# PARIS CATACOMBS SCAN

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## MANUAL 3D DATA COLLECTION

Using the LiDAR sensor and cameras from an iPhone and the Polycam app.

## PROCESSING AND FUSION OF 3D SCANS

Assembly of scans on CloudCompare, cleaning on MeshLab, rendering and compression on Blender.

## CREATION OF A VISUALIZATION WEBAPP

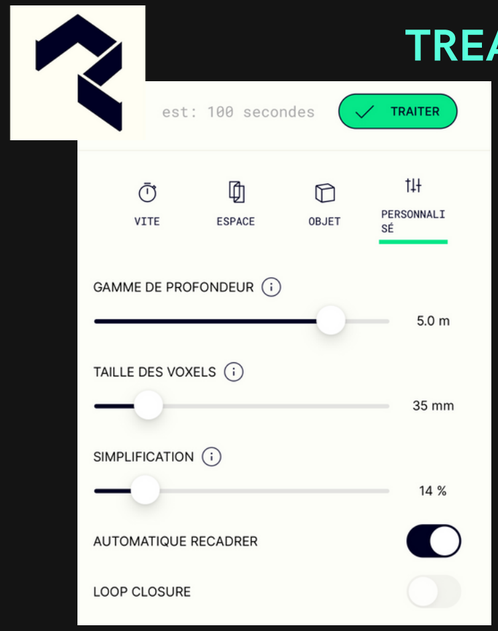
Coded in Three.js to explore and analyze the network of catacombs and surrounding places.

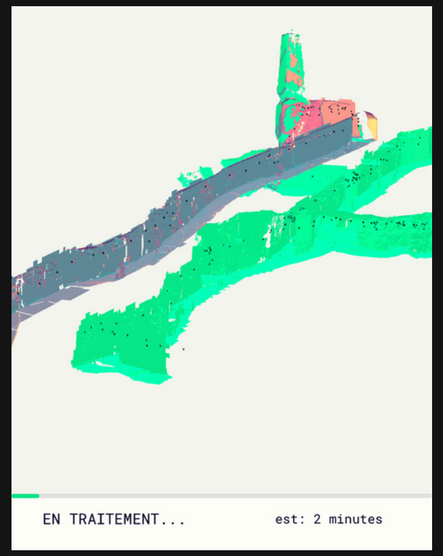
## SETTING UP A VR VISIT OF THE SCANS

Using an Occulus Quest VR headset and the Sketchfab platform to set up the 3D scene.

## MANUAL COLLECTION

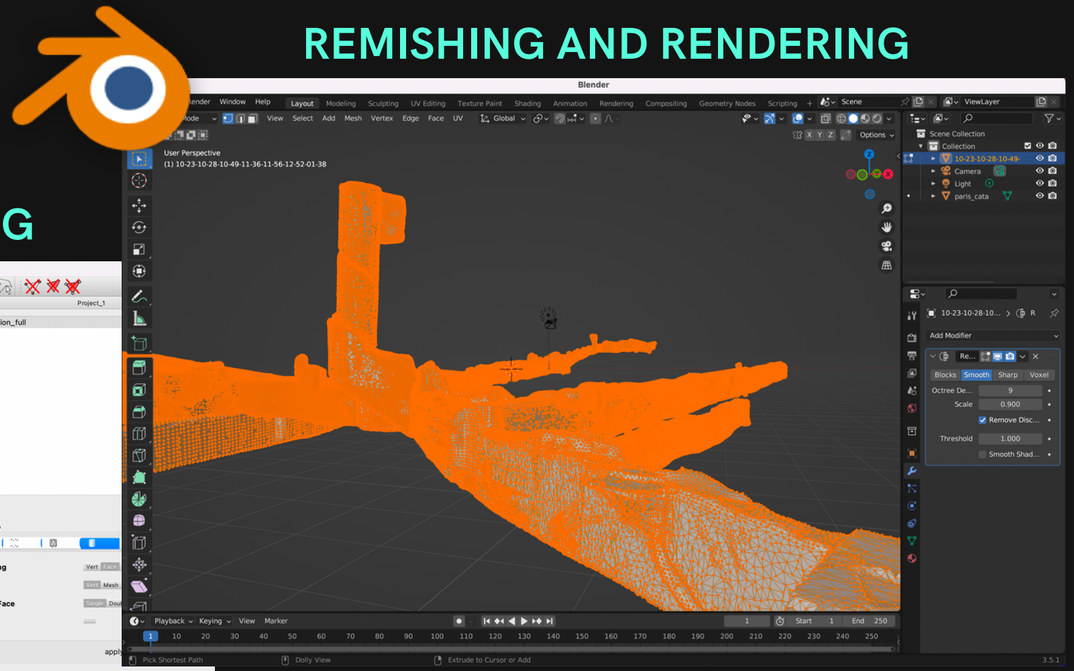
## TREATMENT



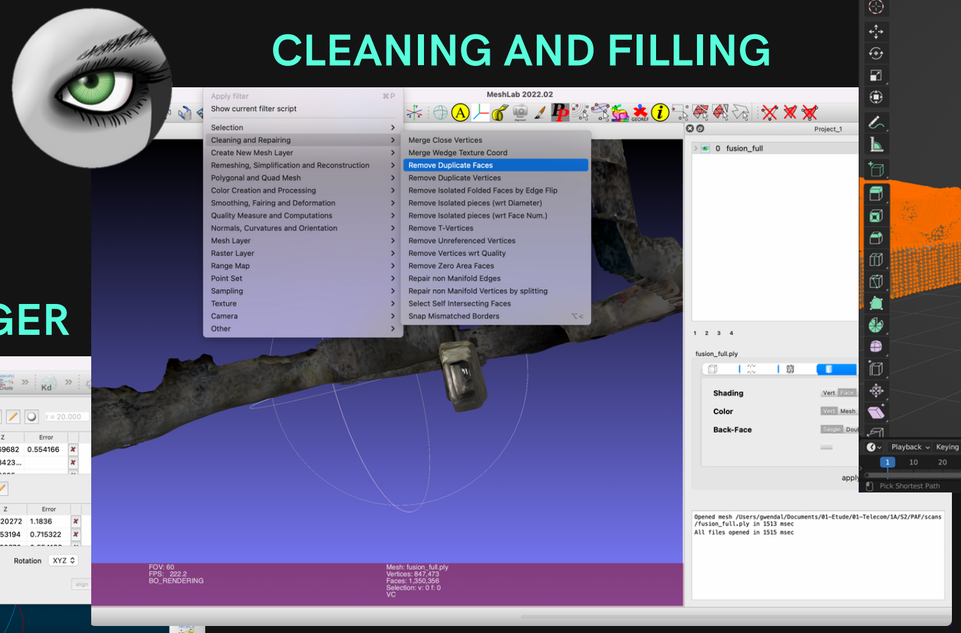




Specific equipment:
iPhone equipped with a Lidar
scan stand equipped with battery-powered lamps
physical landmarks

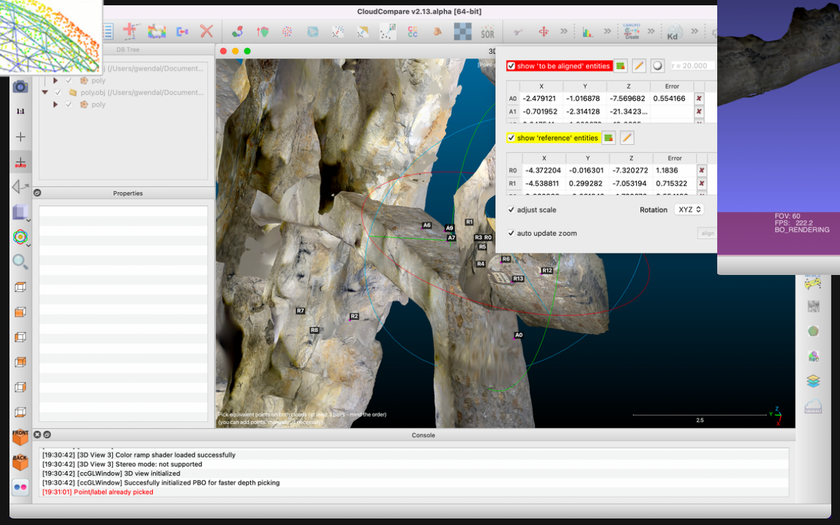
## REMISHING AND RENDERING




## CLEANING AND FILLING




## ALIGNMENT AND MERGER

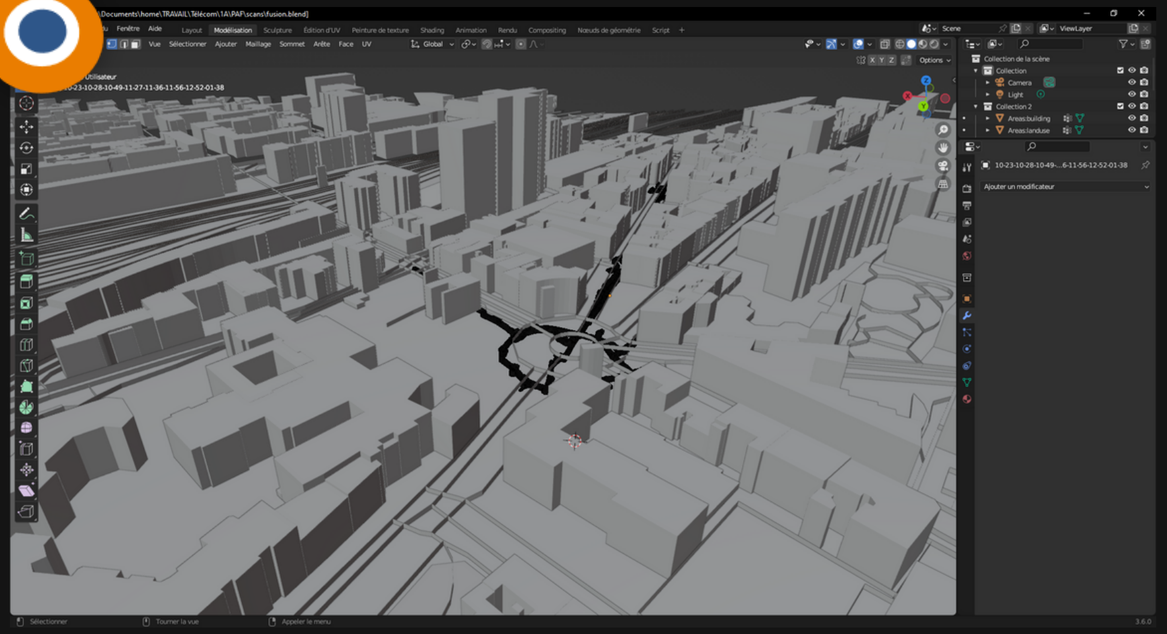



8 merged scans

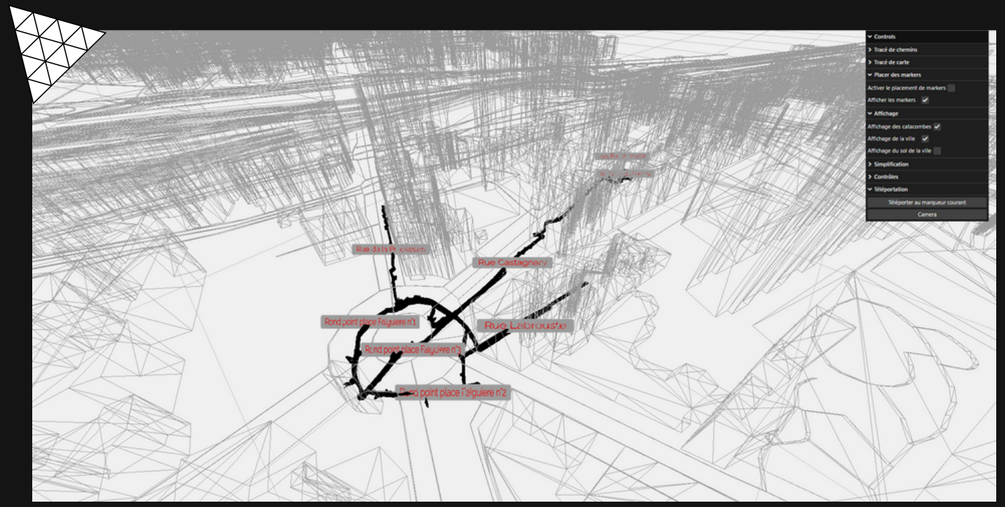
>4M triangles on all scans

5 3D formats processed: .GLB, .OBJ., .PLY, .LAS and .XYZ

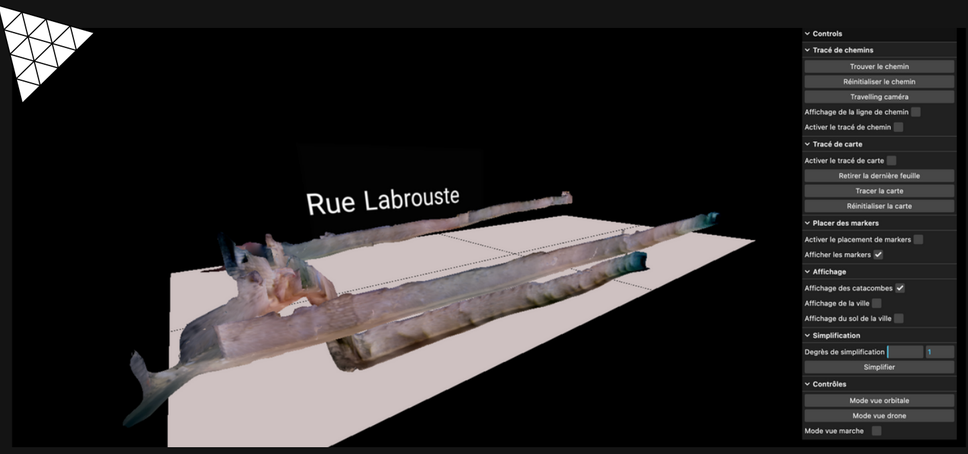
# 3D VISUALIZATION OF THE SURFACE AND UNDERGROUND



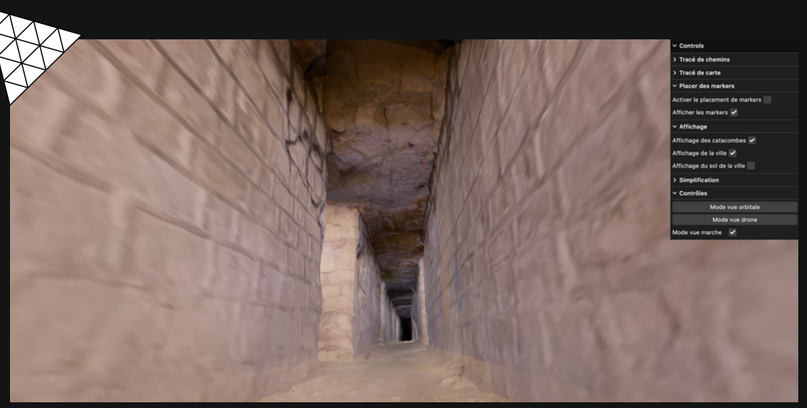

- 3D reconstruction of roads and buildings on Blender from satellite images, SRTM elevation data and OSM queries
- Merging and displaying on a website of surface data and 3D scans



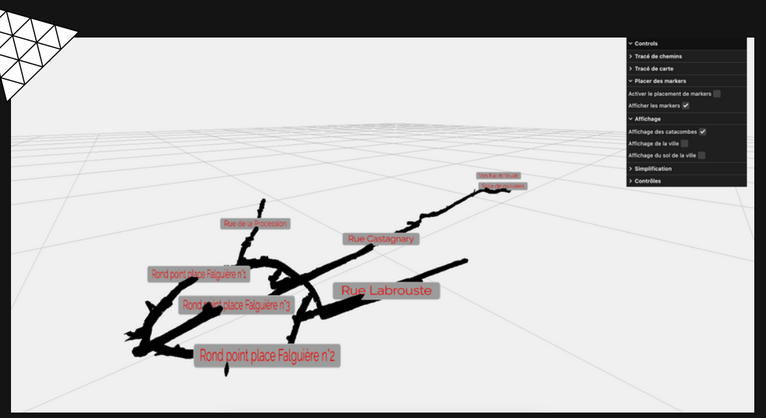

## LABELED OVERVIEW




## DRONE VIEW

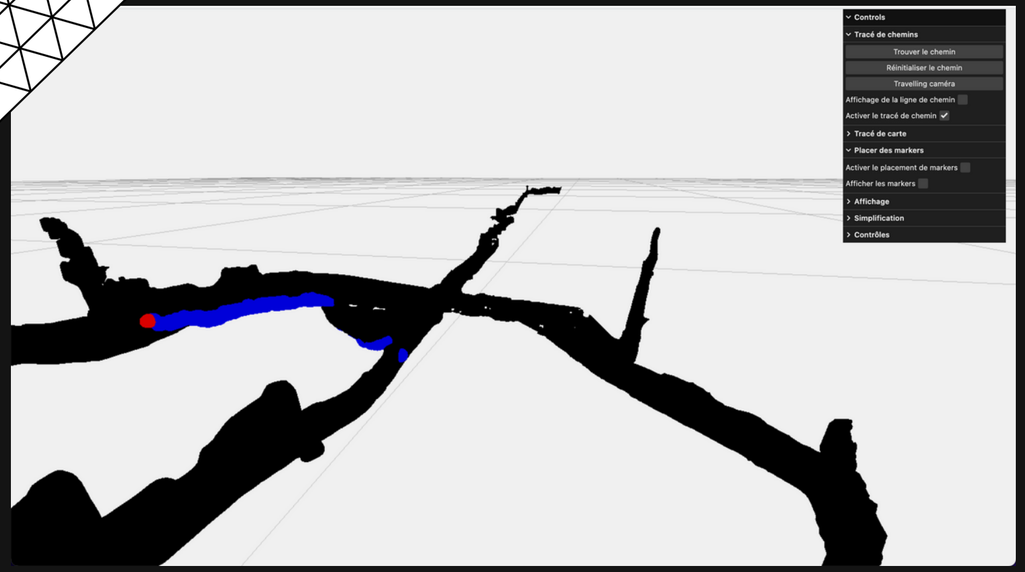



## FIRST PERSON VIEW



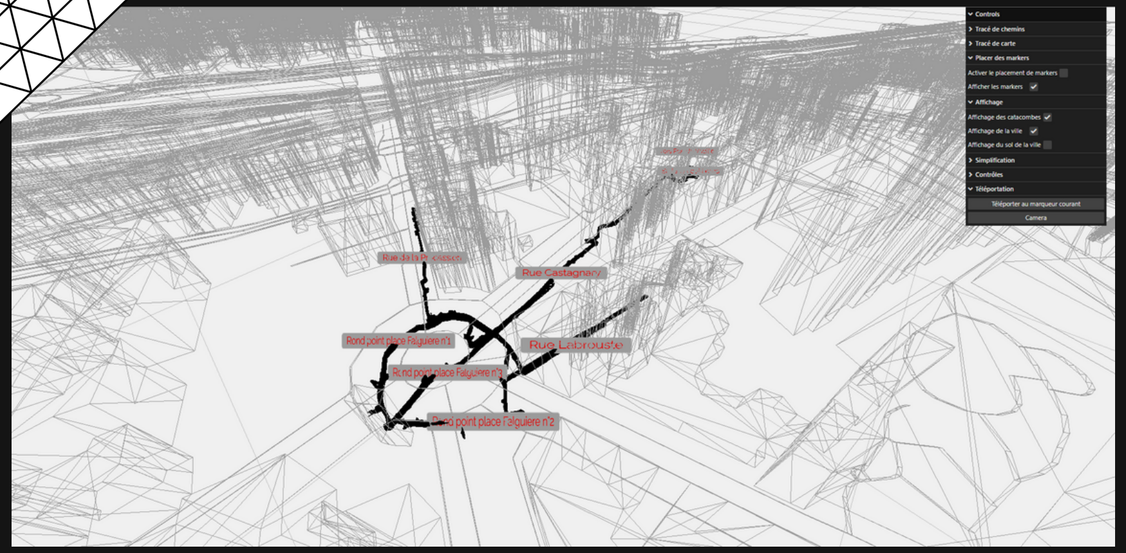

## ORBITAL VIEW

## 3D PATH BETWEEN 2 POINTS



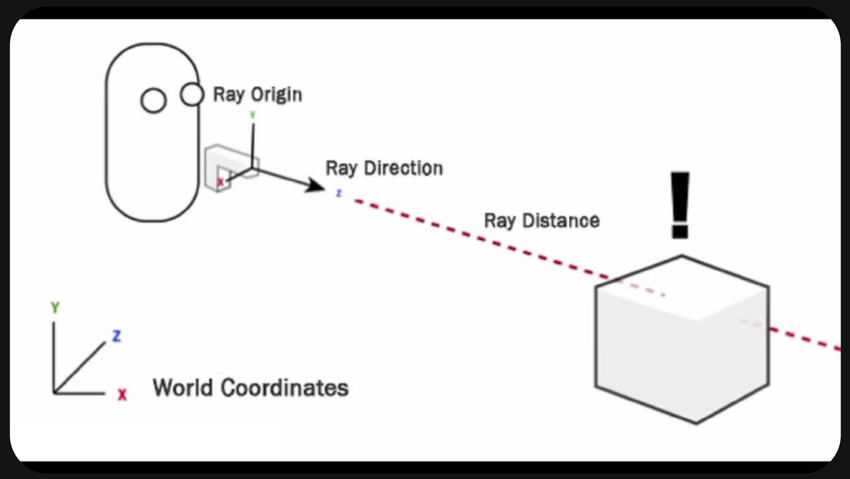

## 3D MAP SUPERIMPOSED ON THE SATELLITE IMAGE


## 3D MAP OF THE GALLERY NETWORK



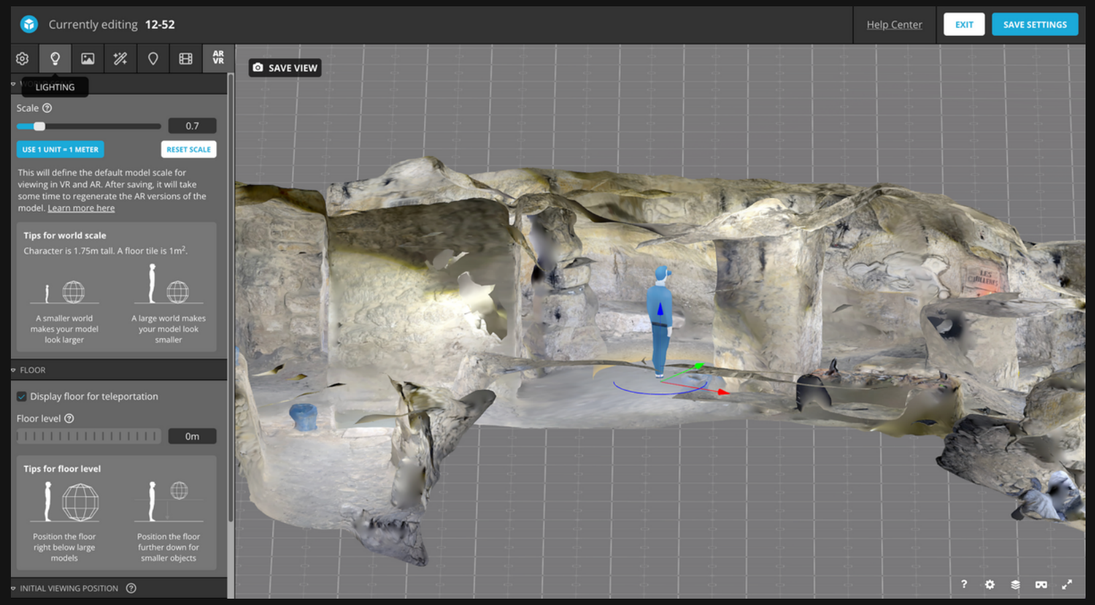
## CHALLENGES THREE.JS

- Optimized loading of mesh files (glb) for WebGL optimization (DracoLoader)
- Raycasting for first-person movement



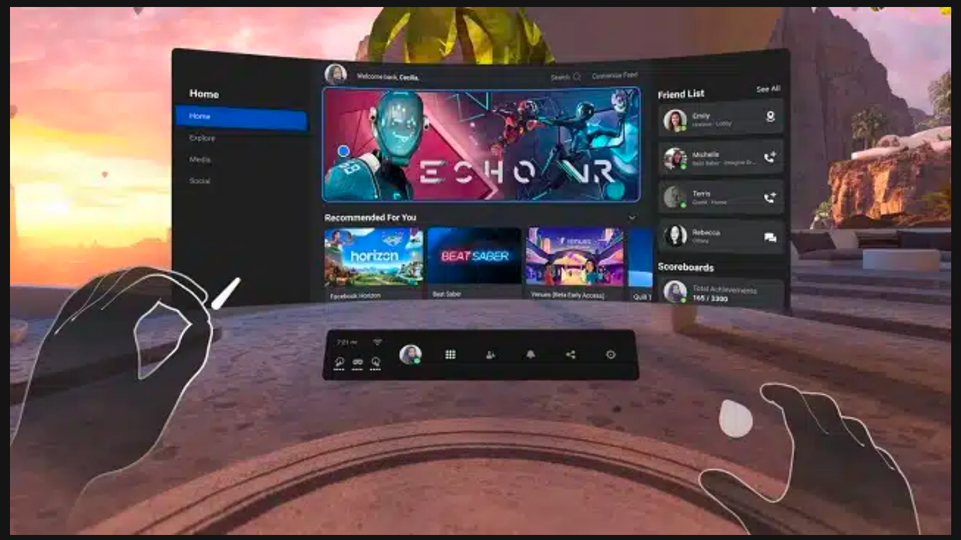

- Simplification of meshes by reduction of the number of points then reconstruction
- Implementation of path drawing on a 3D mesh (merging & complexity of meshes)
- Switch between the different types of controls

## SCENES SELECTION AND CONFIGURATION

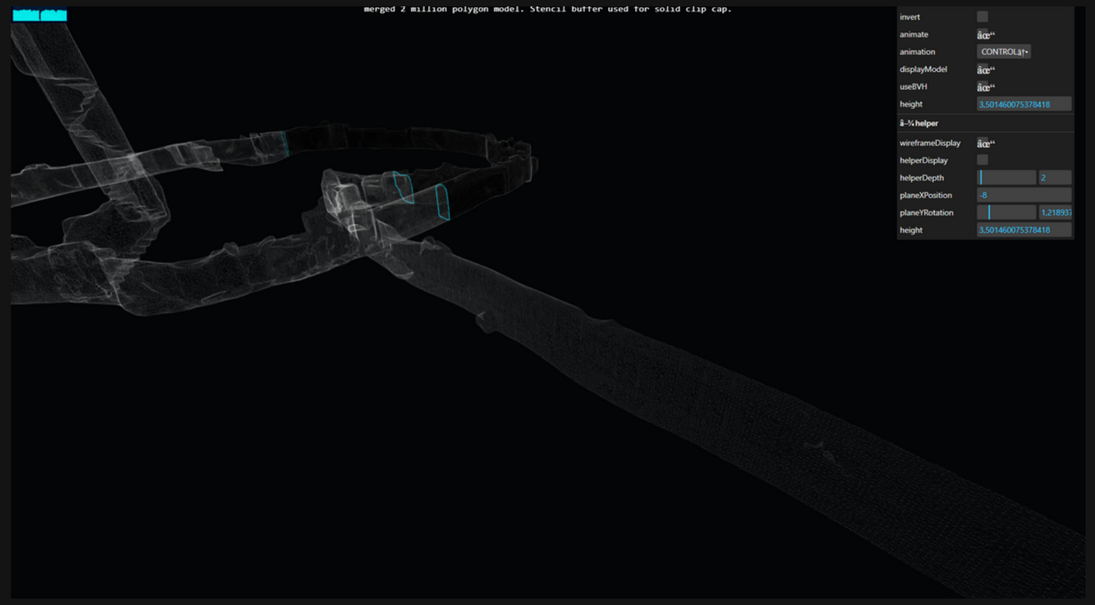



Lighting and filters
Appearance of textures
Scale and height from the ground
Play area and movement

## VR HEADSET SETTINGS



## CUT ACCORDING TO THE POSITION OF X




4 operating modes:
SPIN INFINITE CONTROL
ROTATED

## HEIGHT ESTIMATE