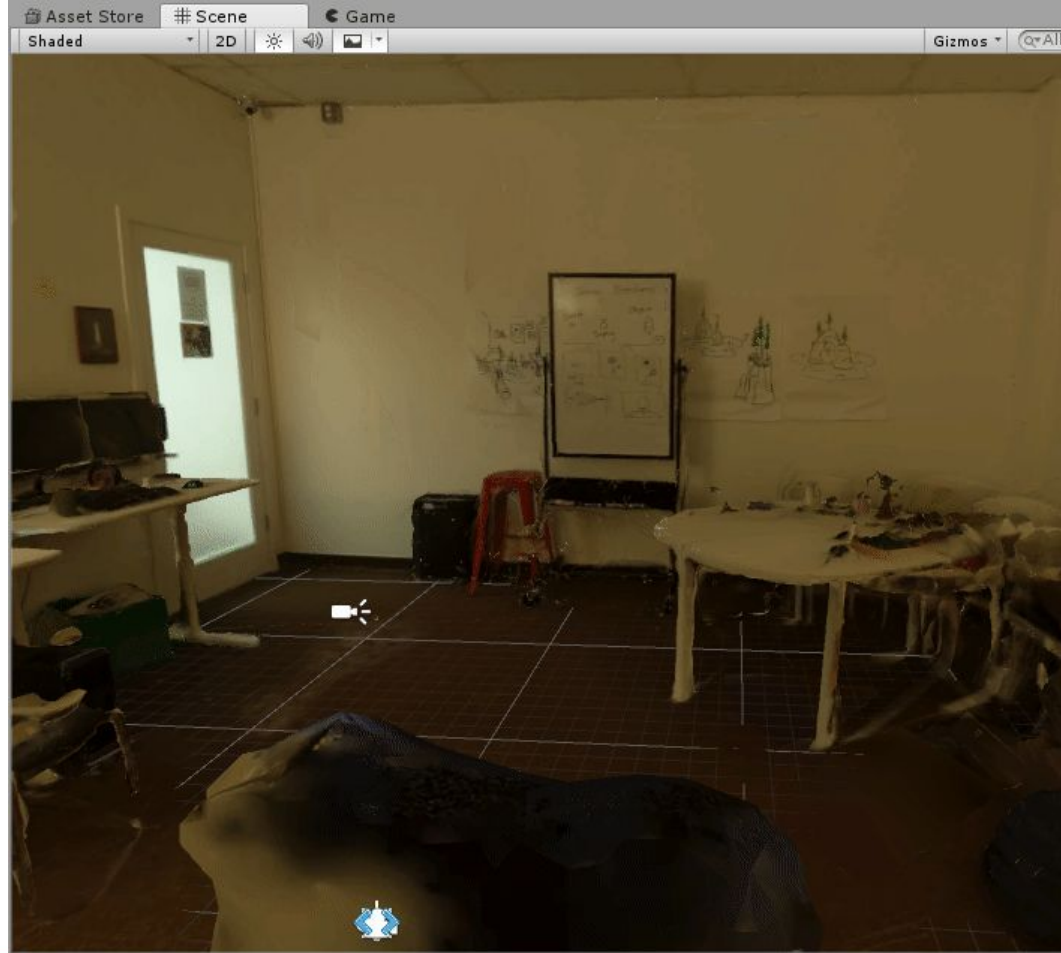


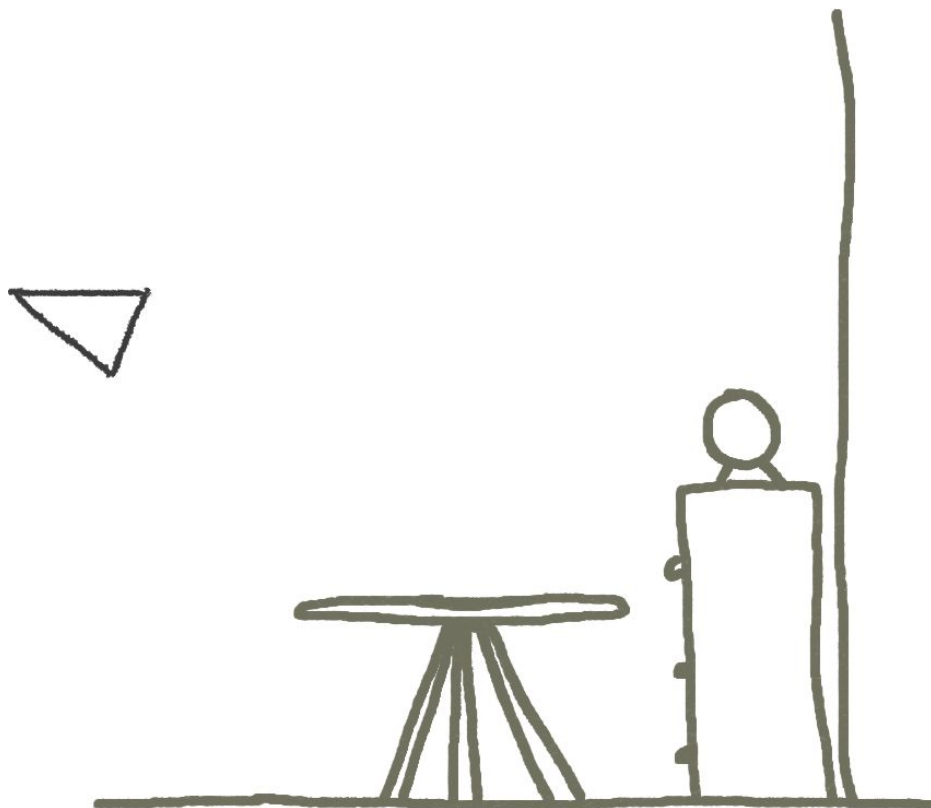
Final

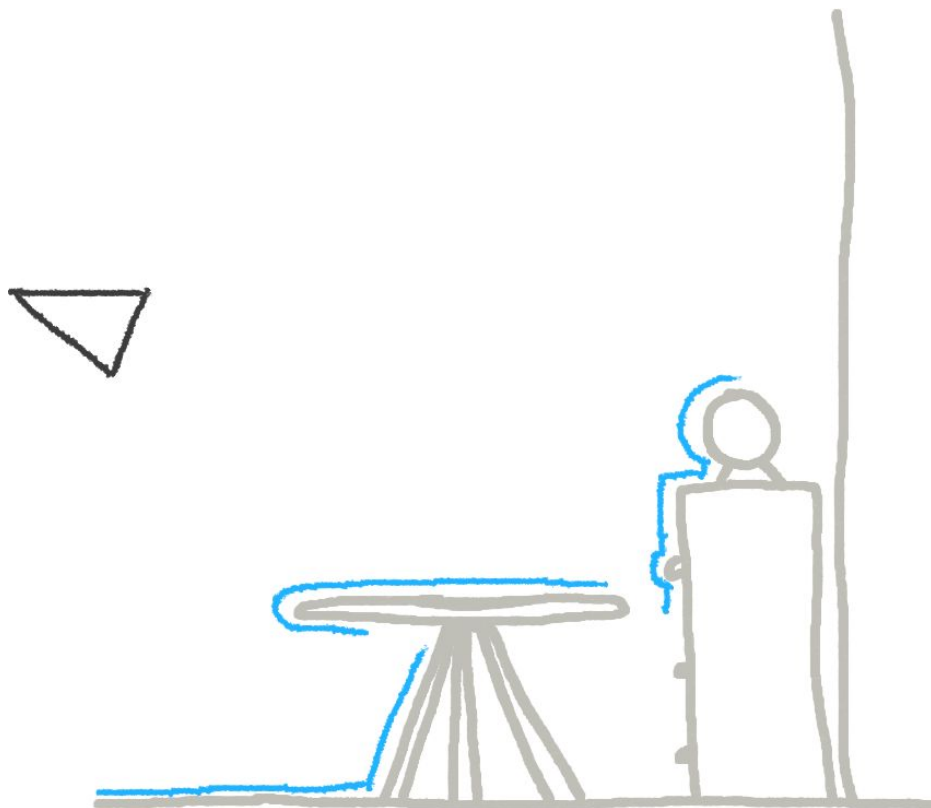
300k tris

8k textures









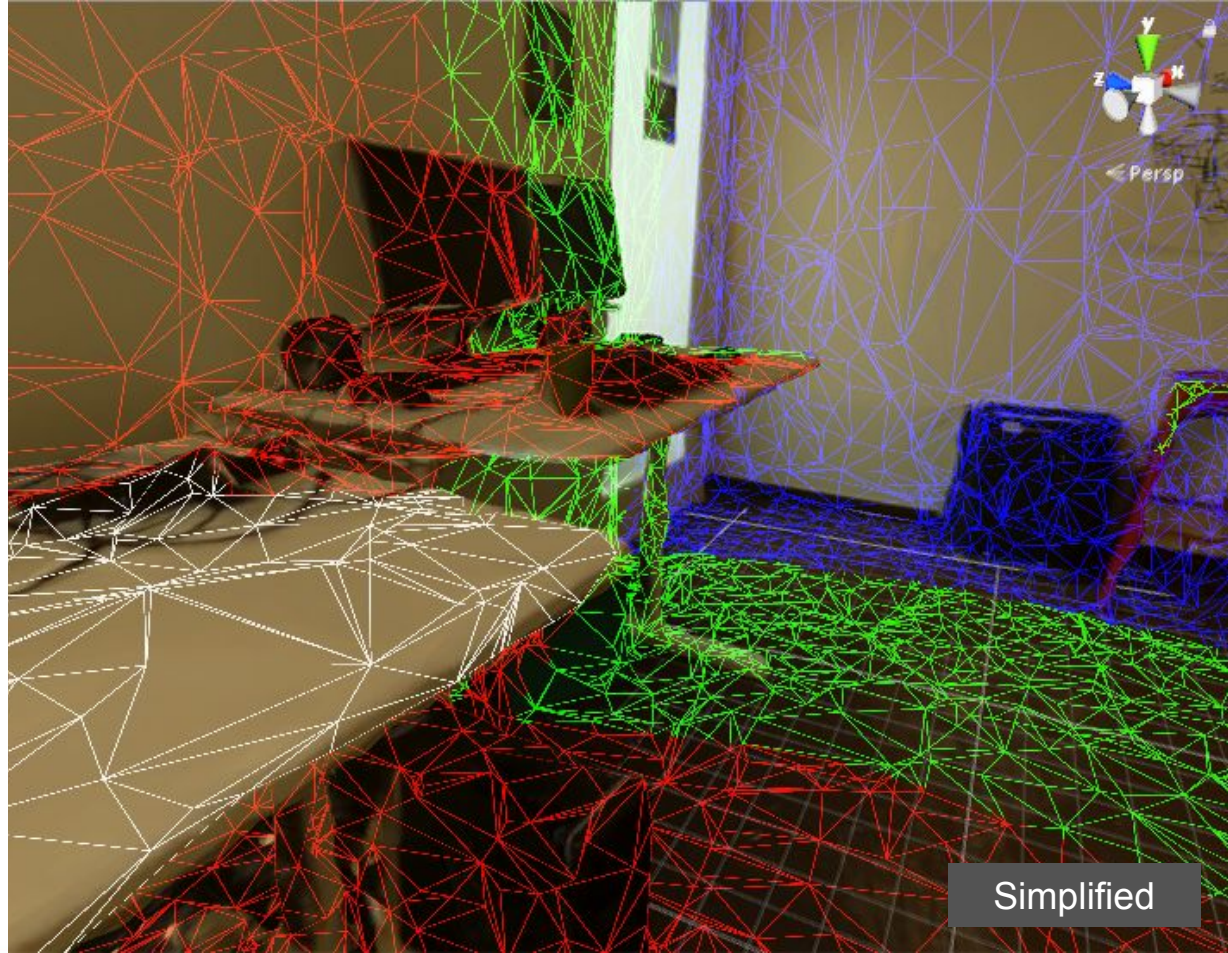
Scanned Mesh

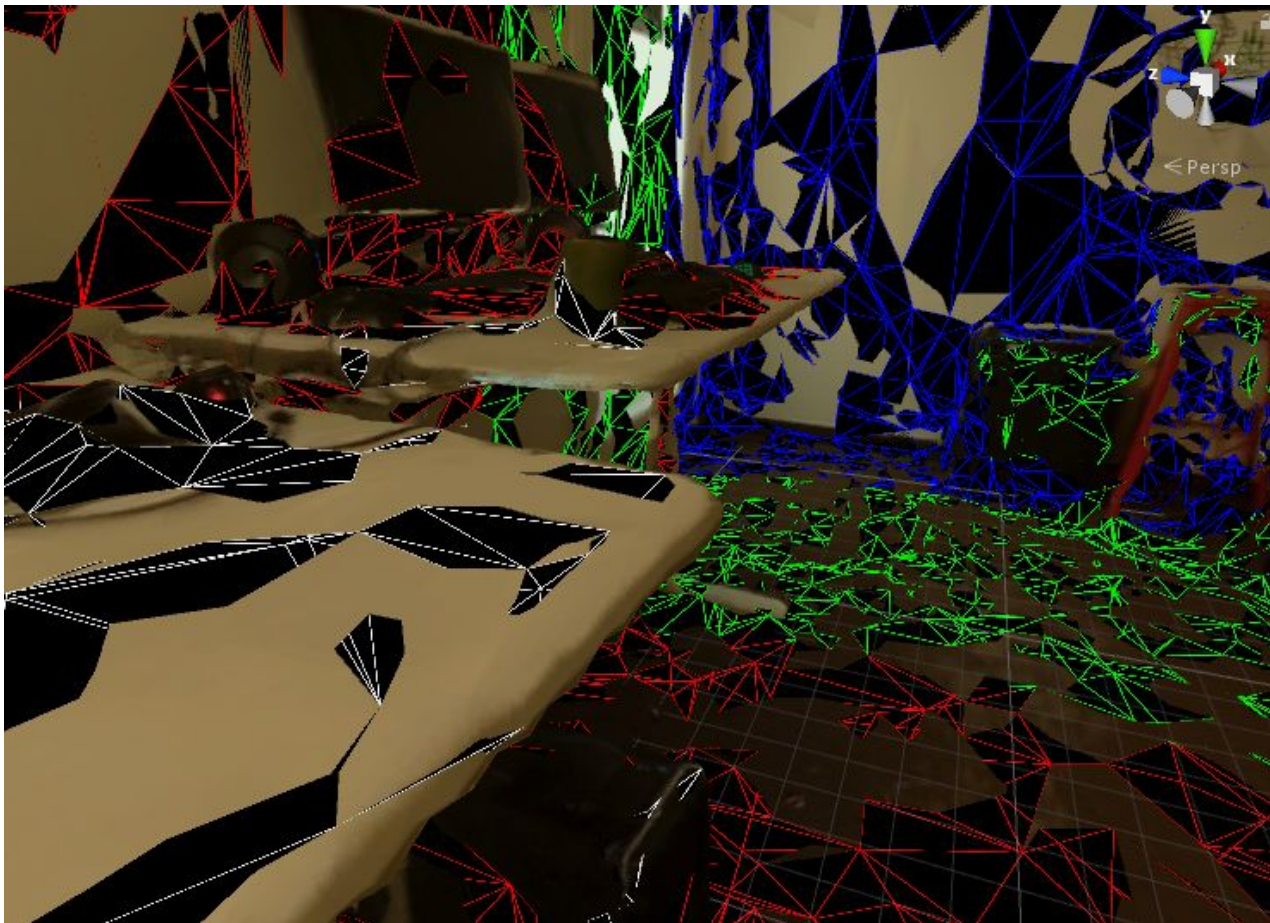
Poly-reduction + noise

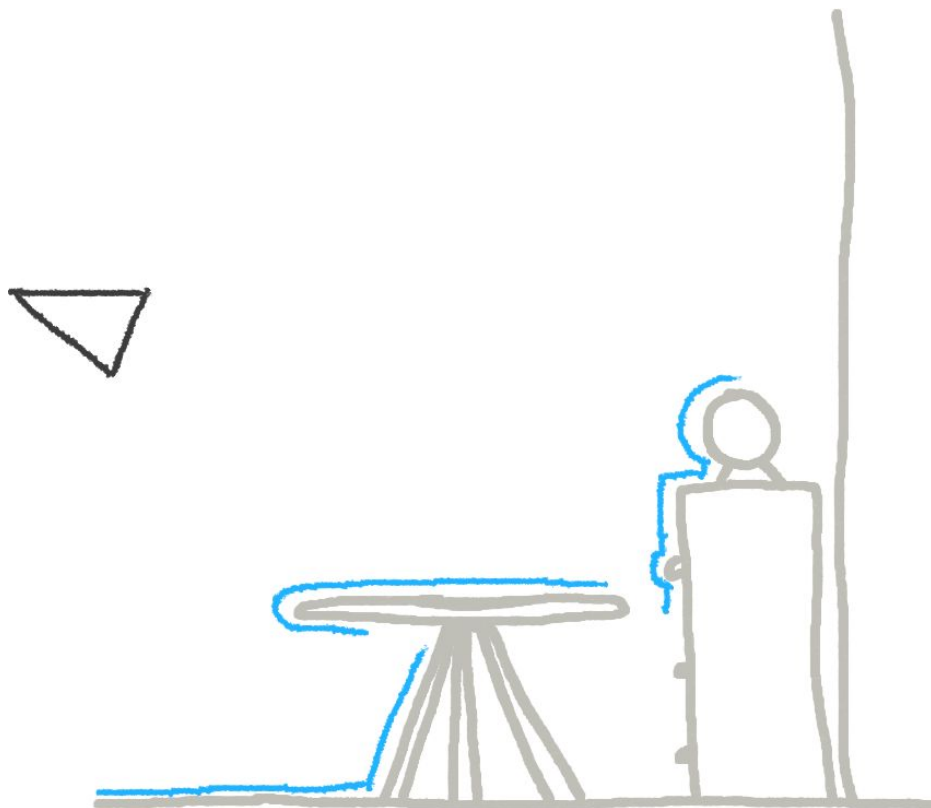


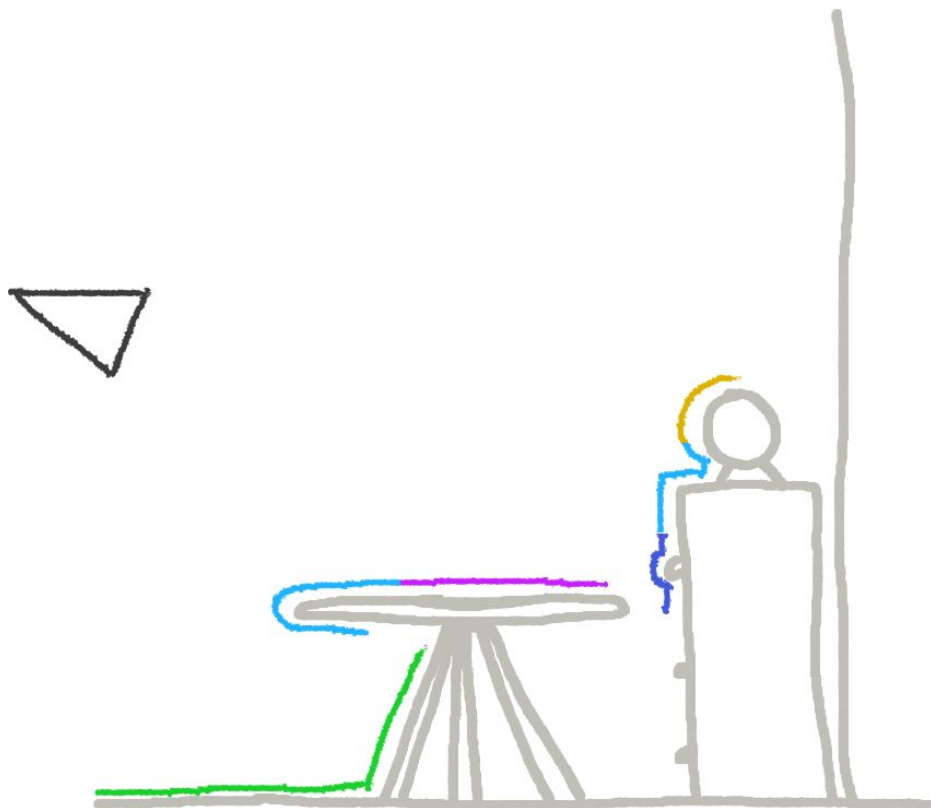
Scanned Mesh

Poly-reduction + noise



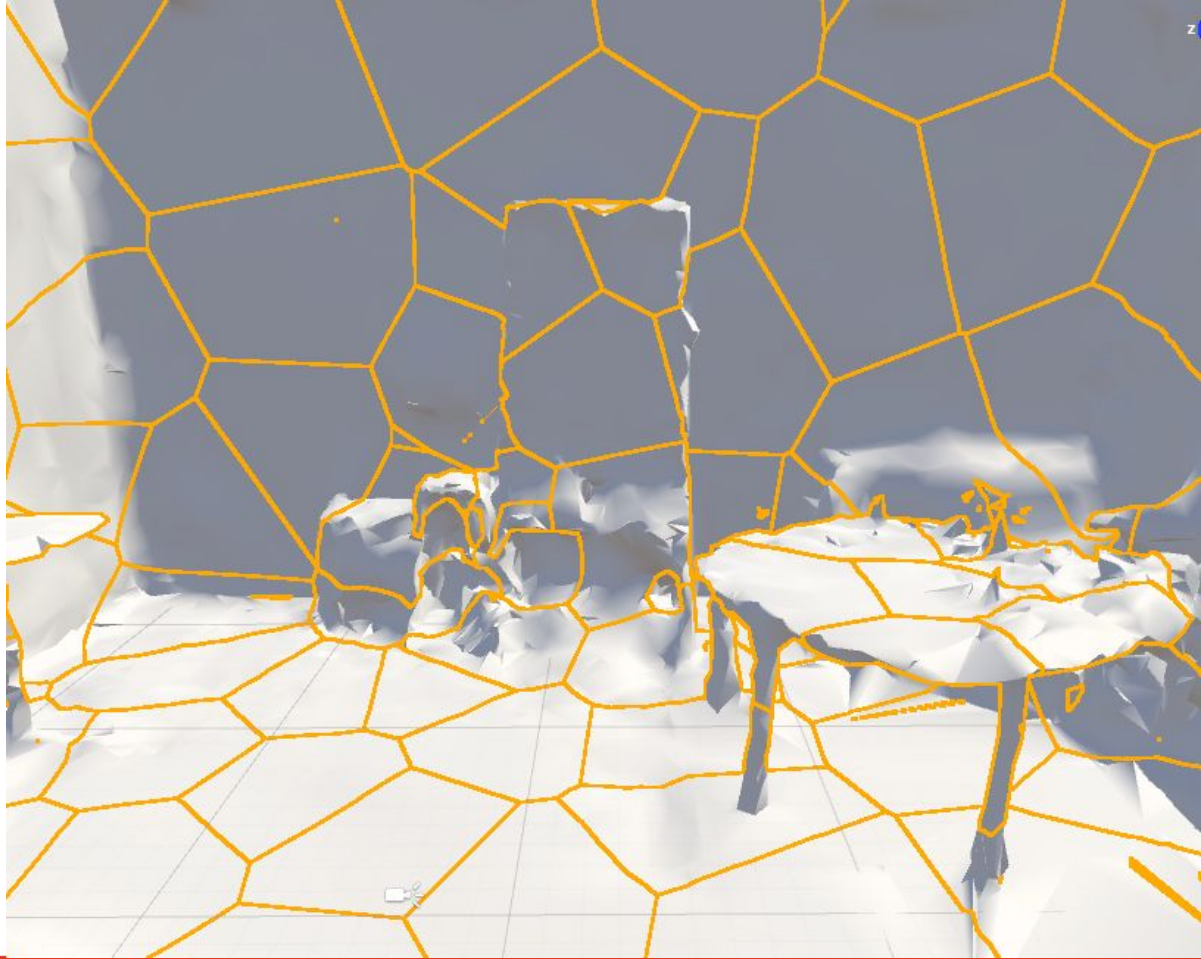






Scanned Mesh

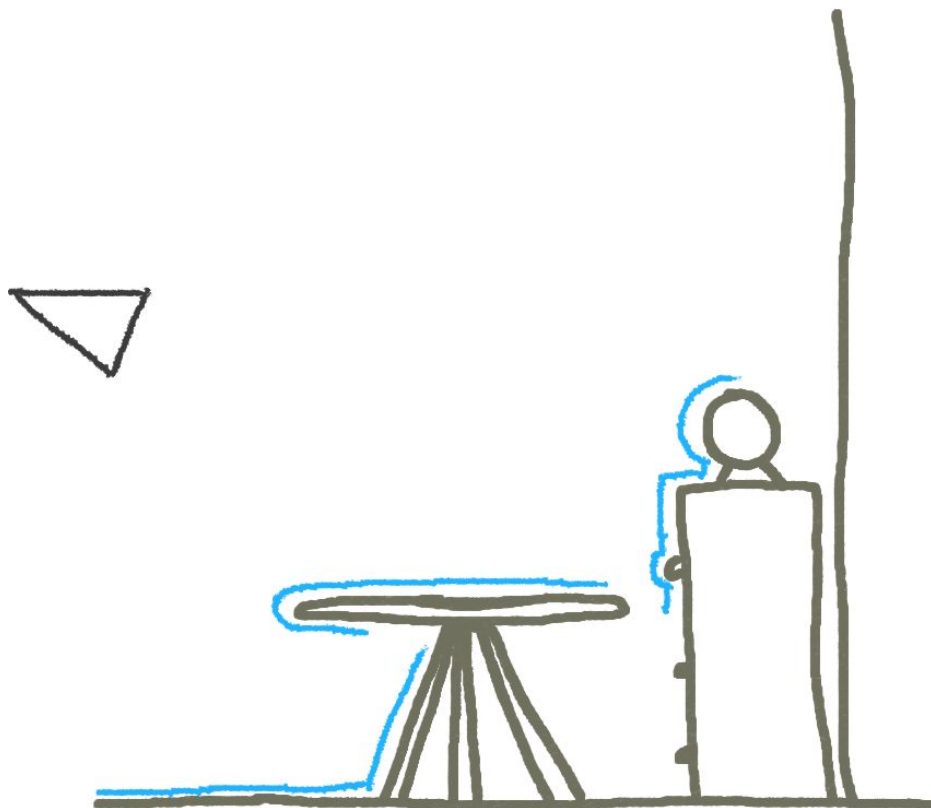
Voronoi fracturing to simulate chunking.

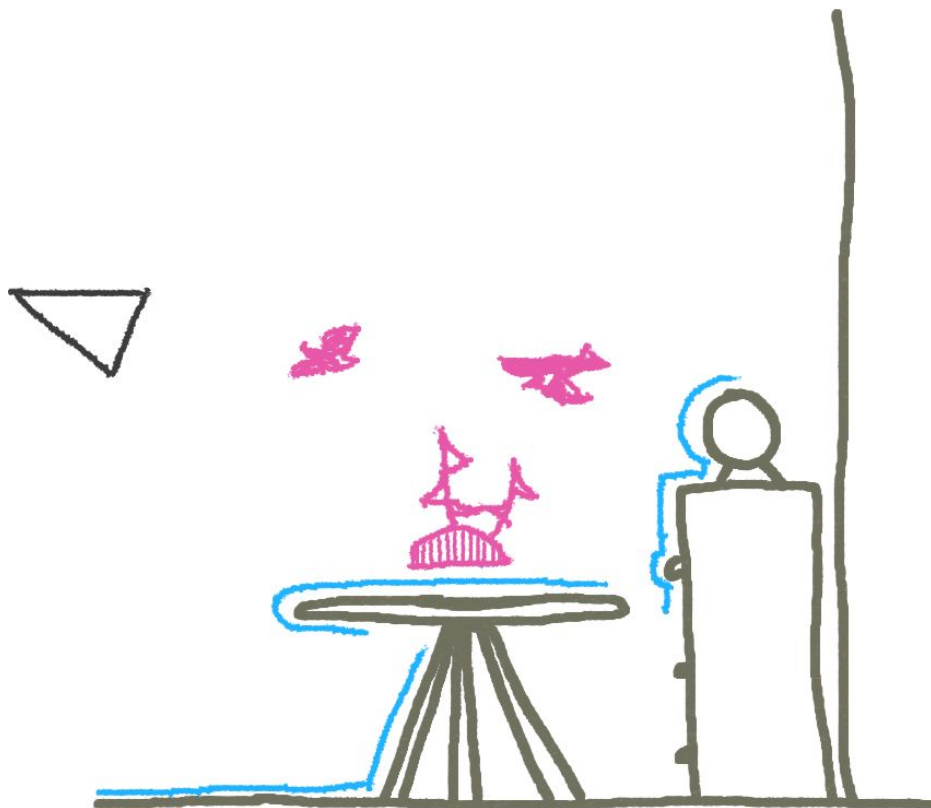


Scanned Mesh

Voronoi fracturing to simulate chunking.

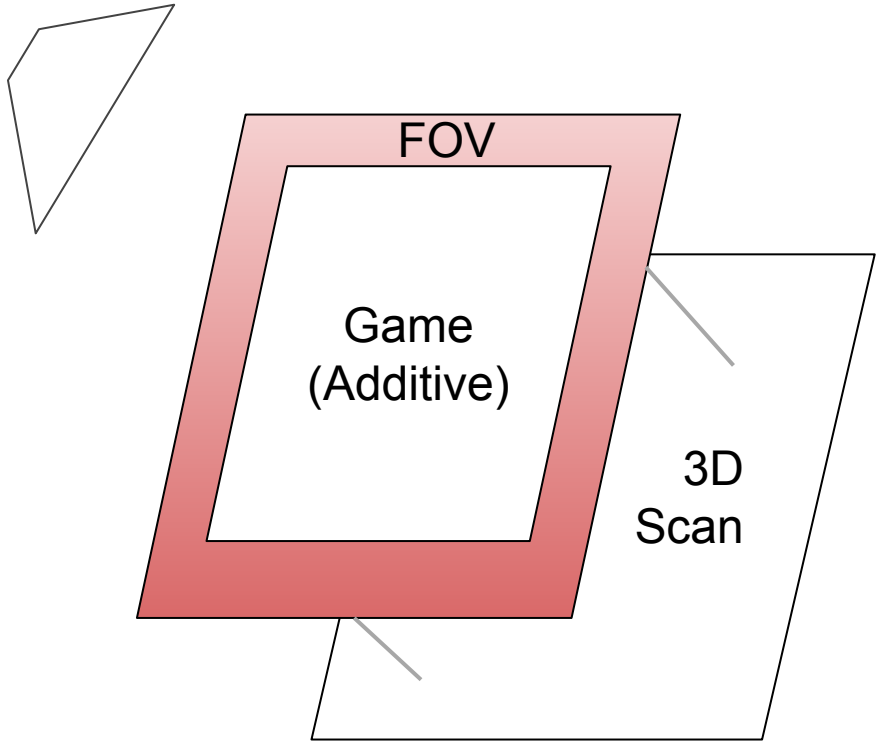






Compositing

- i. The Magic Leap is additive!
- ii. Limited Field of View
- iii. Real World should not interact with the Virtual World.





Simulating Input

The affordances of the simulator should be as close as possible to the target device.

- i. Add noise to simulate tracking loss / jitter.
- ii. Simulate 3DOF



Simulators: Software + APIs

- I. One-to-one abstraction on top of the Magic Leap API.
- II. Implement bugs and quirks!

The goal is to match the target platform, not make a perfect one!



Results

- I. Allowed us to ship Luna: Moondust Garden in 8 months!
- II. Insulated us from fast-moving platform changes.
- III. Allowed us to **work from home**, without the hardware!

Experimental hardware can be stressful — a good simulator can make a huge difference in team quality of life.



Design Thoughts

Don't design to the simulator.

- i. Scale can be difficult to guess in VR.
- ii. Input can easily be **too** good.

A simulator is most useful later on as the project goes through less design iteration.



Thanks! Questions?

@kleptine

John Austin



Other Simulators

Magic Leap offers a couple of other simulators and although they speed up development, the iteration time is still slow.

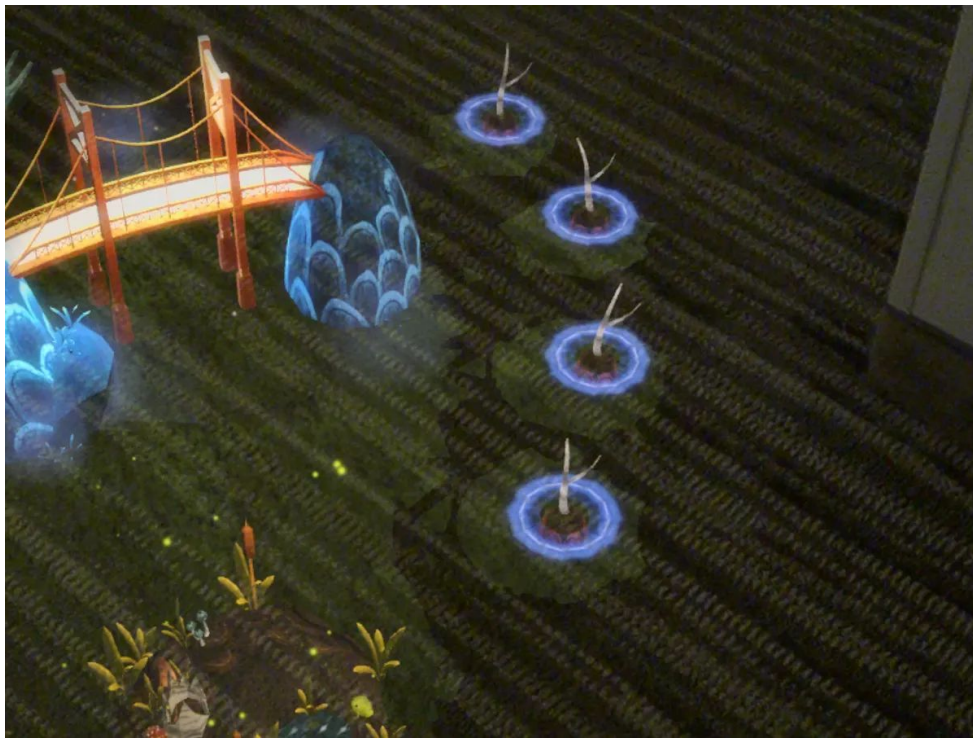
- I. Magic Leap Simple Simulator
- II. Magic Leap Zero Iteration Mode



Benefits!

- I. 2 minutes -> 2 seconds iteration time.
- II. Gameplay debugging with standard tools.
- III. Insulated us from fast-moving platform changes.





What makes a good simulator - Visuals

- I. Budget Photogrammetry
- II. Depth Simulation
- III. Compositing
 - i. Limited FOV
 - ii. 2 layers + additive blending

