AR/VR APPLICATIONS IN GEOLOGY AND MINING ENGINEERING

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DUMLUPINAR ÜNİVERSİTESİ
KÜTAHYA

National Office
Erasmus+UA
erasmusplus.org.ua

We are on the eve of a great digital transformation....

EXTENDED REALITY

Real Life

Physical Environment Around Us

AR

Real-world environment with superimposed digital objects

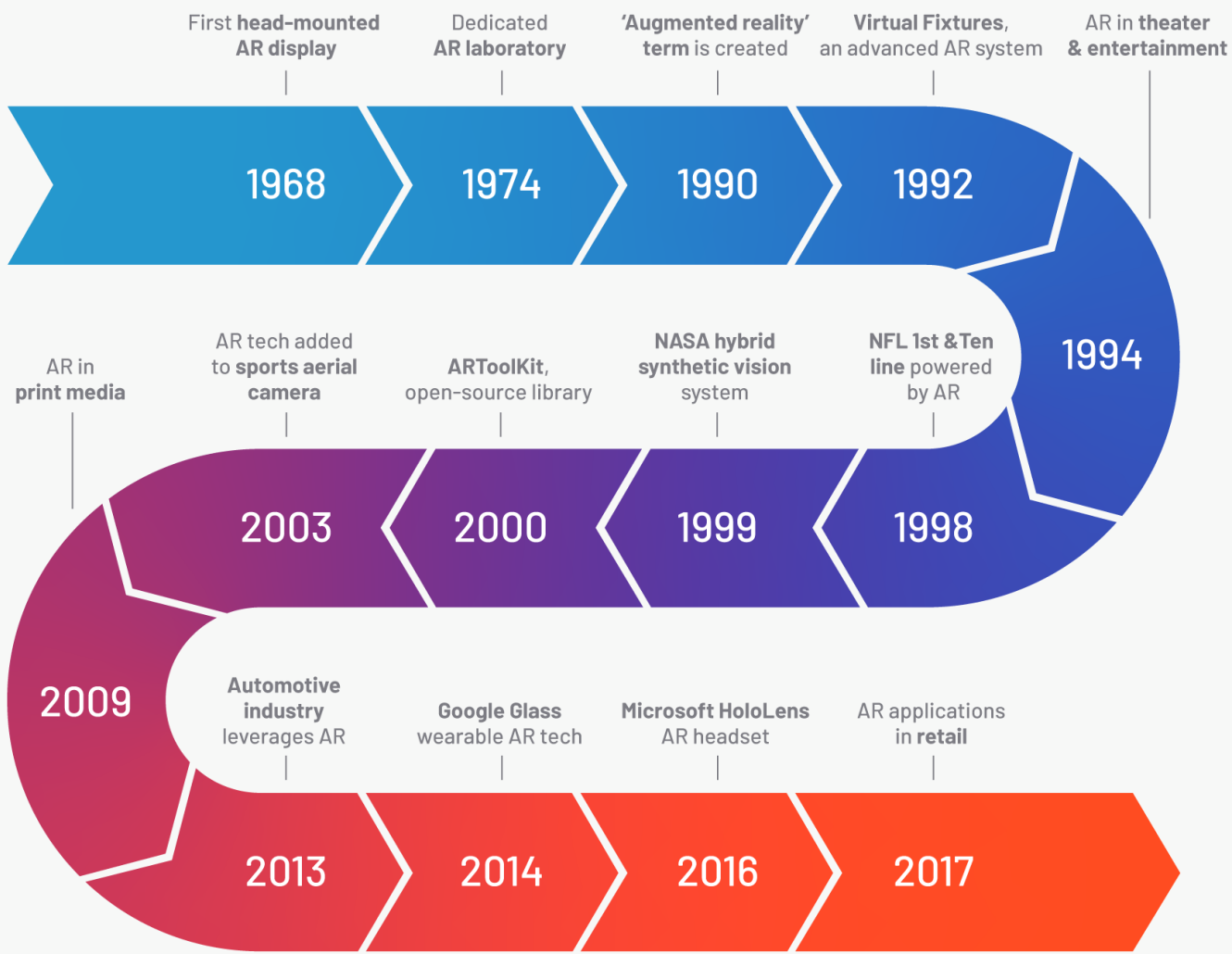
MR

Real-world environment with superimposed interactive digital objects

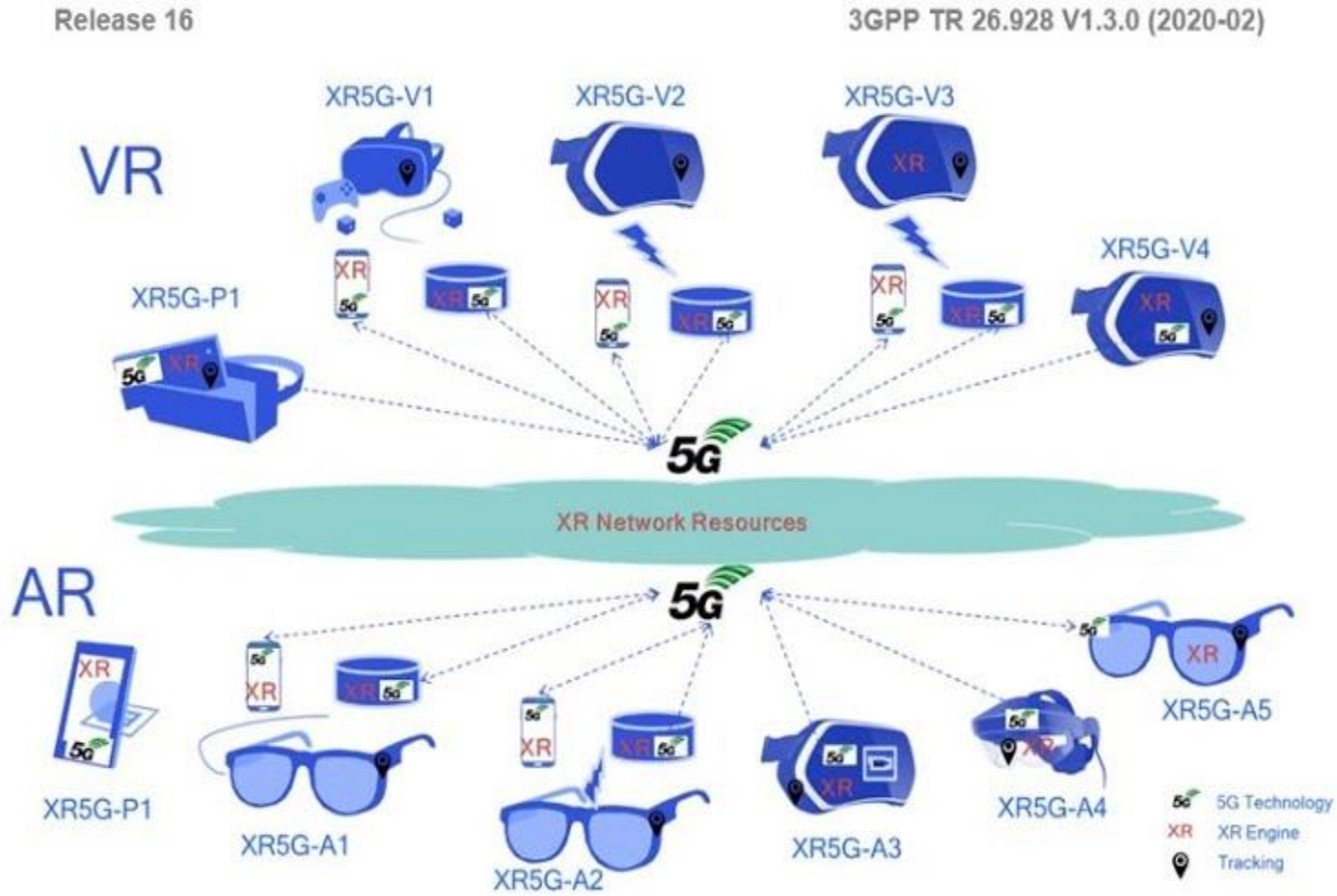
VR

Completely digital environment

History of Augmented Reality

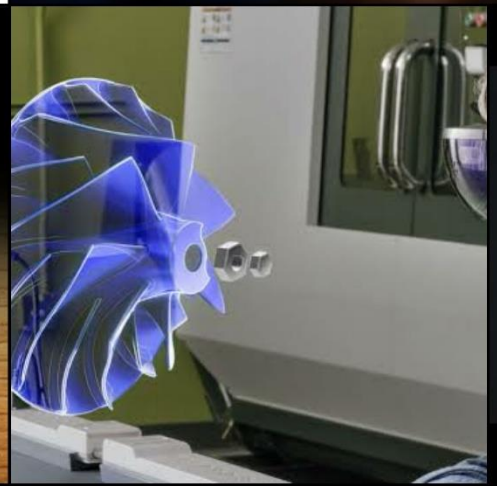


XR Devices and Form Factors

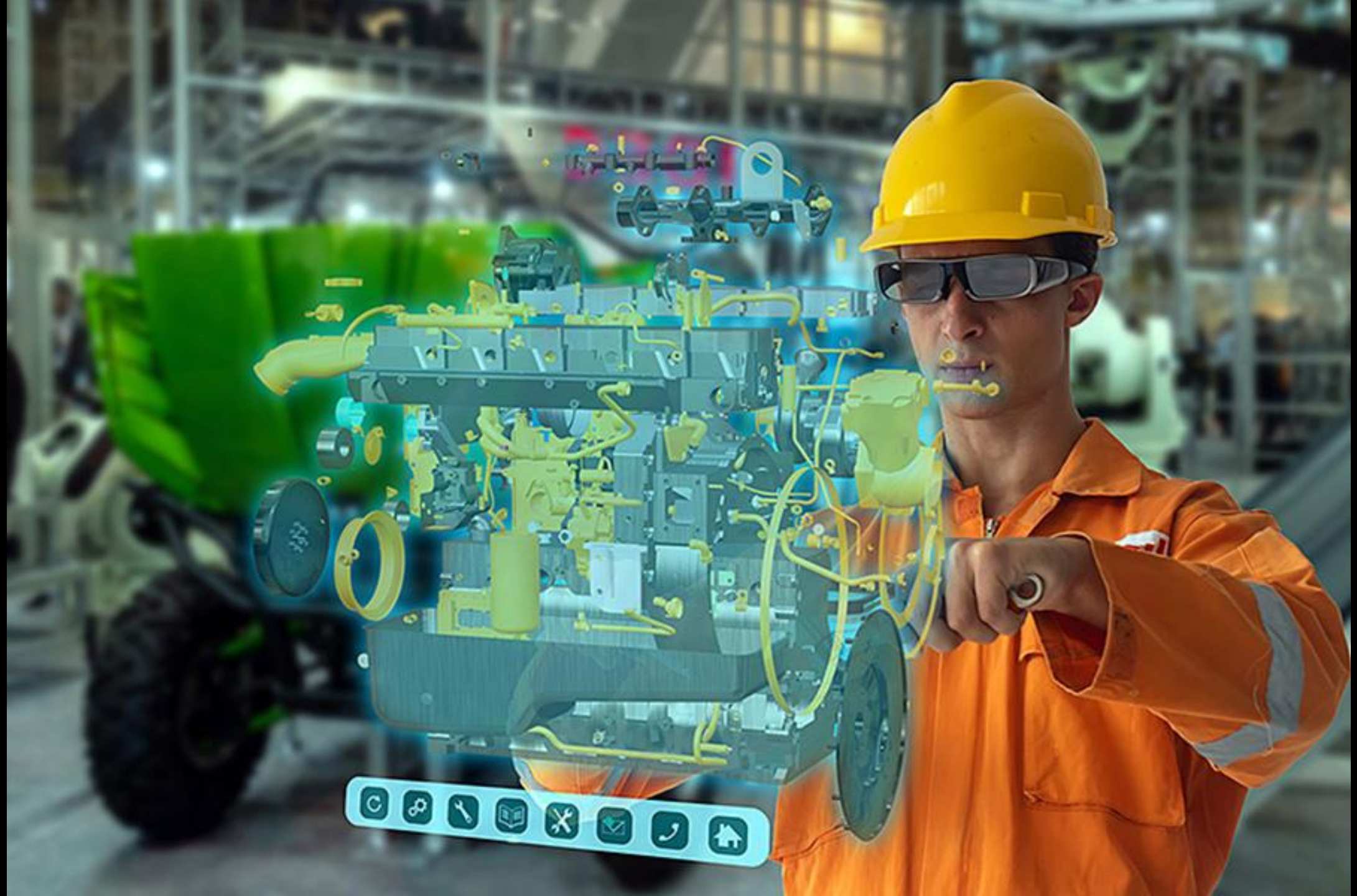


Some of the applications...

NOKIA
NOKIA

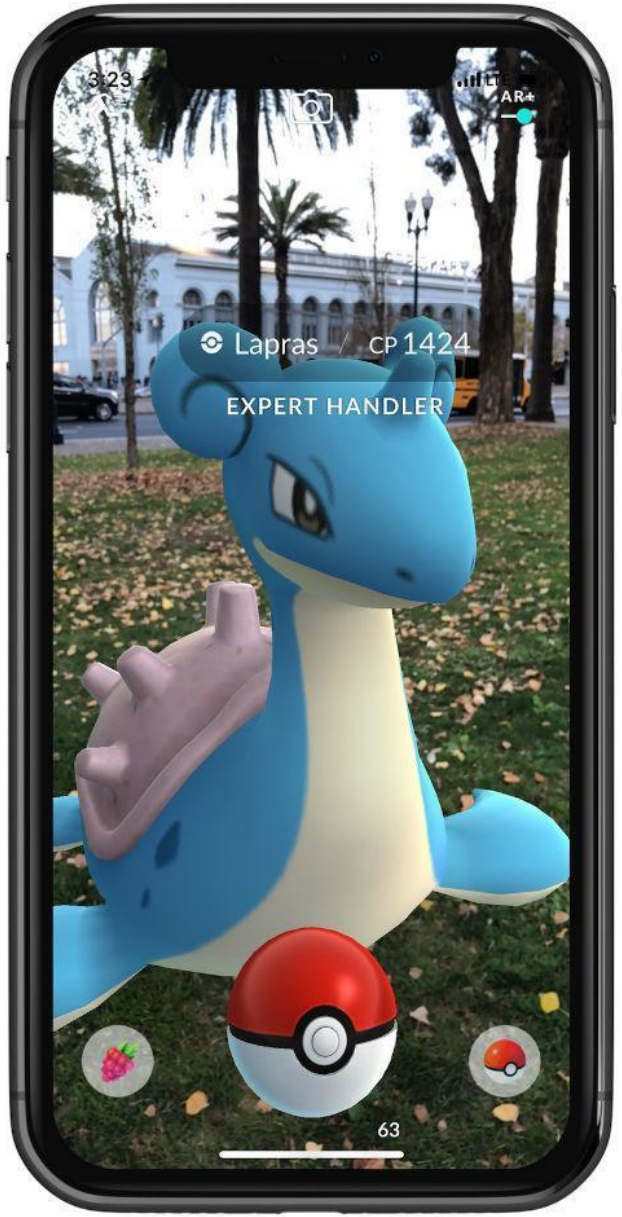


SERVICE &MAINTENANCE AUGMENTED REALITY



CURATE
by Sotheby's International Realty

2:53
LTE
AR+
Pikachu / CP 31
64


3:23
LTE
AR+
Lapras / CP 1424
EXPERT HANDLER
63

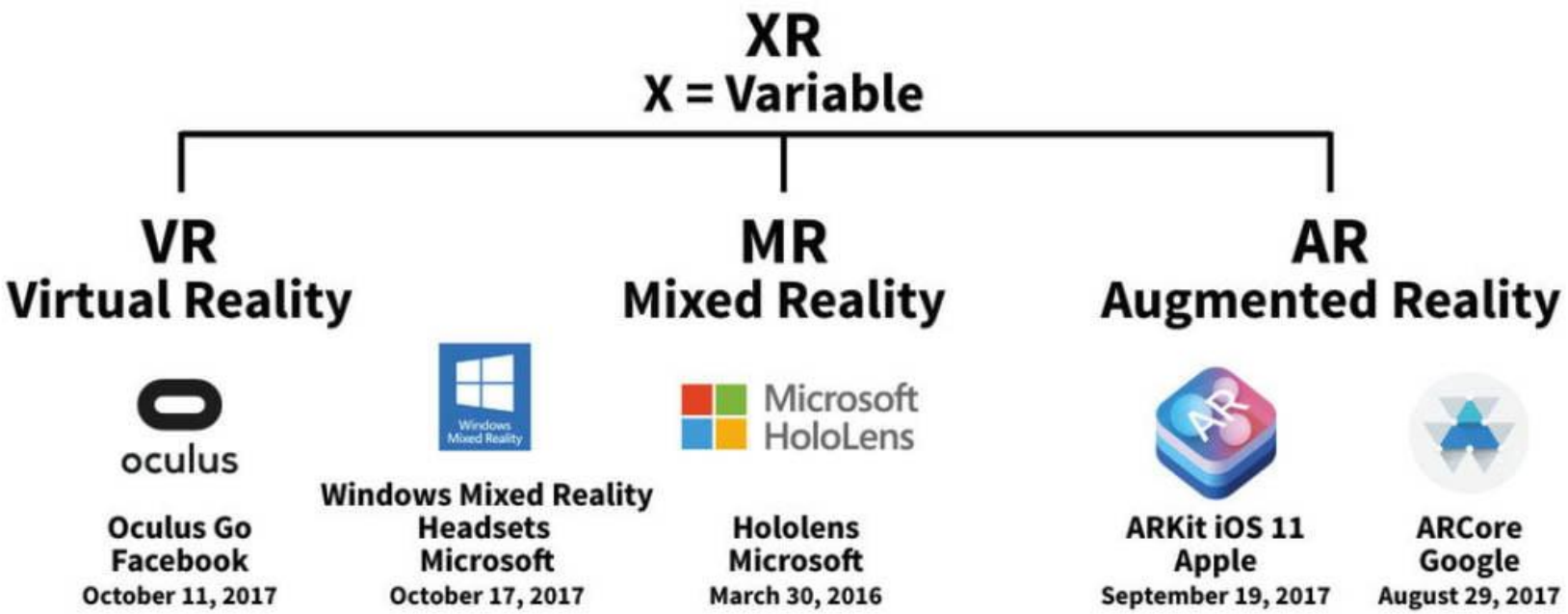
3:16
AR+
Charizard / CP 818
63

ONCE UPON A TIME there were four little Rabbits, and their names were—
Flopsy,
Mopsy,
Cotton-tail,
and Peter.
They lived with their Mothe
in a sand-bank, underr
root of a very big
BOOK (READ MODE)
READ AND LISTEN
and their names were-
Flopsy, Mopsy, Cotton-tail, and Peter.
Development Build

Puma

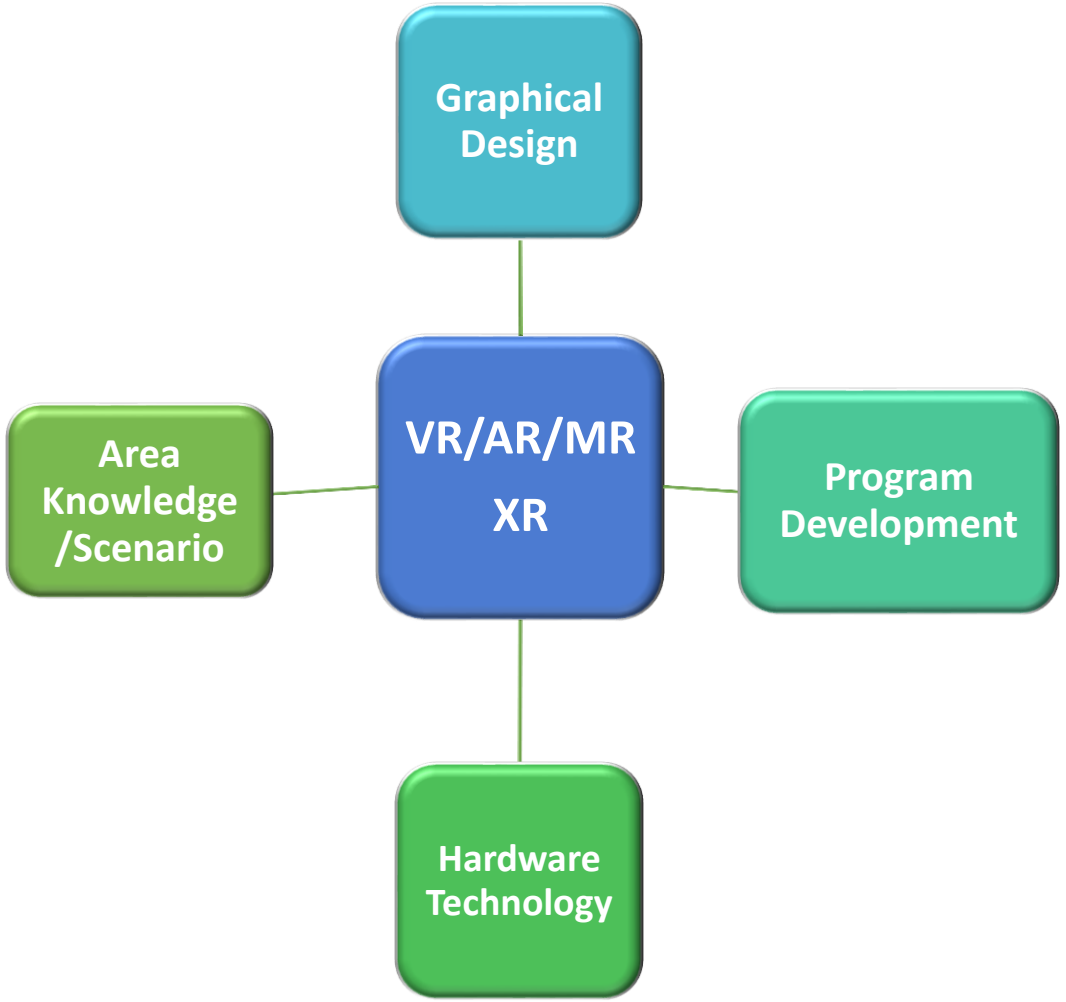
SIMULATION

Headsets Smart Glasses Mobile Devices



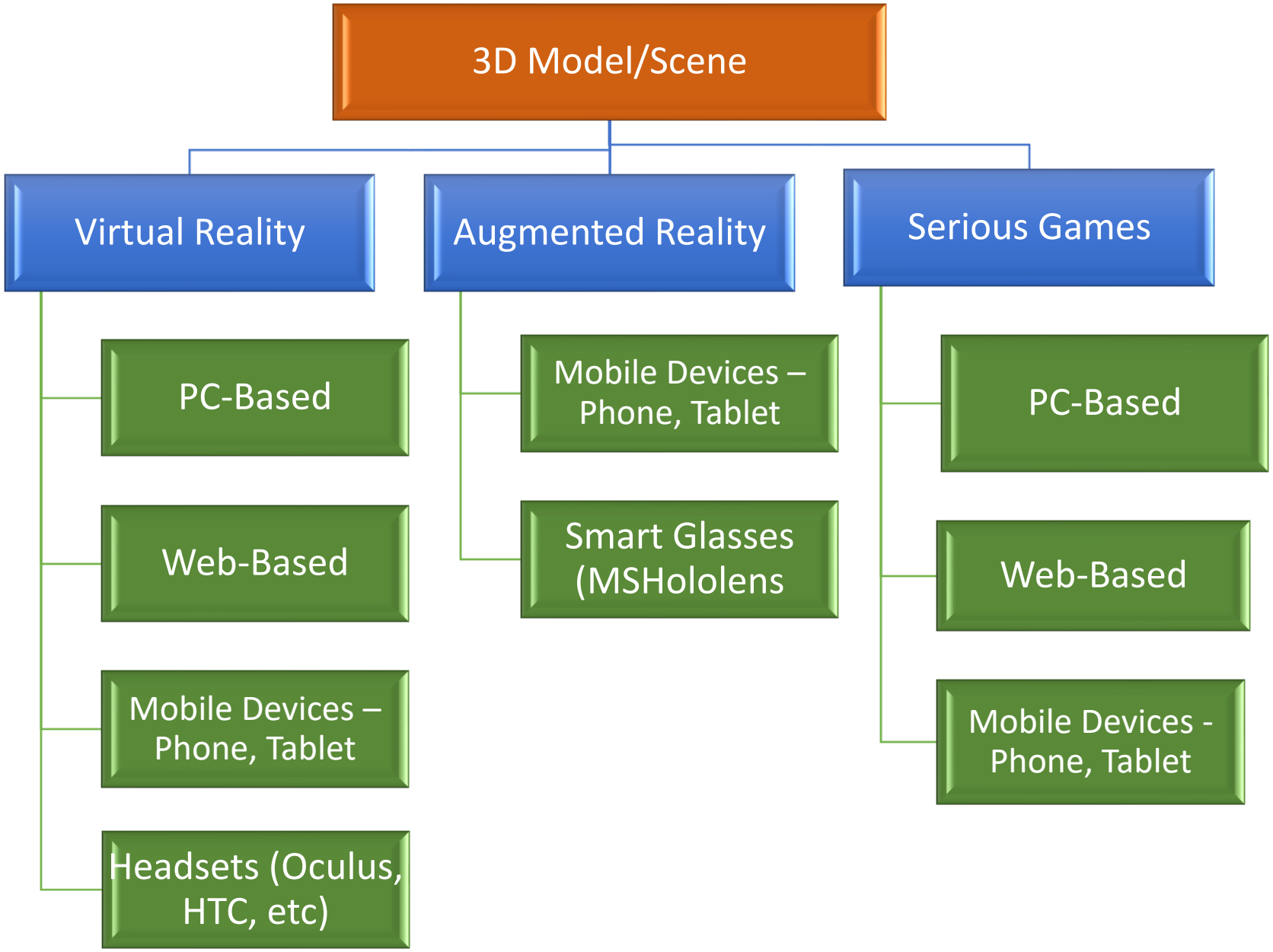
also Amazon, Adobe, etc…

Interdisciplinary



Components

Graphical Design	PLATFORM/ENGINE	AR ENGINE	Code Development	Hardware
• AUTOCAD • MAYA • 3D STUDIO MAX • BLENDER • 4DCINEMA • PHOTOSHOP • Pix4D (Photogrammetry)	• UNITY • UNREAL ENGINE	• VUFORIA • ARFOUNDATION • ARCORE • ARKIT	• C++ • C# • Python • MESHROOM	• VR HEAD SET • SMART GLASS • PHOTOGRAMMETRIC CAMERA


3D Model/Scene
Virtual Reality
Augmented Reality
Serious Games
PC-Based
Web-Based
Mobile Devices – Phone, Tablet
Headsets (Oculus, HTC, etc)
Mobile Devices – Phone, Tablet
Smart Glasses (MSHololens
PC-Based
Web-Based
Mobile Devices - Phone, Tablet

APPLICATION TYPES

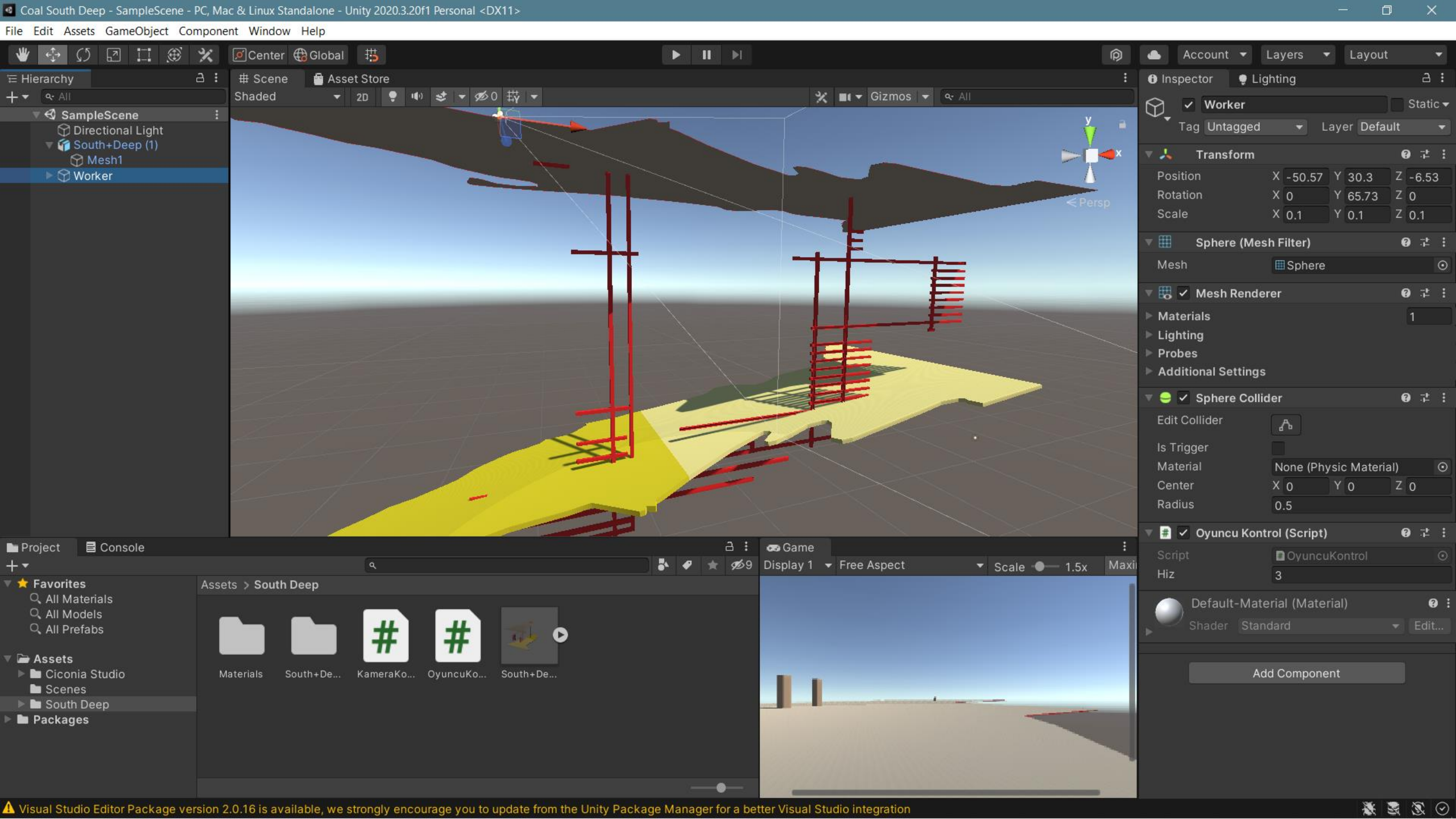
AR	VR	Serious Games
• Mobile phone/tablet • Glasses/headsets	• PC • Web • Headset (Oculus, etc)	• PC • Web • Mobile phone/tablet

Mining & Geosciences...

The picture can't be displayed.

RESCUE

Main Pit
Ore Body


Coal South Deep - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.20f1 Personal <DX11>
File Edit Assets GameObject Component Window Help
Center Global
Account Layers Layout
Hierarchy
SampleScene
Directional Light
South+Deep (1)
Mesh1
Worker
Scene Asset Store
Shaded 2D Gizmos
Persp
Inspector Lighting
Worker
Static
Tag Untagged Layer Default
Transform
Position X -50.57 Y 30.3 Z -6.53
Rotation X 0 Y 65.73 Z 0
Scale X 0.1 Y 0.1 Z 0.1
Sphere (Mesh Filter)
Mesh Sphere
Mesh Renderer
Materials 1
Lighting
Probes
Additional Settings
Sphere Collider
Edit Collider
Is Trigger
Material None (Physic Material)
Center X 0 Y 0 Z 0
Radius 0.5
Oyuncu Kontrol (Script)
Script OyuncuKontrol
Hiz 3
Default-Material (Material)
Shader Standard Edit...
Add Component
Project Console
Favorites
All Materials
All Models
All Prefabs
Assets
Ciconia Studio
Scenes
South Deep
Packages
Assets > South Deep
Materials
South+De...
KameraKo...
OyuncuKo...
South+De...
Game
Display 1 Free Aspect Scale 1.5x
Visual Studio Editor Package version 2.0.16 is available, we strongly encourage you to update from the Unity Package Manager for a better Visual Studio integration

CoalUGMine - SampleScene - PC, Mac & Linux Standalone - Unity 2020.3.20f1 Personal* <DX11>

File Edit Assets GameObject Component Window Help

Center Global

Account Layers Layout

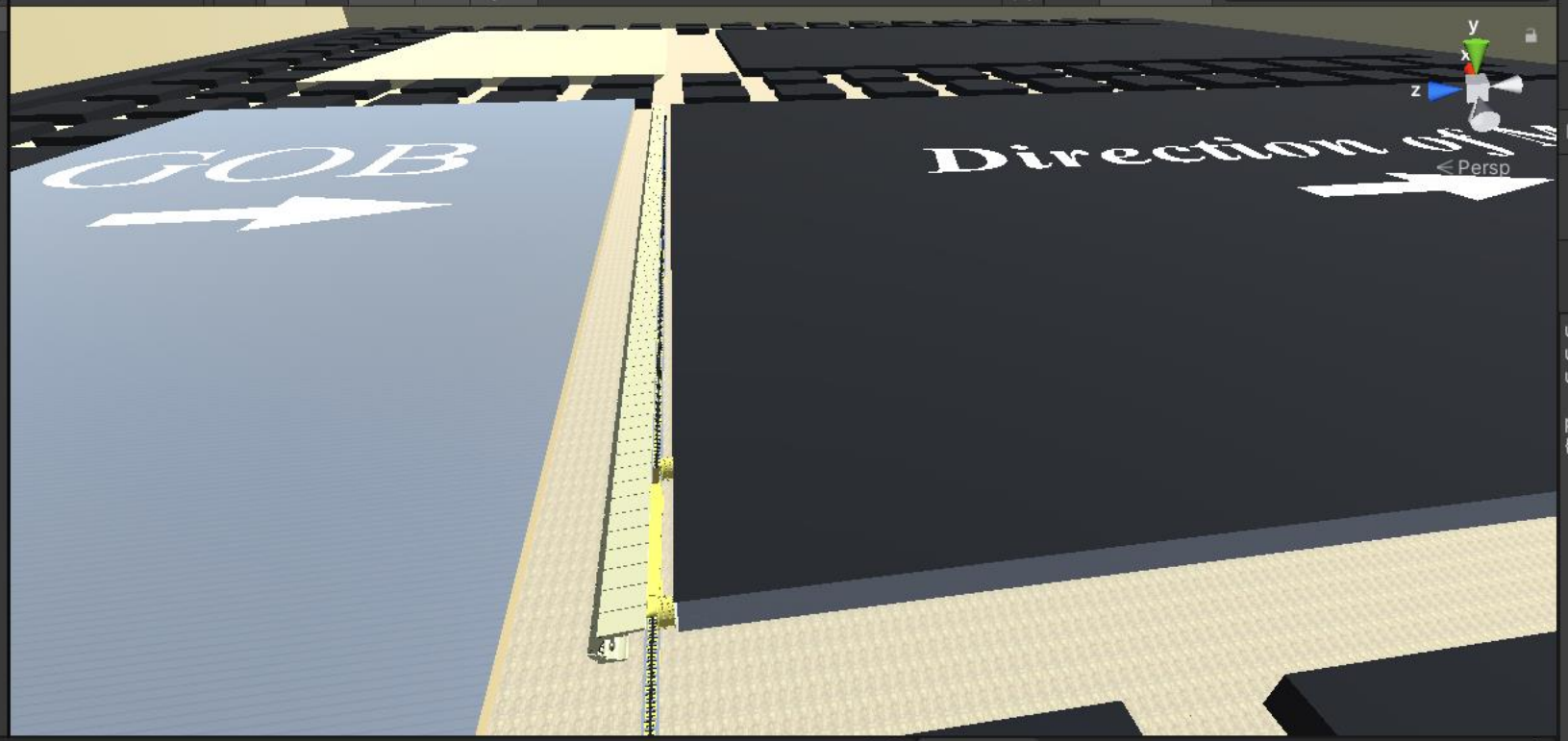
Hierarchy

All

SampleScene*
- Worker
- model
- Directional Light

Scene Asset Store

Shaded 2D Gizmos All



Inspector Lighting

Kamera Kontrol (Mono Script) Import S

Open Execution Order...

Imported Object

Kamera Kontrol (Mono Script)

Assembly Information

Filename Assembly-CSharp.dll

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class KameraKontrol : MonoBehaviour
{
    private float hassasiyet = 5f;
    private float yumusaklik = 2f;
    Vector2 gecisPos;
    Vector2 camPos;
    GameObject oyuncu;
    // Start is called before the first frame update
    void Start()
    {
        oyuncu = transform.parent.gameObject;
    }

    // Update is called once per frame
    void Update()
    {
        Vector2 farePos = new
Vector2(Input.GetAxis("Mouse X"),
Input.GetAxis("Mouse Y"));
        farePos = Vector2.Scale(farePos, new
Vector2(yumusaklik * hassasiyet, yumusaklik *
hassasiyet));

        gecisPos.x = Mathf.Lerp(gecisPos.x, farePos.x, 1f /
yumusaklik);
        gecisPos.y = Mathf.Lerp(gecisPos.y, farePos.y, 1f
/ yumusaklik);
        camPos += gecisPos;
        transform.localRotation =
```

Asset Labels

Project Console

Favorites
- All Materials
- All Models
- All Prefabs

Assets
- Ciconia Studio
- Longwall+Project
  - model
- Scenes

Packages

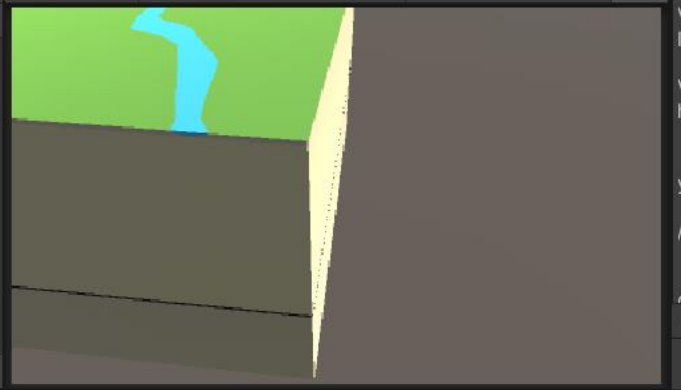
Assets > Longwall+Project

model KameraKo... model OyuncuKo...

Assets/Longwall+Project/KameraKontrol.cs

Game

Display 1 Free Aspect Scale 1.2x Maxi



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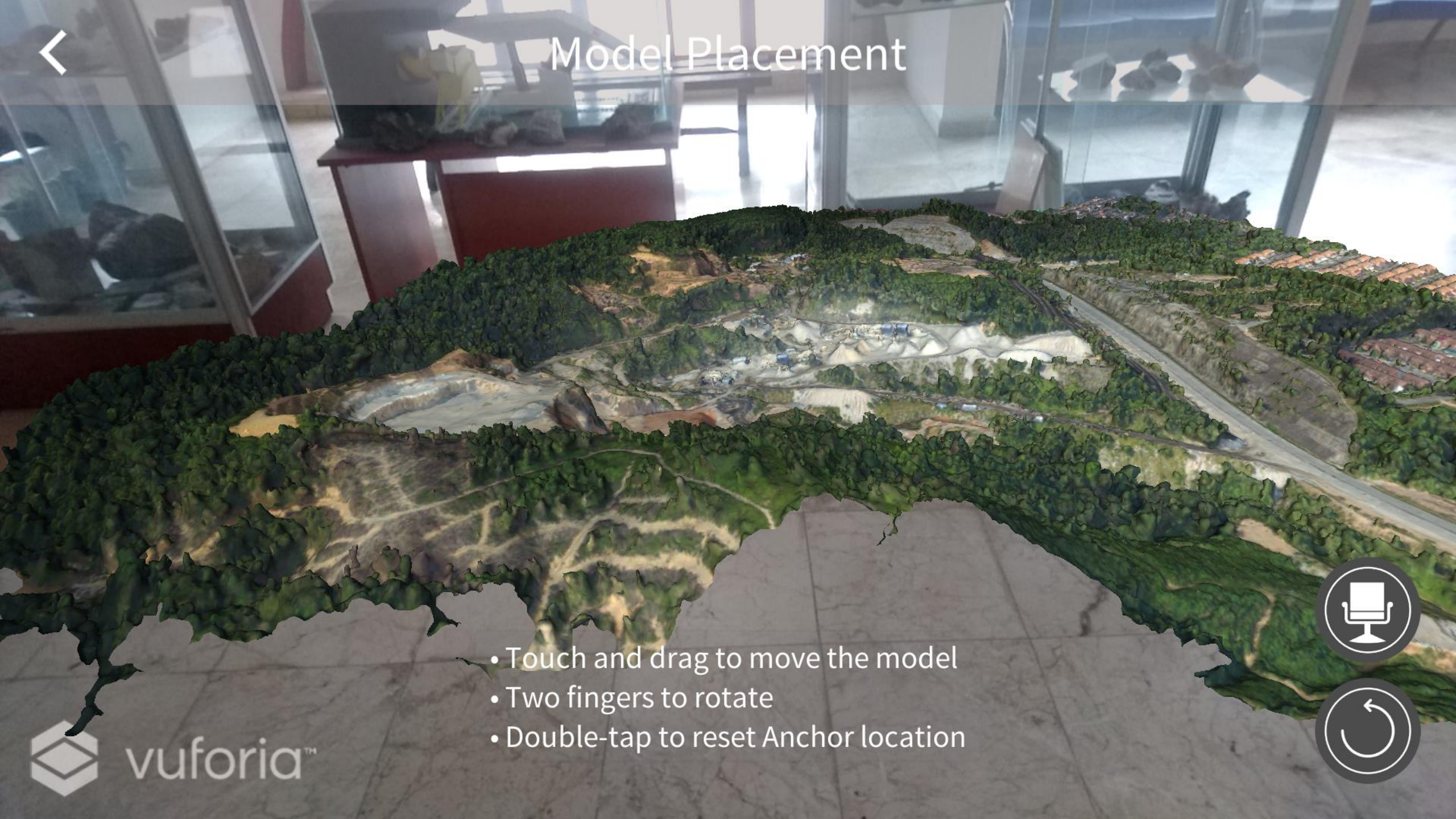
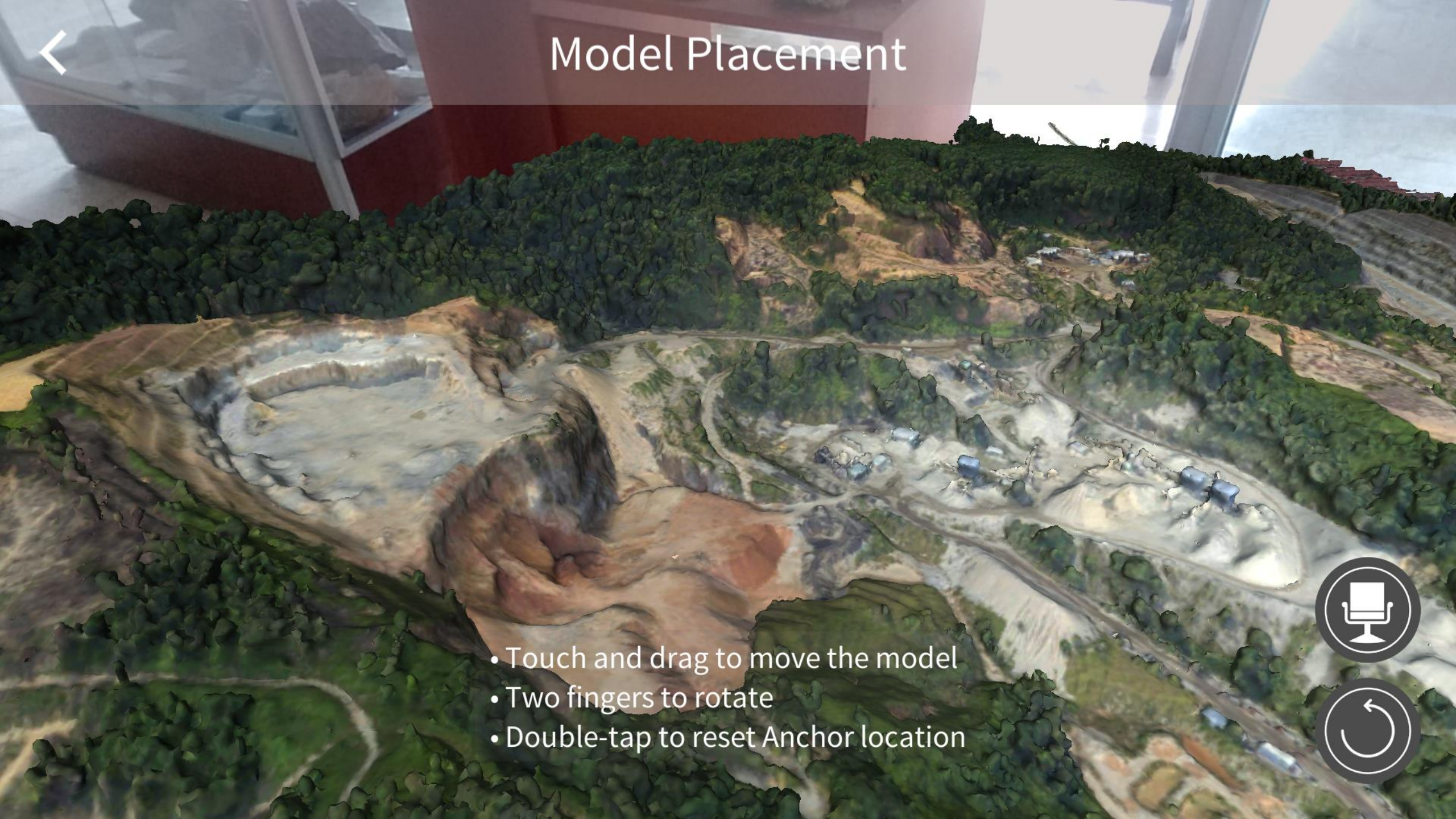
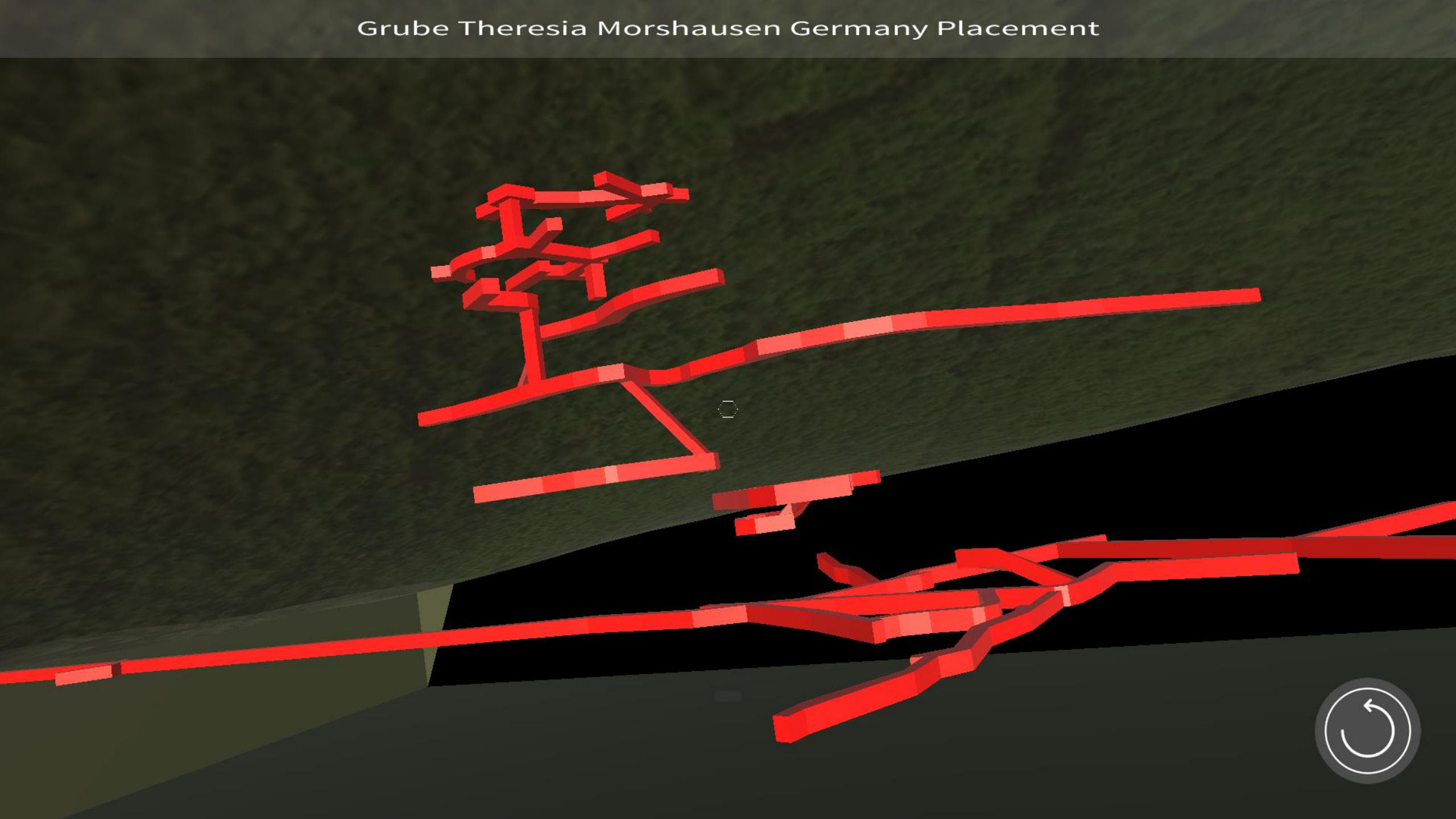
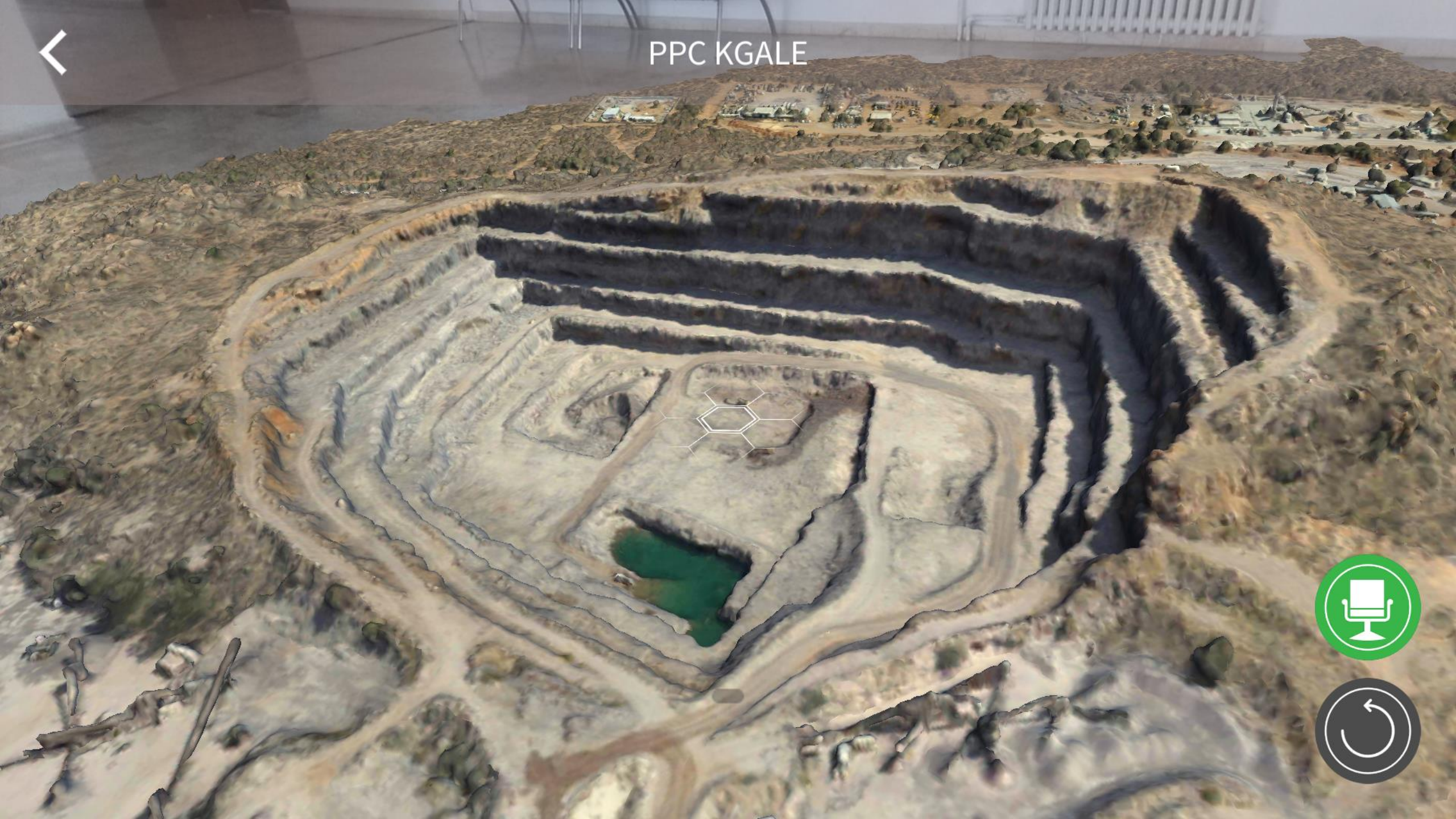

Model Placement
• Touch and drag to move the model
• Two fingers to rotate
• Double-tap to reset Anchor location
vuforia™


Model Placement
• Touch and drag to move the model
• Two fingers to rotate
• Double-tap to reset Anchor location

Grube Theresia Morshausen Germany Placement

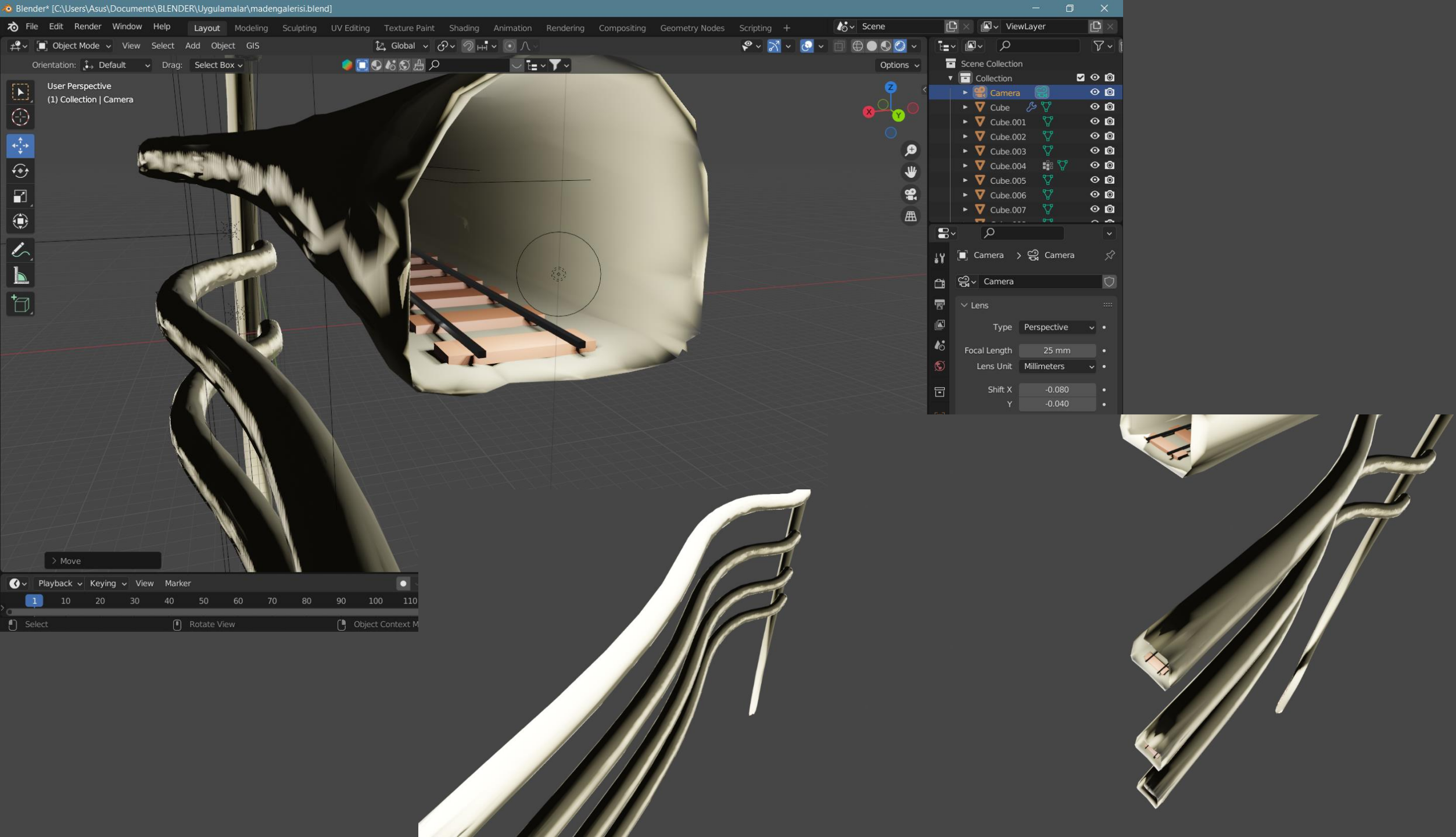

Grube Theresia Morshausen Germany Placement

Point your device to the floor and move to scan


PPC KGALE

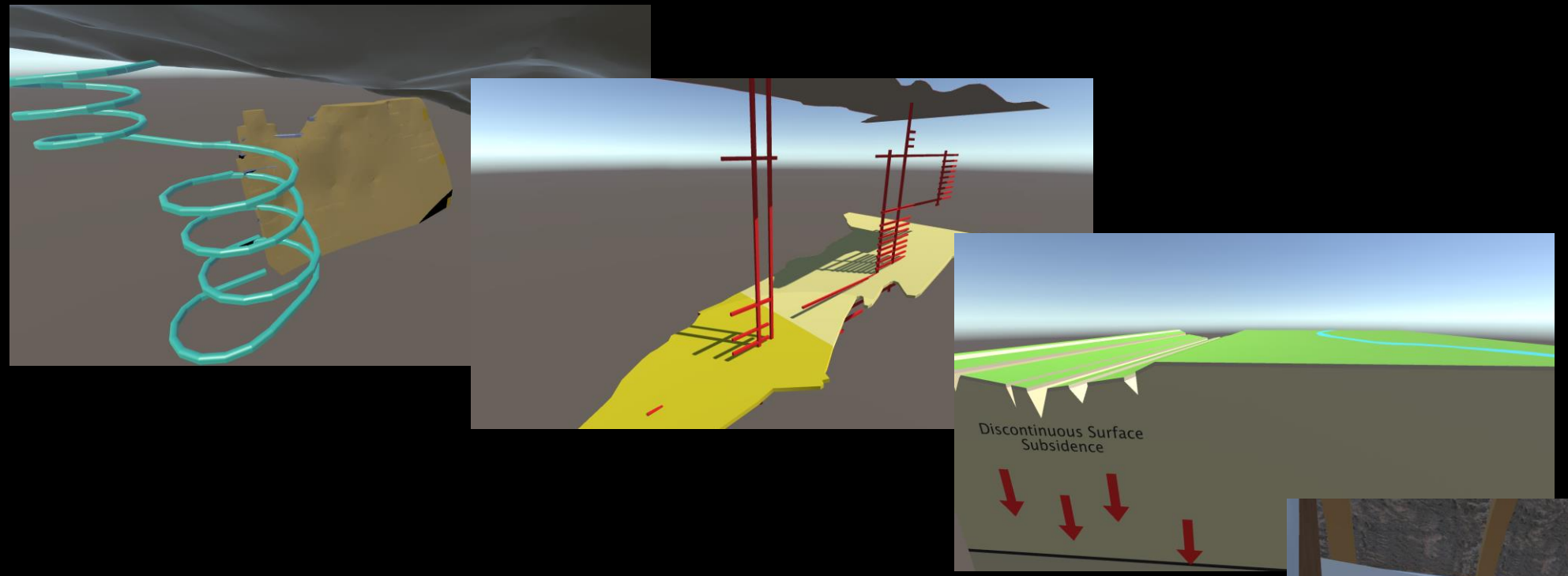
• Touch and drag to move the quarry
• Two fingers to rotate
• Double-tap to reset Anchor location
• Touch and drag to move the quarry

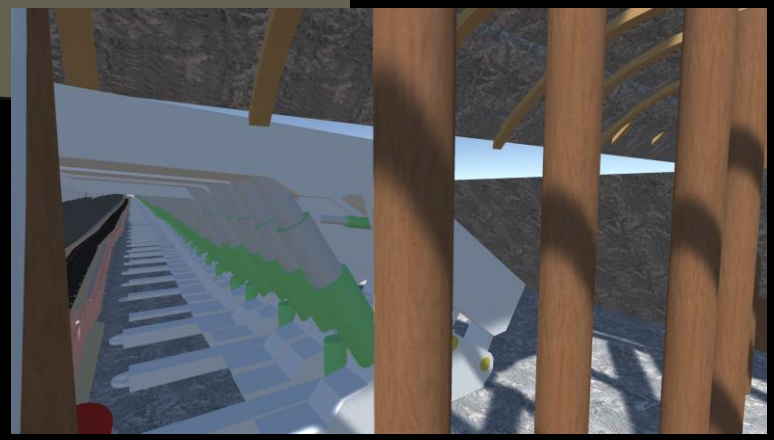
CAT
225
CAT
225


Blender* [C:\Users\Asus\Documents\BLENDER\Uygulamalar\madengalerisi.blend]
File Edit Render Window Help
Layout Modeling Sculpting UV Editing Texture Paint Shading Animation Rendering Compositing Geometry Nodes Scripting
Scene
ViewLayer
Object Mode View Select Add Object GIS
Global
Orientation: Default
Drag: Select Box
Options
User Perspective
(1) Collection | Camera
Scene Collection
Collection
Camera
Cube
Cube.001
Cube.002
Cube.003
Cube.004
Cube.005
Cube.006
Cube.007
Camera
Camera
Camera
Lens
Type Perspective
Focal Length 25 mm
Lens Unit Millimeters
Shift X -0.080
Y -0.040
Move
Playback Keying View Marker
1 10 20 30 40 50 60 70 80 90 100 110
Select
Rotate View
Object Context M

Product Placement
• Touch and drag to move Chair
• Two fingers to rotate
• Double-tap to reset Anchor location
DU RECORDER

Serious Game examples…





We would like to work with partners…

- Projects
- Research & Publication
- Lectures

Thank you for your attendance…