CSE 566 Virtual Reality
Spring 2020, Assignment 3: Augmented Reality

https://drive.google.com/open?id=1P80_P4ITiHC3JG3_aanNgdf63rpecKGn

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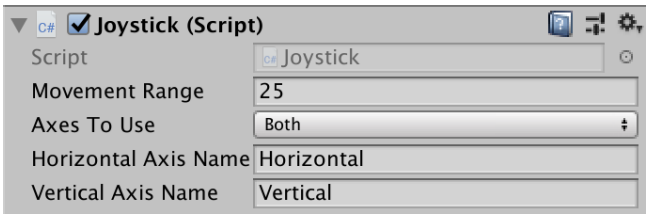
Unity version: 2018.4.19f1
Vuforia version: 8.3.8
Directory hierarchy:

Details on implementation:

AR Settings:
PlaceFinder: First of all, to make the plane detectable for ar devices, I set a new component called *plan finder* and *grand plane stage* from the Vuforia Engine. Therefore the camera can find where to place the scene and start to detect a certain object.

Joystick Controller:
Following the tutorial in reference , there is a default scripts in the standard assets to control the joystick. By using the CrossPlatformInputManger, the joystick can get control from the horizontal and vertical axis. With the script, I made one joystick that can control the movement. Then by splitting it up, one joystick can move the object and another will rotate it.

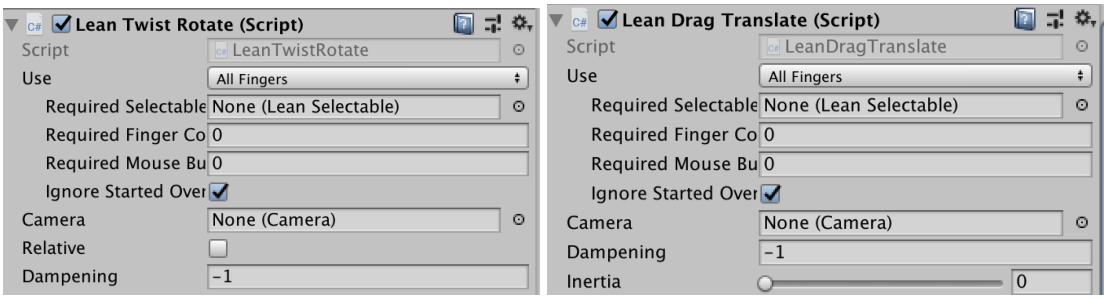



```
float x = CrossPlatformInputManager.GetAxis("Horizontal");
float y = CrossPlatformInputManager.GetAxis("Vertical");

float RotateX = CrossPlatformInputManager.GetAxis("Horizontal_1");
float RotateY = CrossPlatformInputManager.GetAxis("Vertical_1");
```

Drag Objects:

The lean touch assets can be used for dragging objects and rotating them. After importing it, add *lean translate & lean rotate* scripts to the target, then you can drag and rotate the objects in the AR running mode with fingers.



Spaceship Motion:

The spaceship can move forward in the game mode.

```
float step = 0.08f * Time.deltaTime;
transform.position = Vector3.MoveTowards(transform.position, Target.transform.position, step);

if (Vector3.Distance(transform.position, Target.transform.position) < 0.01f)
{
    transform.position += new Vector3(0, 0, 0);
}
```

Move Cargos:

The cargos are set to move forward to the target plane with a certain speed. Once their distance is close enough, the speed will be set to zero. The initial position is from Also if the distance between the cargo and the greenhouse is close, then it will be freezed by disabling all the scripts on it, so that it won't affect the next dragging action.

```
if( dist > 0.1)
{
    if (Vector3.Distance(Targetobj.transform.position, transform.position) <= 0.1)
    {
        willmove = false;
        transform.position += new Vector3(0, 0, 0);

    }
    else if (Vector3.Distance(Targetobj.transform.position, transform.position) > 0.1 && willmove == true)
    {

        if (setinitial == true)
        {
            startpos = moveto();// -> setinitial=false;
            transform.position = startpos + dirNormalized * speed * Time.deltaTime;

        }
        else
        {
            // when setinitial = false:
            dirNormalized = Targetobj.transform.position - transform.position;
            transform.position += dirNormalized * speed * Time.deltaTime;
        }
    }
    else
    {
        transform.position += new Vector3(0, 0, 0);
    }
}
```

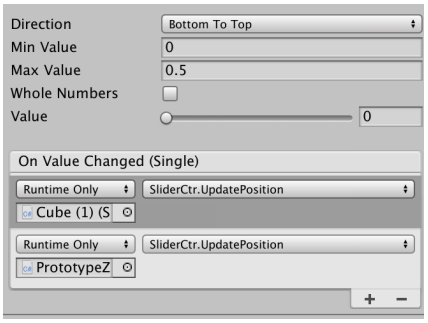
Light Swith:
The light switch is implemented by pressing a button. In the light mode(night mode) the directional light will be set off, and the point light inside several objects like greenhouse, spaceship will be turned on.

```
if (LightOn)
{
    GlobalLight.intensity = 0;
    Light1.intensity = 0.7f;
    Light2.intensity = 0.7f;

}
```

Transition:
There are two buttons shown on the screen so that the users can switch between. In the Build Mode, all the actions like placing, rotating, and using sliders are set active on the button, while in the Game Mode they are set to be inactive. Meanwhile the planets rotating, spaceship motion will be set active.

UI Canvas:
Each button has an onclick function to set the specific object active.
Slider: The sliderCtr script is to set the values of the slider.




```
public Slider slider;
public Vector3 pos1 = new Vector3(0,0,0);
public Vector3 pos2 = new Vector3(0, 1, 0);

private void Start()
{

    slider.onValueChanged.AddListener(UpdatePosition);
}

public void UpdatePosition(float value)
{
    pos1.x = transform.position.x;
    pos1.z = transform.position.z;
    pos2.x = pos1.x;
    pos2.z = pos1.z;
    Vector3 newPos = Vector3.Lerp(pos1, pos2, value);
    transform.position = newPos;
}
```

References:

Planets:https://assetstore.unity.com/packages/3d/environments/stylized-planet-pack-full-148233
GreenHouse:https://assetstore.unity.com/packages/3d/environments/urban/lowpoly-modern-city-buildings-set-64427
Spaceship:https://assetstore.unity.com/packages/3d/characters/toon-spaceships-102417
JoystickTutorial:https://www.youtube.com/watch?v=lMFn8eTwePI
https://www.youtube.com/watch?v=s_fGk2M3I2c
Move And Rotate Object Using LeanTouch: https://www.youtube.com/watch?v=KC0i5U1-1cc
Cast Shadow: https://www.youtube.com/watch?v=M6zFKfF4gOE\
SliderControl: https://forum.unity.com/threads/how-do-i-move-gameobjects-with-a-ui-slider.519417/