VISUALIZING KEEZHADI EXCAVATION OBJECTS IN AUGMENTED REALITY

A PROJECT REPORT

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BONAFIDE CERTIFICATE

Certified that this Report titled "**Visualizing keezhadi excavation objects in augmented reality**" is the bonafide work of **V.Dhivagar (2019272008)** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

PLACE: CHENNAI

DATE: 13/05/2022

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PROJECT GUIDE

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ABSTRACT

- Augmented reality (AR) is an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound and delivered via technology.
- Now using this AR technology, we are going to create the artefacts into a virtual object.
- For example, In Keezhadi excavation site various Artefacts are found like urns, various types of pottery (red utensils, black objects), iron tools, knives, swords and arrows, some stone beads and some gold ornaments. By this project we turn many valuable and damaged antiques into 3D models by using AR.

CHAPTER 1

INTRODUCTION:

- Augmented Reality (AR) was introduced as the opposite of virtual reality: instead of immersing the user into a synthesized purely informational environment, the goal of AR is to augment the real world with information handling capabilities.
- Augmented reality (AR) is a field of computer research which deals with the combination of real world and computer-generated data. Augmented reality (AR) refers to computer displays that add virtual information to a user's sensory perceptions.
- Combines real and virtual objects in a real environment.

PROBLEM STATEMENT:

- Now the archaeological department is releasing their findings in an article or news papers as a news.
- So the valuable antiques are seen only as a 2D element.
- Many interested youngsters in this field will be able to understand the valuable antique’s information and their importance by seeing those things in 3D objects.

MOTIVATION:

- Create the artefacts into a virtual object.
- Combines real and virtual objects in a real environment.

OBJECTIVE:

- In an animated visualization, you are asking the reader to follow the progression of information as it moves from one frame to another.
- There are different ways to do this, from narrative stories to videos to a series of images in static form, but all require users to track information and hold it in their memories.
- Added background, sound, texture, colours, lighting, and other attributes to an animation. Added Voice Over About the Keezhadi Excavation Objects.
-

DEVELOPMENT PLATFORM:

- Unity
- Vuforia SDK
- Blender
- Visual Studio
- Adobe Photoshop
- Audacity

CHAPTER 2

LITERATURE REVIEW

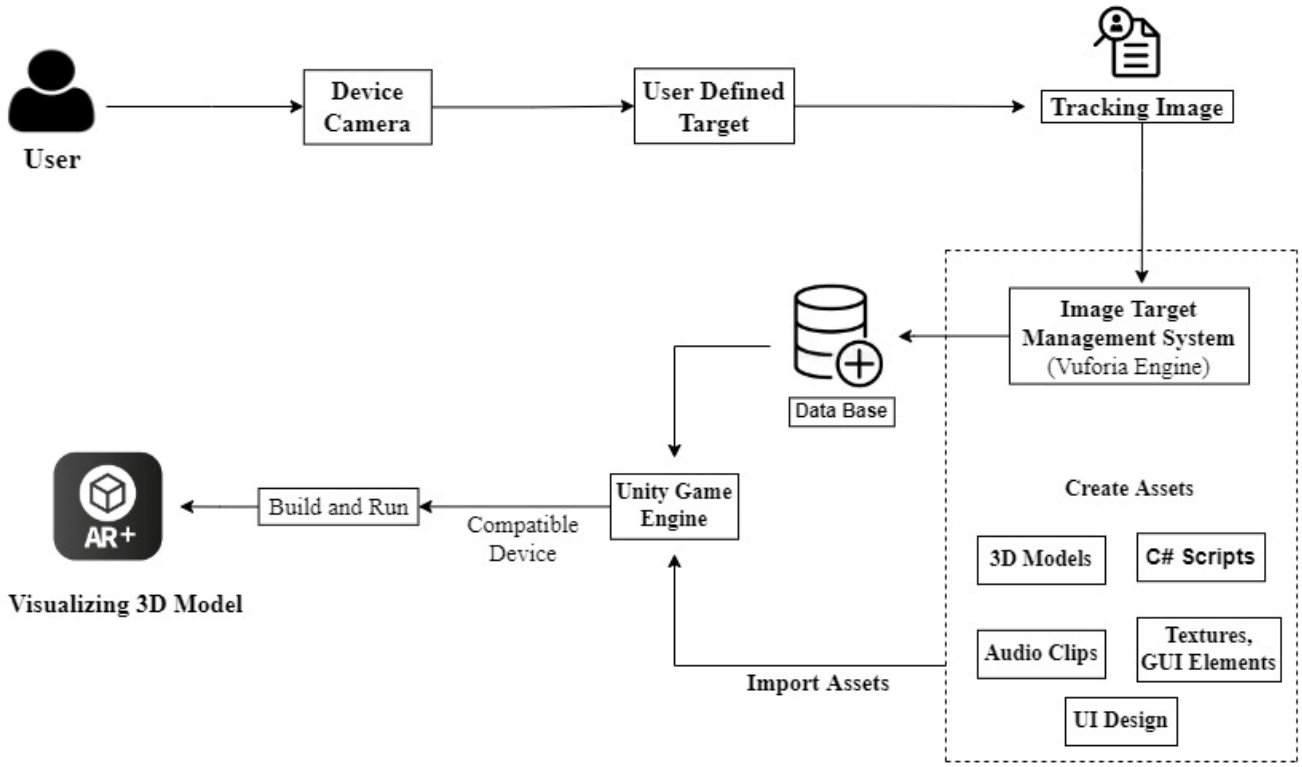
This Chapter explains about the literature survey made on the existing system, analyzing the problem statements and issues with the existing system and proposed objectives for the new system.

S.No	Paper title	Author Name	Published in	Used Technology:
1.	Towards a web-based archaeological excavation platform for smartphones.	Nota Pantzou, Georgios Styliaras,	Digital Heritage International Congress (DigitalHeritage) , IEEE, 28 Sept.-2 Oct. 2015	Unity 3D Game Engine, Blender, Vuforia SDK
2.	Concepts and User Interface Designs for Augmented Reality Maintenance Worker Support Systems	Jisu Kim, Mario Lorenz, Sebastian Knopp, Philipp Klimant,	IEEE International Symposium on Mixed and Augmented Reality Workshops (ISMARW) 29 April 2019	Unity,AR Foundation, AR HMD, Blender
3.	3D-Content Editor for Augmented Reality Maintenance Worker Support System	Mario Lorenz, Sebastian Knopp, Philipp Klimant, Jisu Kim	2020 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct),16 December 2020	Unity 3D Game Engine,AR HMD,AR Kit

CHAPTER 3

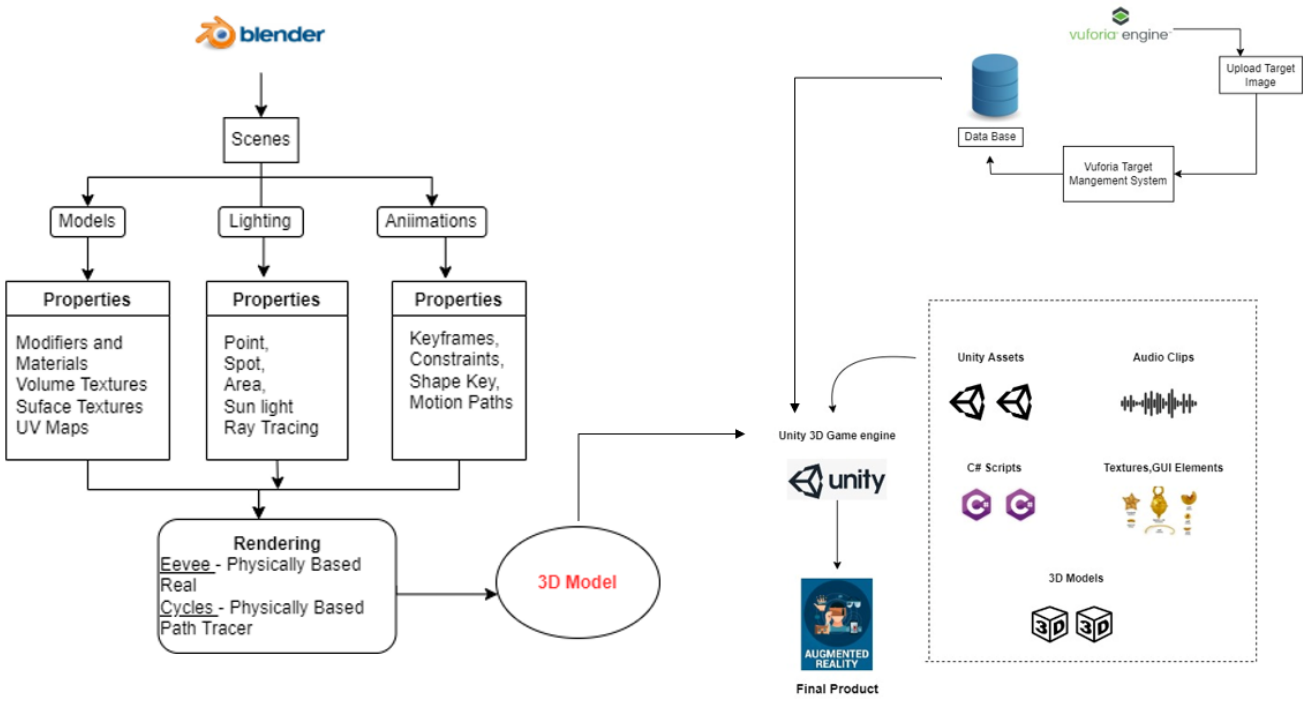
OVERALL ARCHITECTURE

Architecture design



Over-all Architecture diagram

Modules design and development process:



Development process diagram

List of the MODULES:

- Rendering 3D Object
- Image Processing Module
- Visualizing Object

RENDERING 3D OBJECT:

- Blender is a free, open-source 3D creation suite. It supports the entirety of the 3D pipeline: modeling, animation, simulation, rendering, compositing and motion tracking, and video editing and game creation.
- The primary use of Blender is to create three-dimensional objects and scenes using the 3D viewport and a suite of modeling tools that allow

the user to create any object and any scenario that they want to create in 3D space.

- Basic objects and environments can be created using mesh objects constructed from three types of geometry. These are vertices, edges, and faces.
- There were two rendering module teams in Blender: Cycles, Eevee.

IMAGE PROCESSING MODULE:

AR Camera & Image Target:

- **Vuforia** for this project we decided to go with **Vuforia SDK** in order to enable **AR** instead of unity's own AR.
- **The Engine detects and tracks the image by comparing extracted natural features from the camera image against a known target resource database**. Once the Image Target is detected, Vuforia Engine will track the image and augment your content seamlessly using best in market image tracking technology.
- The AR camera will allow your camera to recognize certain images (called Image Target) in order to display content above these target images. So along with the AR Camera, we added a Target Image object and added an image to it that will be recognized.
- **Unity and Vuforia platform is the best way to start your augmented reality projects**. Unity is a game engine used to create games and render it its software.

VISUALIZING OBJECT:

- The development process begins by exporting a building model from Blender. The model should have a low polygon count for use in a gaming engine and for AR. Therefore, some parts of the model will need to be reduced in complexity. Remodeling, collapsing and adding animations to the model are done in Unity.
- During the package installation, mark Vuforia Augmented Reality Support together with the support of iOS or Android, or both.
- After the successful download and installation, create your project in Unity3D.

How the App Works

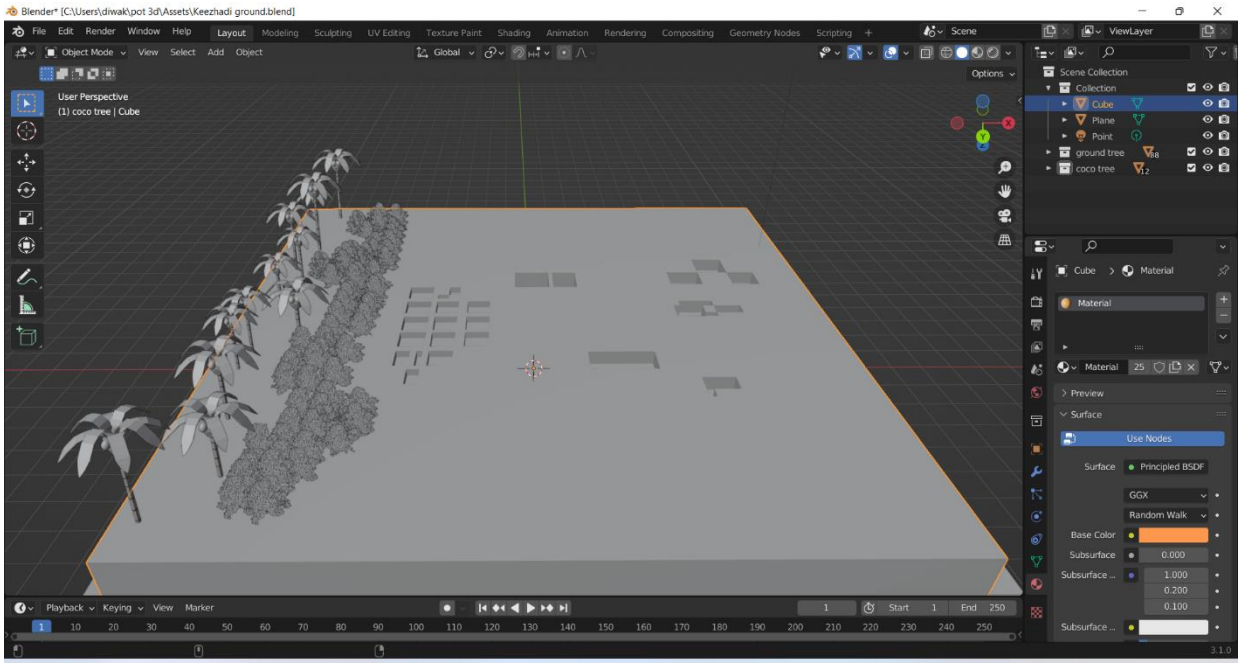
With computervision technology, we have the ability to understand and track an image within a 3D environment. If you have a predefined image in your view of reality, an augmented reality app can track that image and superimpose a 3D model on top of it. In this way, you can establish a composite view of an augmented model and the real world.

CHAPER 4

IMPLEMENTATION

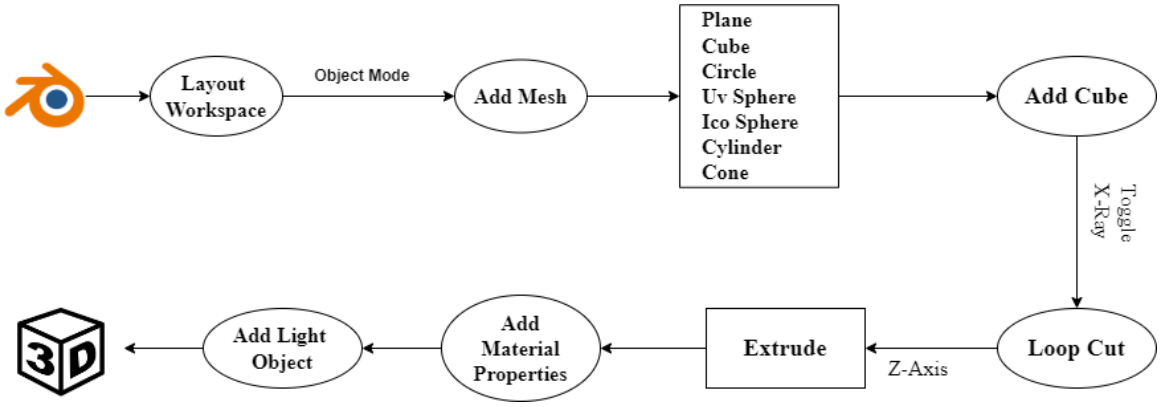
Keezhadi Ground View 3D Model:

Original 2D Image



Final Rendering Output

WORK FLOW DIAGRAM:



Step 1: Add a Cube

Step 2: Toggle X-Ray the original image

Step 3: Loop Cut and Slide it

Step 4: Extrude the particular area in Z-Axis

Step 5: Creating Trees -> Add Plane

Step 6: Loop cut -> Select the center (Vertex Select) -> Scale X axis

Step 7: Similarly, Y-Axis and Create Tree

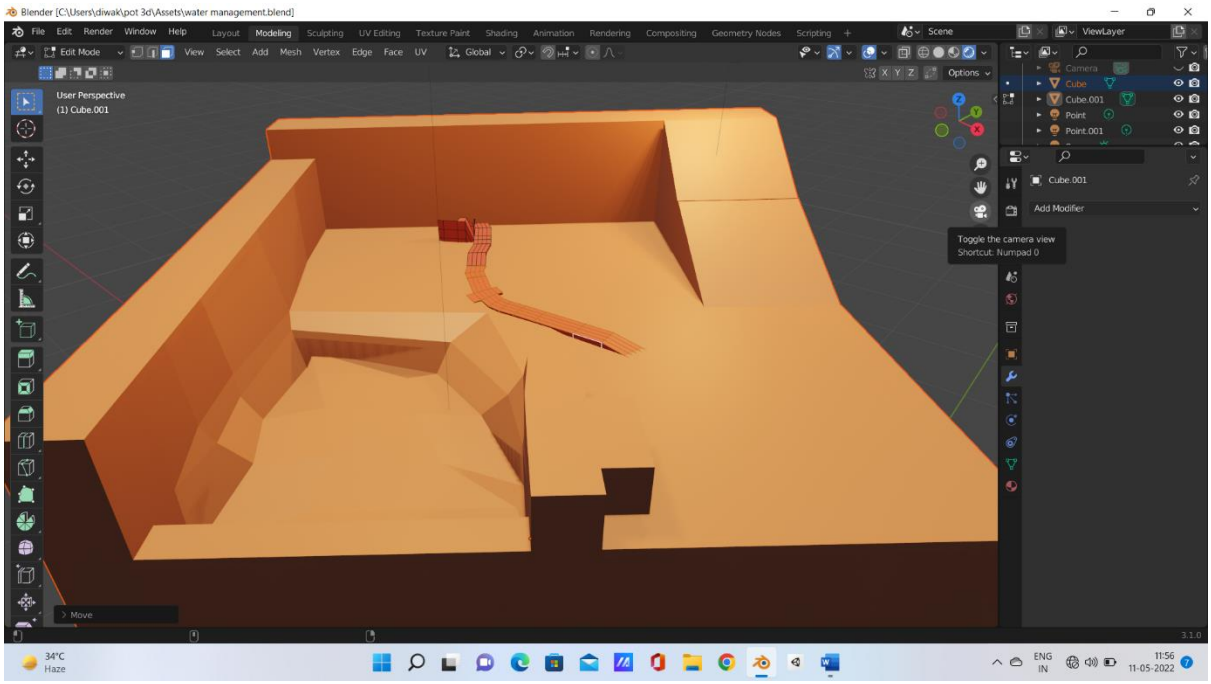
Step 8: Add Material Properties

Step 9: Add a light object to the Scene

Step 10: Save to (. Blend or .obj) file

Keezhadi Water Management System 3D Model:

Original 2D Image



Final Rendering Output

Step 1: Add a Cube

Step 2: Toggle X-Ray the original image (Transparent Scene display)

Step 3: Select the Wireframe Display the object as wire edges

Step 4: Loop Cut and Slide it

Step 5: Extrude the particular area in Z-Axis

Step 6: Loop cut -> Select the center (Vertex Select) -> Scale X axis

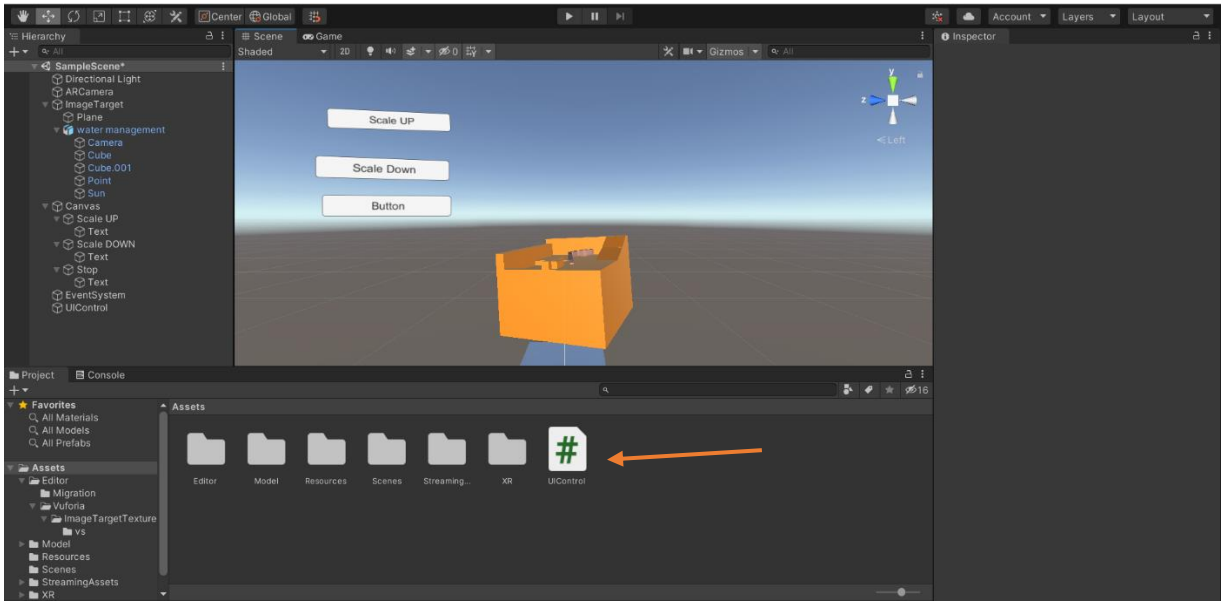
Step 7: Similarly, Y-Axis

Step 8: Add Material Properties

Step 9: Add a light object to the Scene

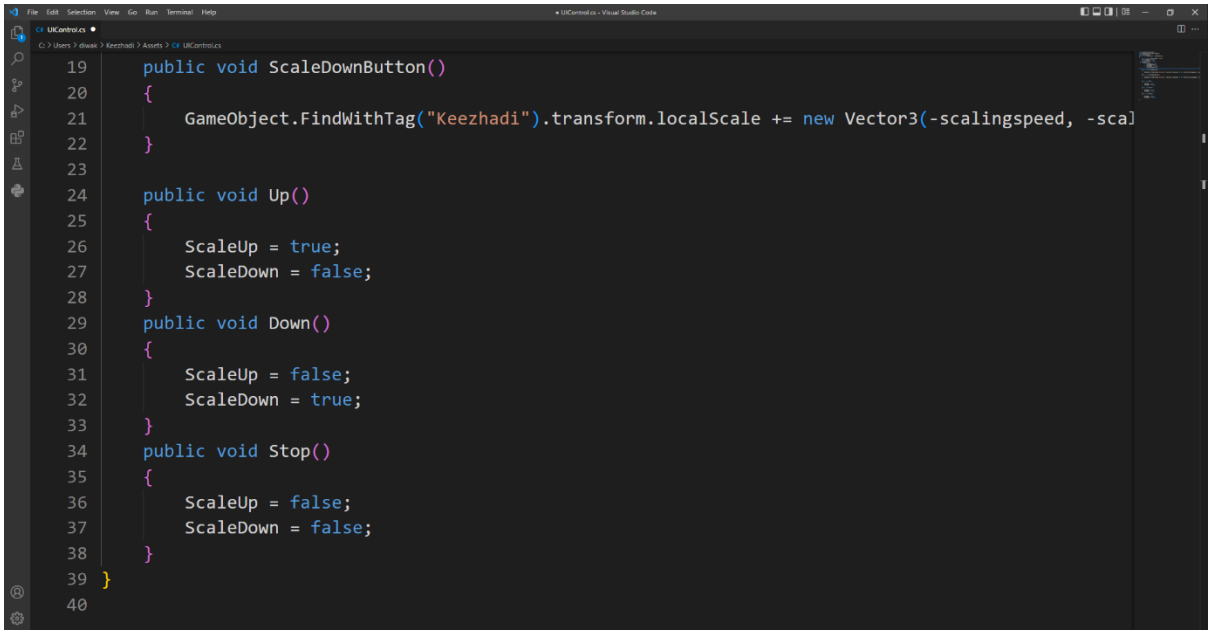
Step 10: Save to (.Blend or .obj)file

Keezhadi Water Management UI Design:



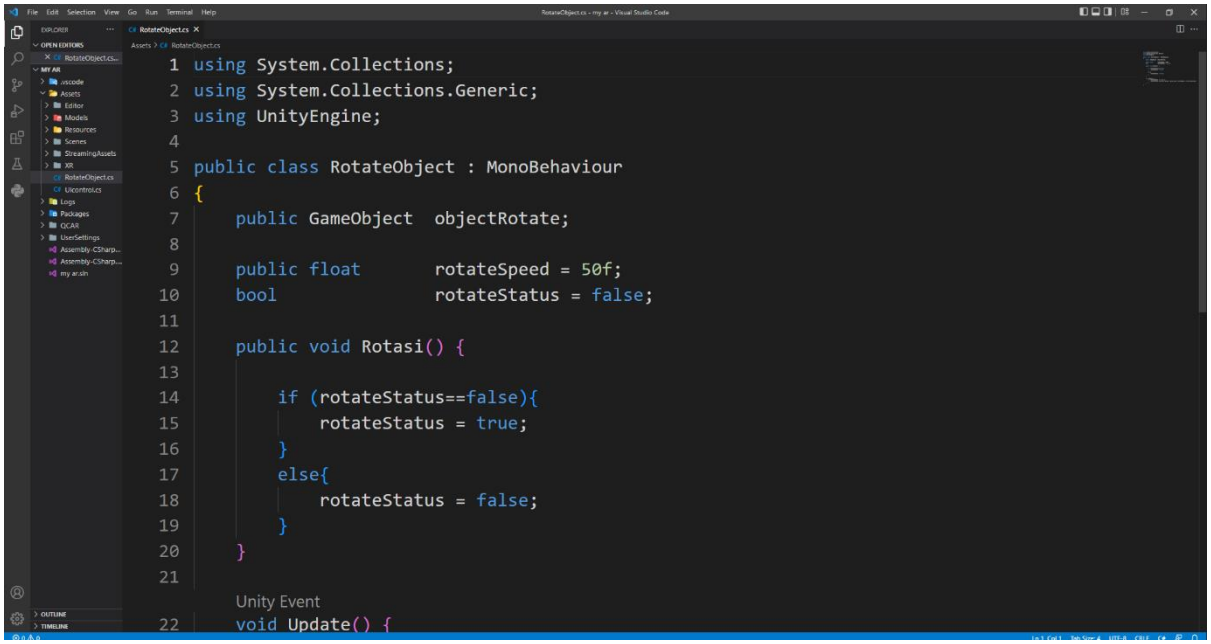
Source code: (UIControl.cs)

```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;
public class UIControl : MonoBehaviour
{
    public float scalingspeed = 0.01f;
    bool ScaleUp = false;
    bool ScaleDown = false;
    Unity Event
void Update () {
        if (ScaleUp == true)
            ScaleUpButton();
        if (ScaleDown == true)
            ScaleDownButton();
}
    public void ScaleUpButton()
    {
        GameObject.FindWithTag("Keezhadi").transform.localScale += new Vector3(scalingspeed, scalir
    }
    public void ScaleDownButton()
    {
        GameObject.FindWithTag("Keezhadi").transform.localScale += new Vector3(-scalingspeed, -scal
    }
```



```
    public void ScaleDownButton()
    {
        GameObject.FindWithTag("Keezhadi").transform.localScale += new Vector3(-scalingspeed, -scal
    }

    public void Up()
    {
        ScaleUp = true;
        ScaleDown = false;
    }
    public void Down()
    {
        ScaleUp = false;
        ScaleDown = true;
    }
    public void Stop()
    {
        ScaleUp = false;
        ScaleDown = false;
    }
}
```

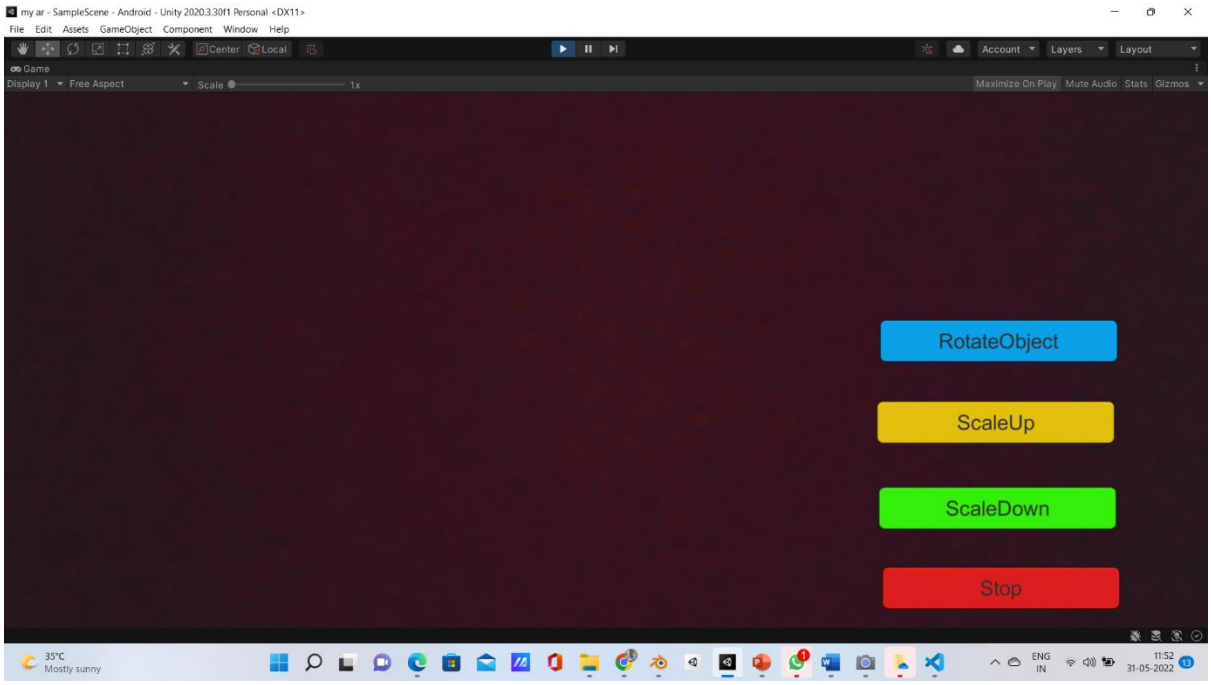
RotateObject.cs

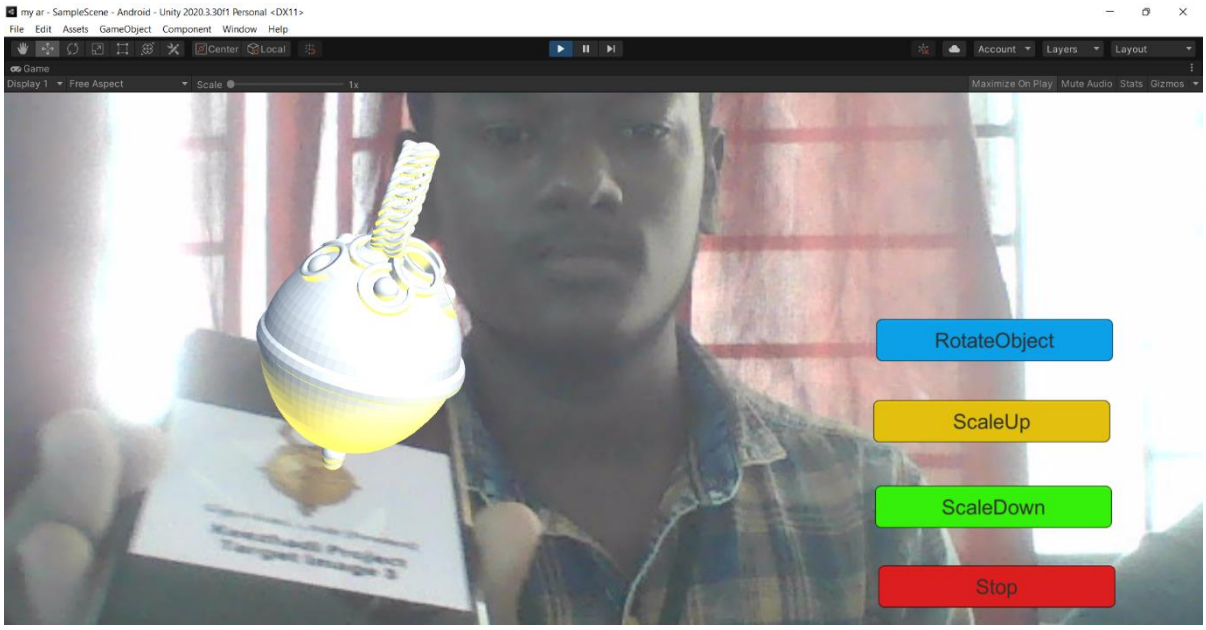


```
using System.Collections;
using System.Collections.Generic;
using UnityEngine;

public class RotateObject : MonoBehaviour
{
    public GameObject  objectRotate;

    public float       rotateSpeed = 50f;
    bool               rotateStatus = false;

    public void Rotasi() {

        if (rotateStatus==false){
            rotateStatus = true;
        }
        else{
            rotateStatus = false;
        }
    }

    Unity Event
    void Update() {
```

```
9     public float       rotateSpeed = 50f;
10    bool               rotateStatus = false;
11
12    public void Rotasi() {
13
14        if (rotateStatus==false){
15            rotateStatus = true;
16        }
17        else{
18            rotateStatus = false;
19        }
20    }
21
      Unity Event
22    void Update() {
23        if (rotateStatus == true) {
24            objectRotate.transform.Rotate (Vector3.up, rotateSpeed * Time.deltaTime);
25        }
26    }
27 }
28
```

WebCam View:

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File Edit Assets GameObject Component Window Help
Center Local
Account Layers Layout
Game
Display 1 Free Aspect Scale 1x
Maximize On Play Mute Audio Stats Gizmos
RotateObject
ScaleUp
ScaleDown
Stop

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- https://www.raywenderlich.com/31539225-creating-reusable-characters-with-blender-and-unity
- https://gamedevacademy.org/how-to-import-blender-models-into-unity-your-one-stop-guide/