TECHNISCHE UNIVERSITÄT DARMSTADT

Informatik

HCI Lab

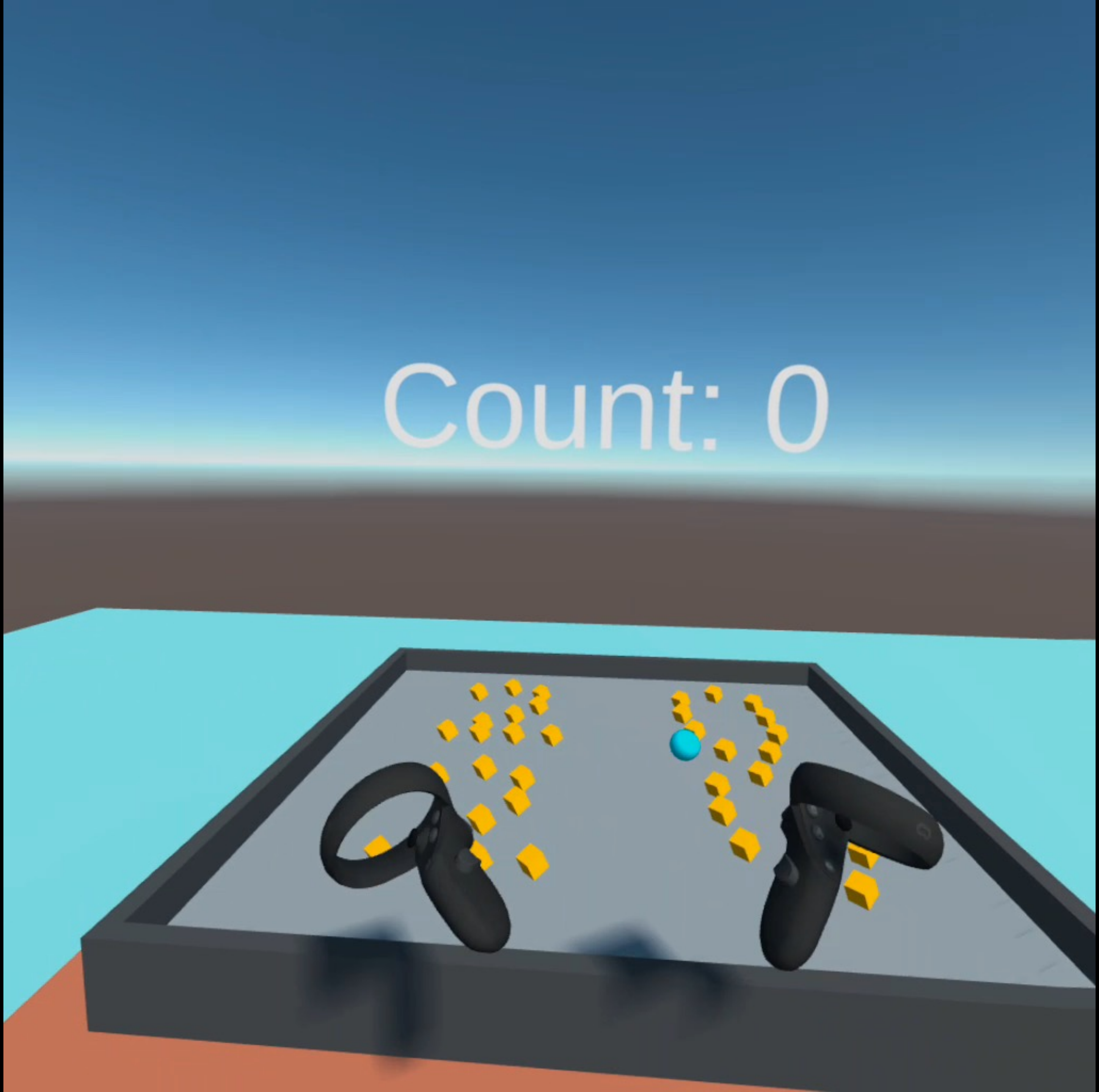
IVAR: Lab 2

Roll-a-ball in VR

31.10.2023

Labs

17.10	~~Website (hugo) + unity setup~~
24.10	~~Reverse classroom topics~~
31.10	Introduction to Unity (roll-a-ball)
	Roll-a-ball in VR
07.11	VR parkour
14.11	Pitch your locomotion and interaction idea
21.11	Reverse classroom 1
27.11	Reverse classroom 2

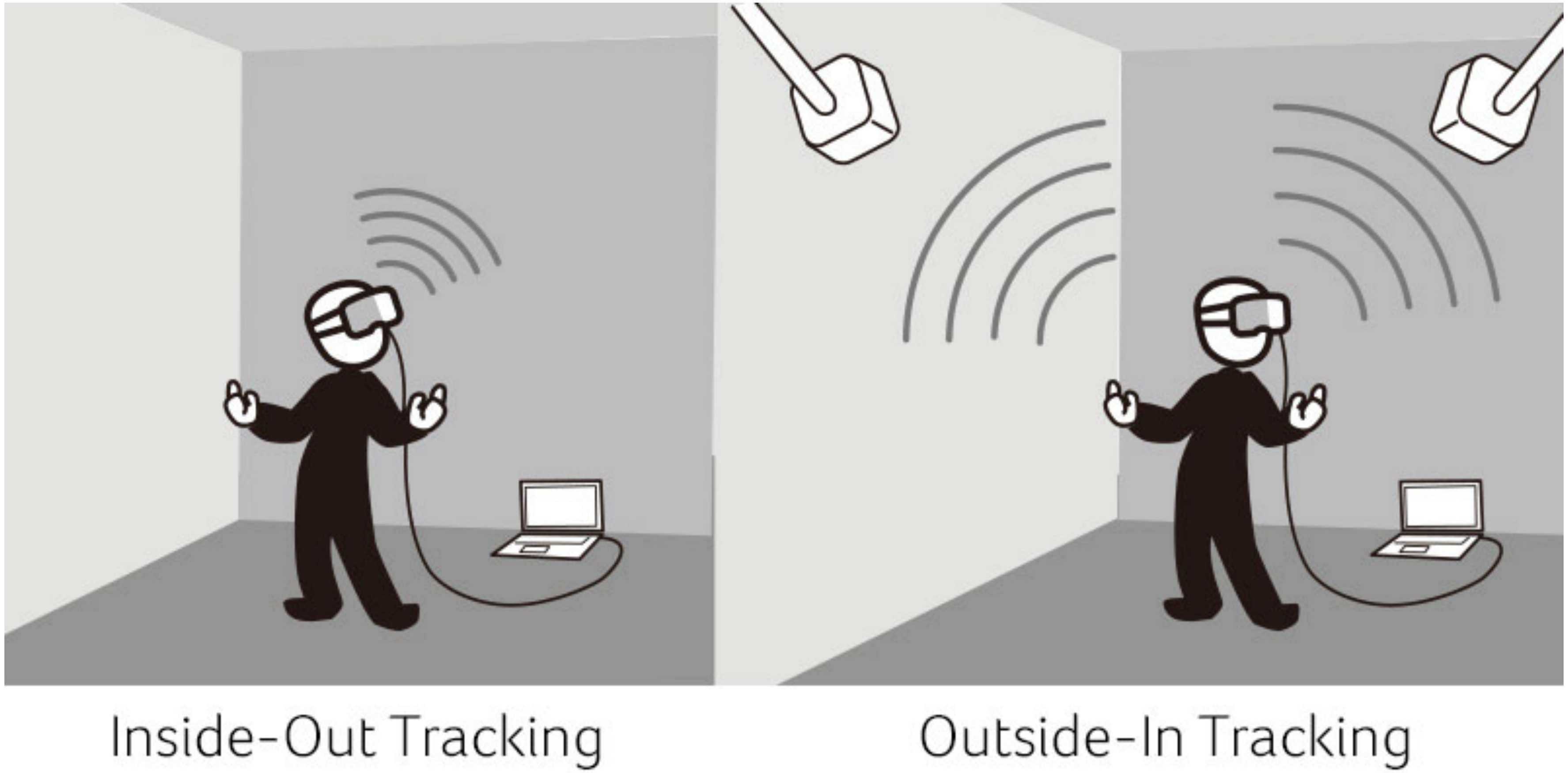


Count: 0

Set up VR in Unity

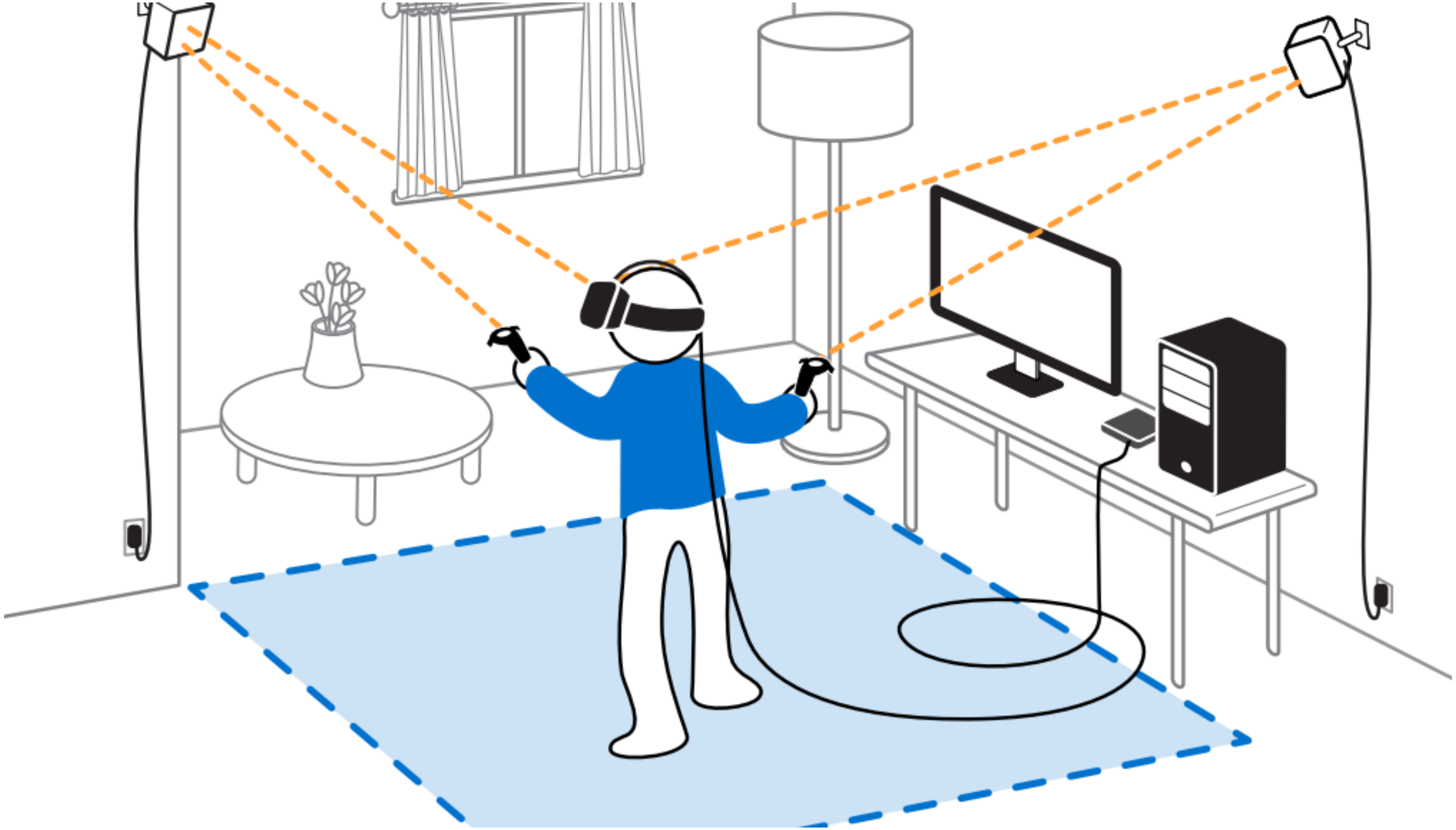
https://static.acer.com/up/Resource/Acer/Wearable/WMR/Design/Hotspot/20170922/Inside-Out%20Tracking.jpg

Tracking



https://forums.tomsguide.com/faq/how-to-set-up-your-vive-base-stations-for-cabled-sync.111306/ddd

Outside-In: HTC Vive Pro



https://hitmotion.games/oculus-quest-mixed-reality/

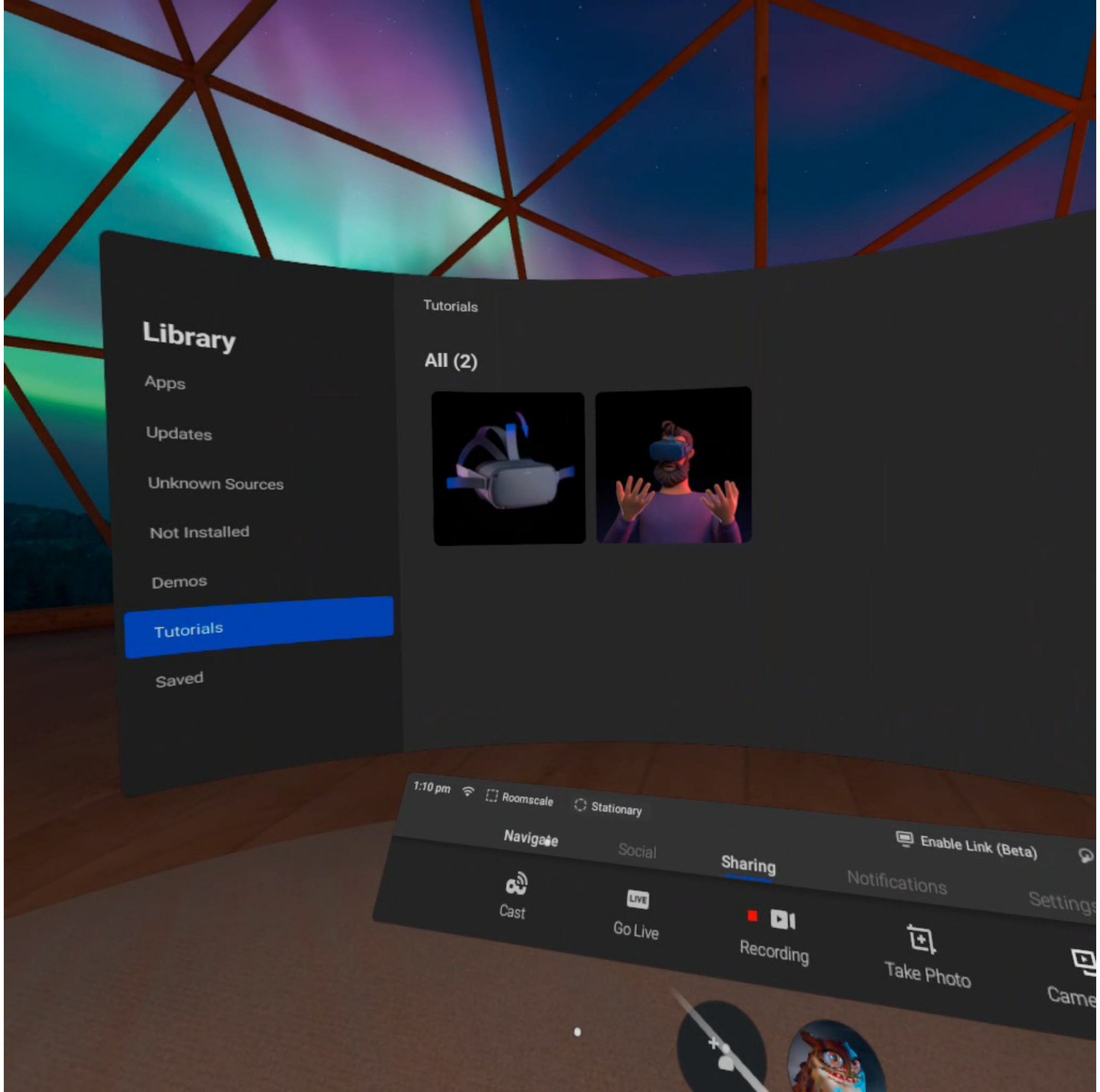
Inside-Out: Oculus Quest

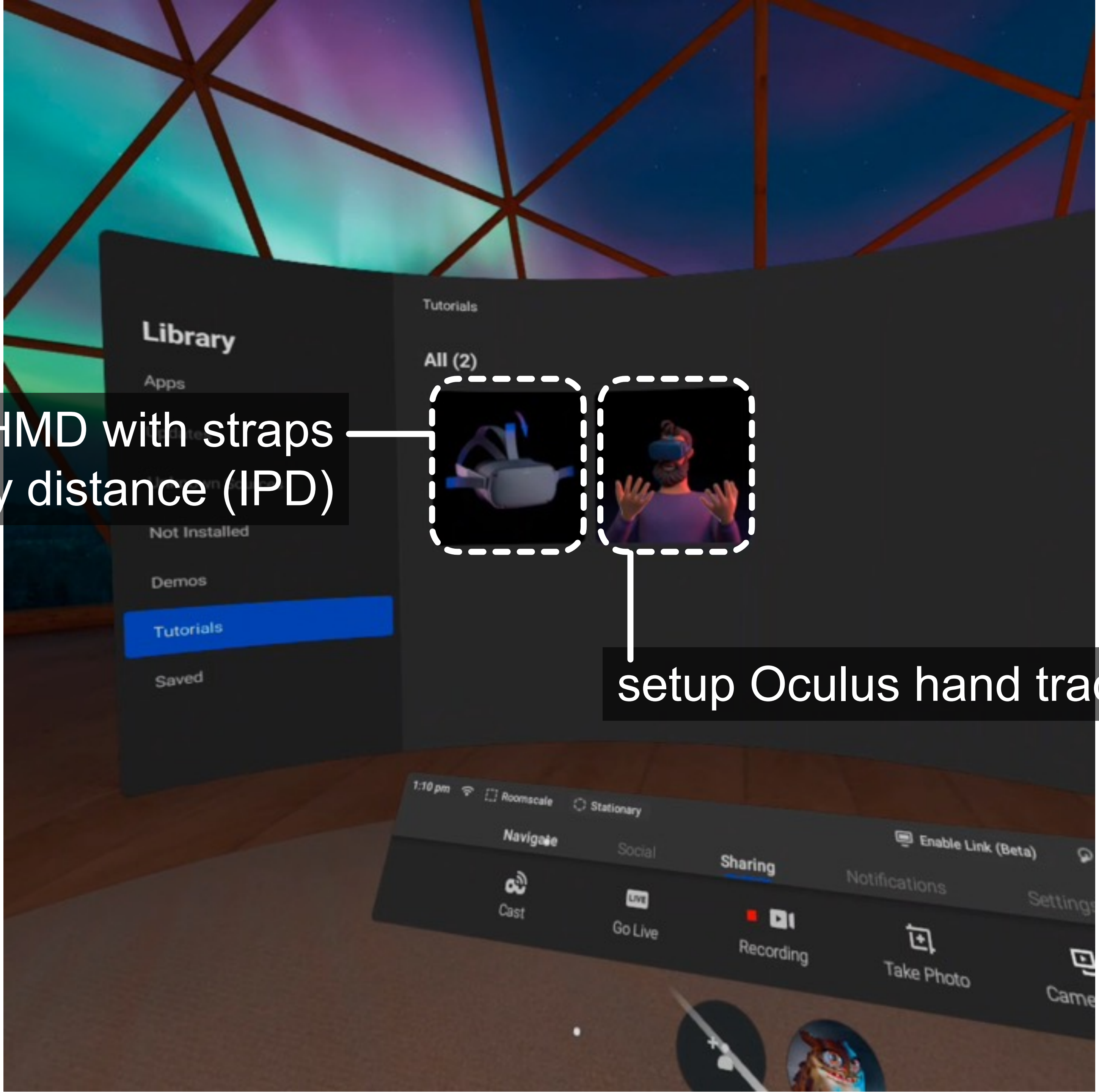
setup Oculus Quest HMDs

Quest

- Room or stationary boundary
- Enable hand tracking
- Upload .apk
  - Enable developer mode on your Quest
  - Using SideQuest

start with two tutorials in HMD





setup HMD with straps
adjust interpupillary distance (IPD)

setup Oculus hand tracking

setup Unity

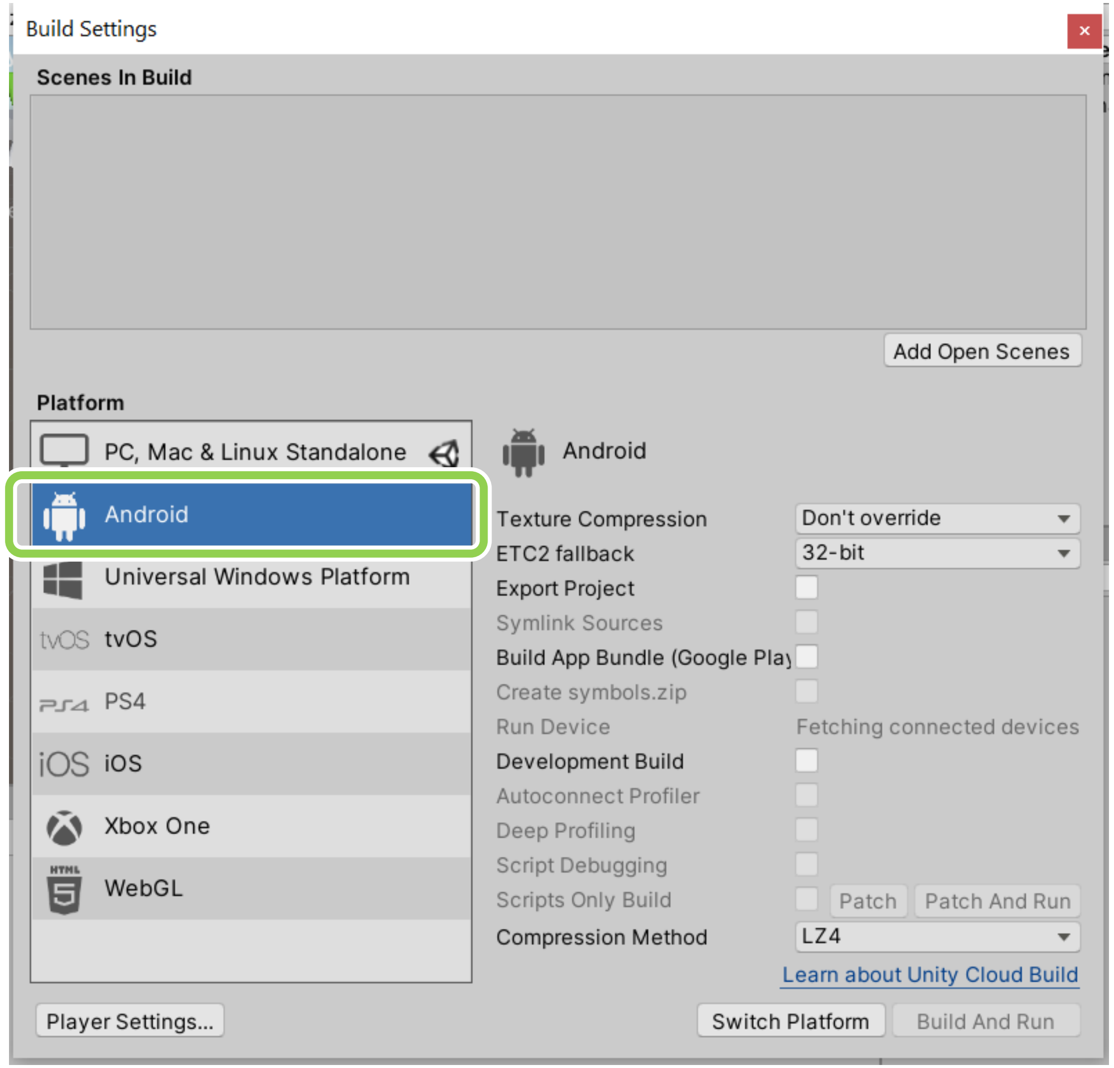
We will need to set up a unity environment to build android applications on Quest.

A reference: https://grendelgames.com/setting-up-your-oculus-within-unity-to-develop-vr-applications/

You can either create a new project or use your old roll-a-ball

Build platform for Quest

- File > Build settings > select Android
- Switch Platform



Build Settings

Scenes In Build

Platform

Android

Texture Compression: Don't override

ETC2 fallback: 32-bit

Export Project □

Symlink Sources □

Build App Bundle (Google Play □

Create symbols.zip □

Run Device: Fetching connected devices

Development Build □

Autoconnect Profiler □

Deep Profiling □

Script Debugging □

Scripts Only Build □

Compression Method: LZ4

VR APIs in Unity

Oculus Integration
link

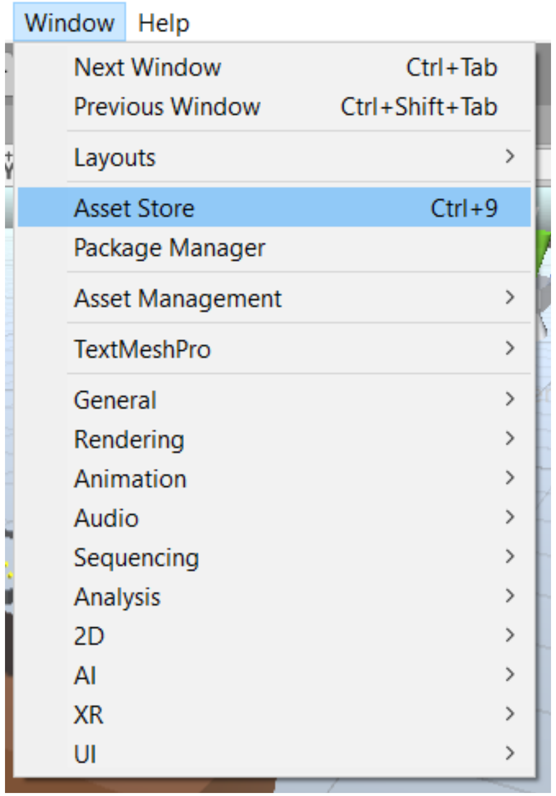
- developing with the original code from oculus
- the latest feature included (e.g., hand tracking)

Unity XR Input
link

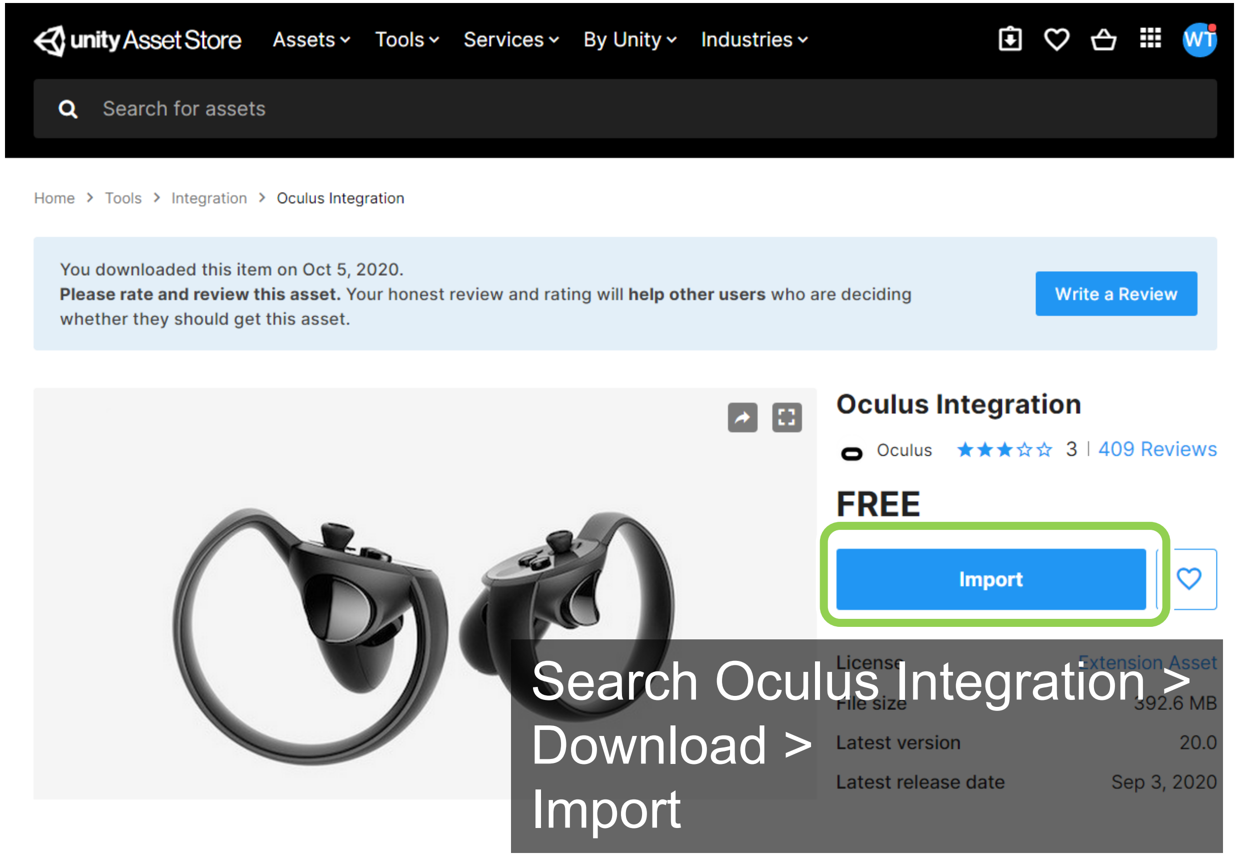
- a wrapper so that you don’t need to touch oculus code
- not always have the latest feature

Import Oculus Integration

1



2

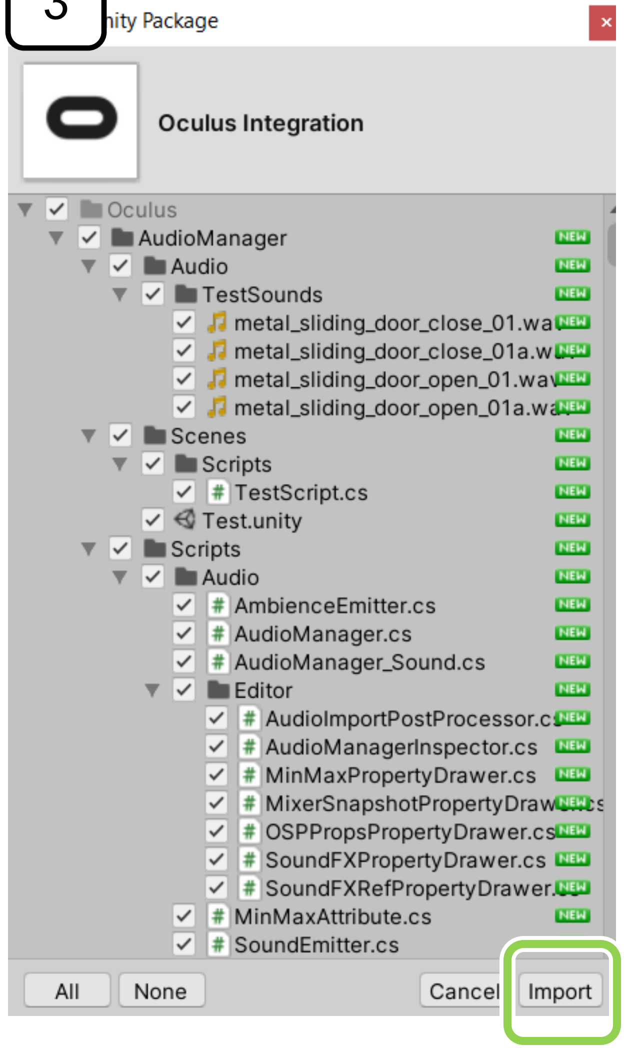


You downloaded this item on Oct 5, 2020.
Please rate and review this asset. Your honest review and rating will **help other users** who are deciding whether they should get this asset.

License	Extension Asset
File size	392.6 MB
Latest version	20.0
Latest release date	Sep 3, 2020

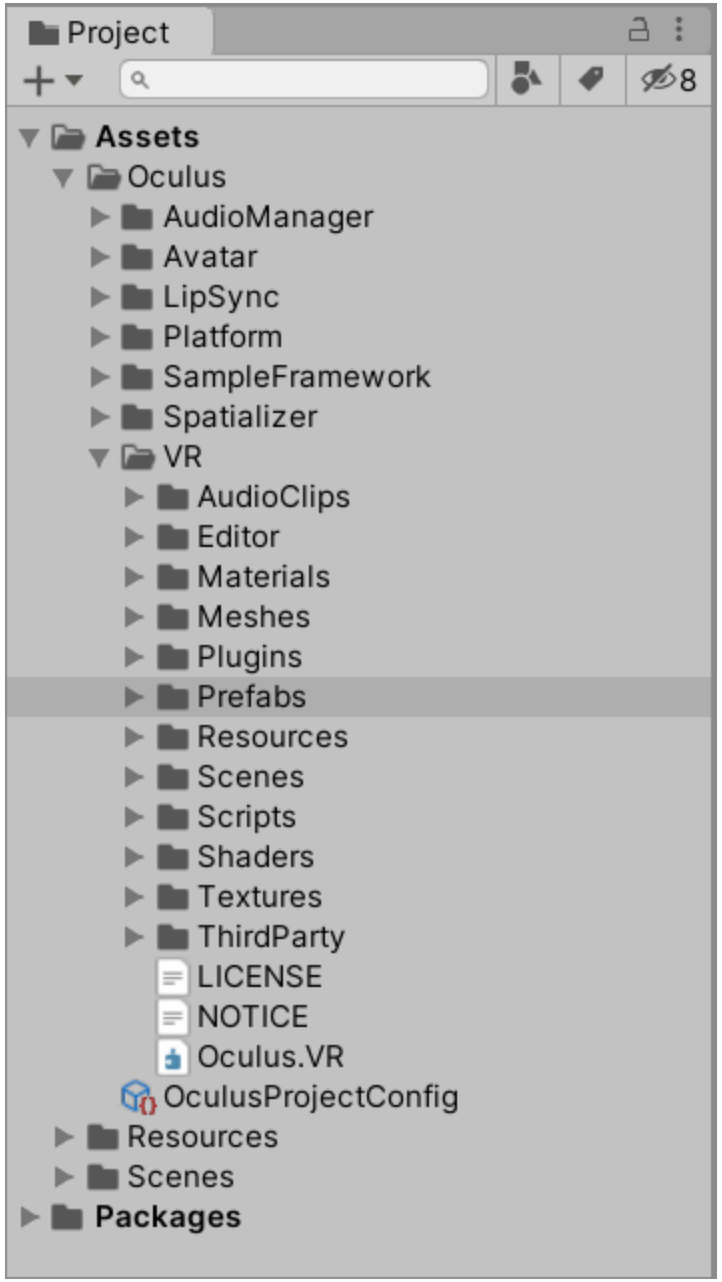
Search Oculus Integration > Download > Import

3



Takes a while to import

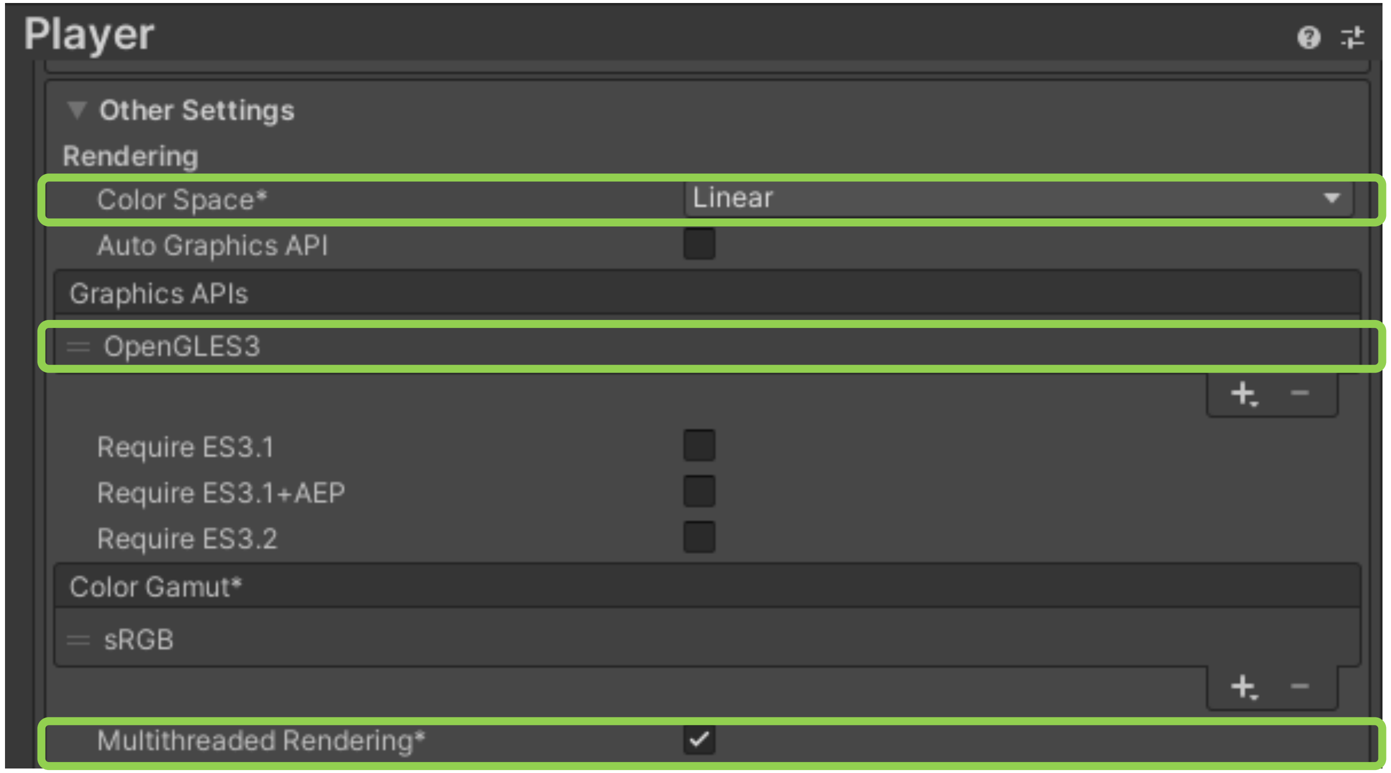
- You will see Oculus folder in your project window.



```
Assets
  Oculus
    AudioManager
    Avatar
    LipSync
    Platform
    SampleFramework
    Spatializer
    VR
      AudioClips
      Editor
      Materials
      Meshes
      Plugins
      Prefabs
      Resources
      Scenes
      Scripts
      Shaders
      Textures
      ThirdParty
      LICENSE
      NOTICE
      Oculus.VR
    OculusProjectConfig
  Resources
  Scenes
Packages
```

Rendering Settings

- ref
- Project settings > Player > Other Settings



Player

Other Settings

Rendering

Color Space* Linear

Auto Graphics API □

Graphics APIs

OpenGLES3

Require ES3.1 □

Require ES3.1+AEP □

Require ES3.2 □

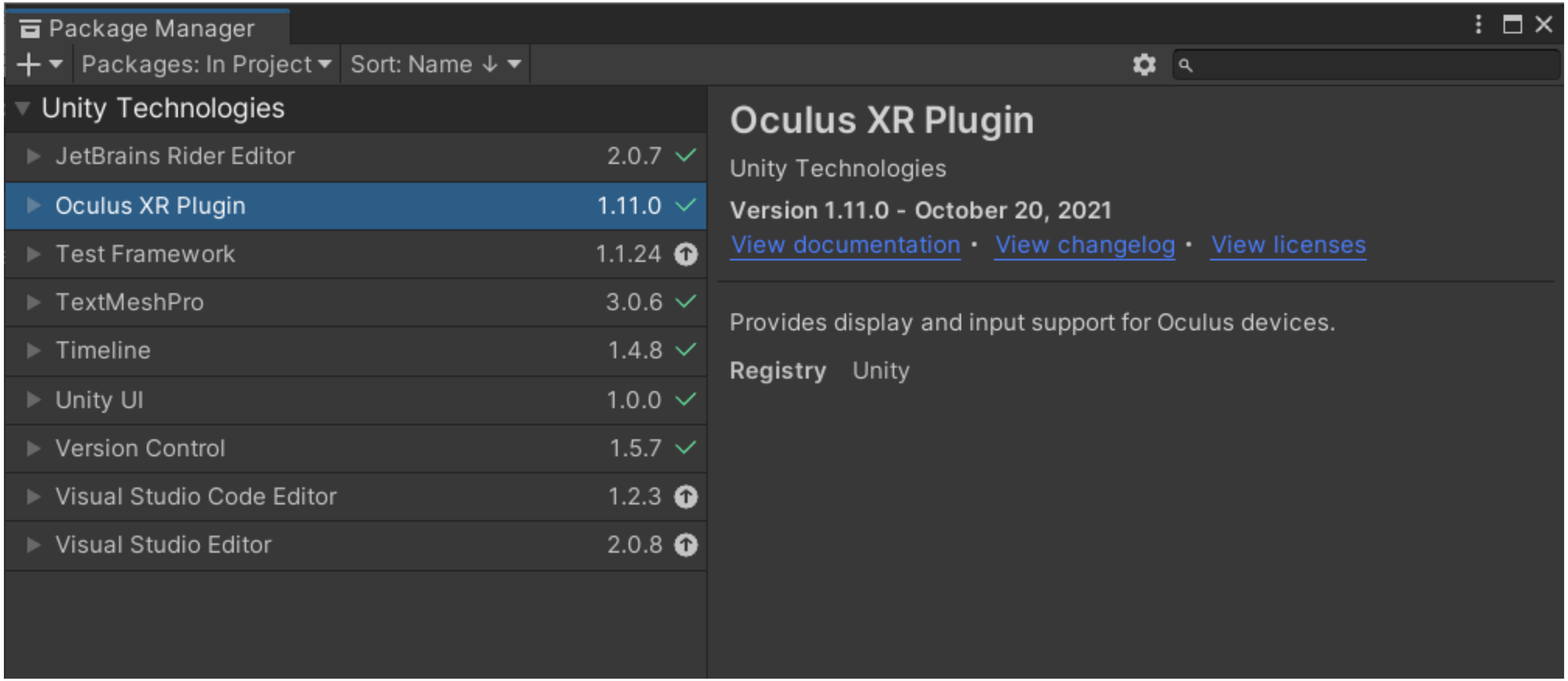
Color Gamut*

sRGB

Multithreaded Rendering* ☑

Package Manager

- add Oculus XR Plugin



Packages: In Project

Sort: Name ↓

Unity Technologies

JetBrains Rider Editor	2.0.7	✓
Oculus XR Plugin	1.11.0	✓
Test Framework	1.1.24	⬆
TextMeshPro	3.0.6	✓
Timeline	1.4.8	✓
Unity UI	1.0.0	✓
Version Control	1.5.7	✓
Visual Studio Code Editor	1.2.3	⬆
Visual Studio Editor	2.0.8	⬆

Oculus XR Plugin

Unity Technologies

Version 1.11.0 - October 20, 2021

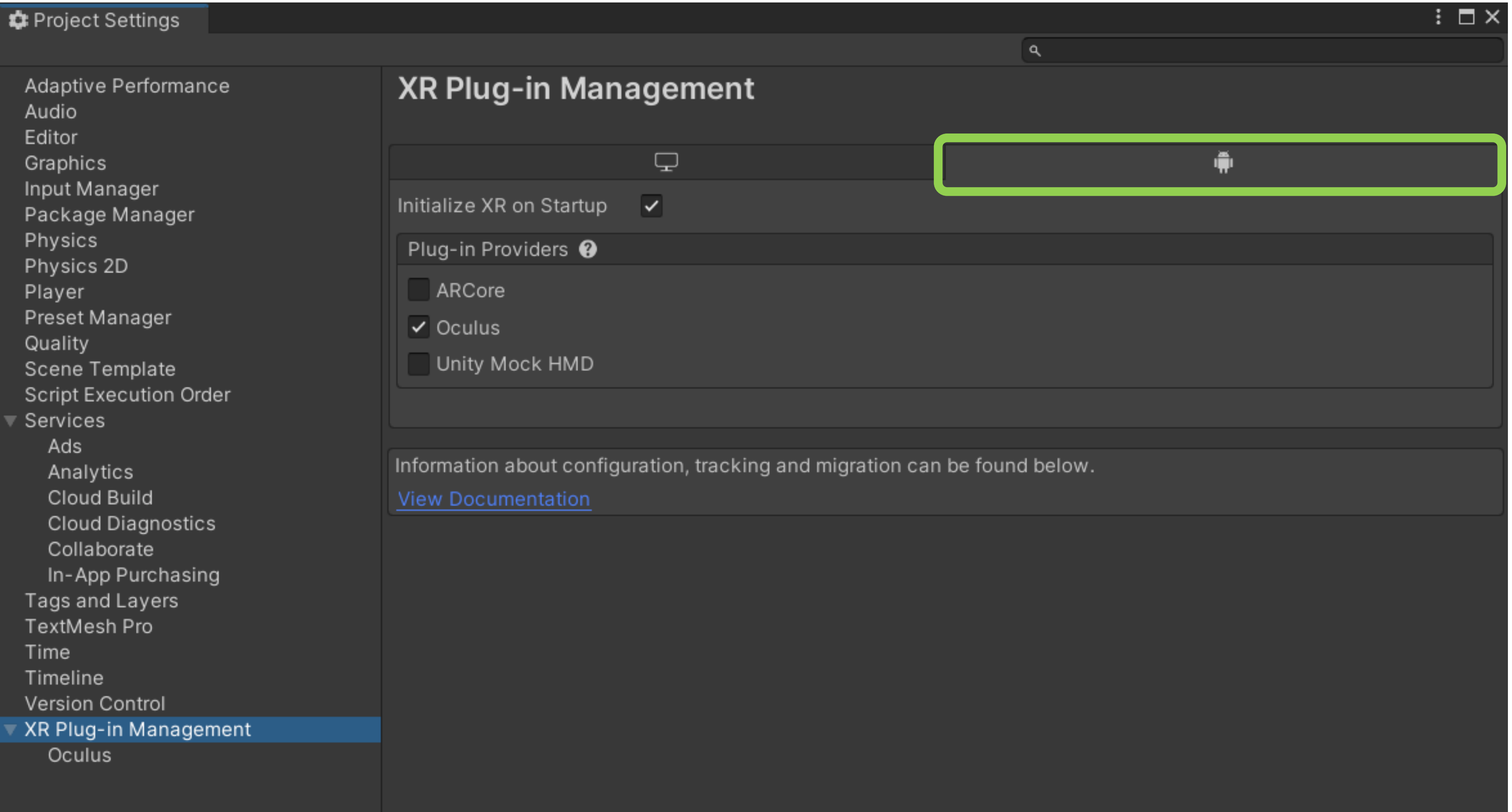
View documentation • View changelog • View licenses

Provides display and input support for Oculus devices.

Registry Unity

Project Settings

- Edit > Project Settings > XR Plug-in Management



XR Plug-in Management

Initialize XR on Startup ☑

Plug-in Providers

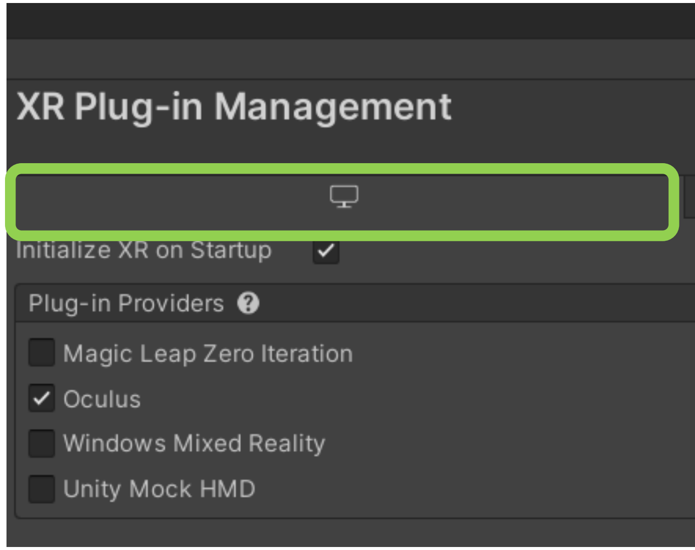
□ ARCore

☑ Oculus

□ Unity Mock HMD

Information about configuration, tracking and migration can be found below.

View Documentation



XR Plug-in Management

Initialize XR on Startup ☑

Plug-in Providers

□ Magic Leap Zero Iteration

☑ Oculus

□ Windows Mixed Reality

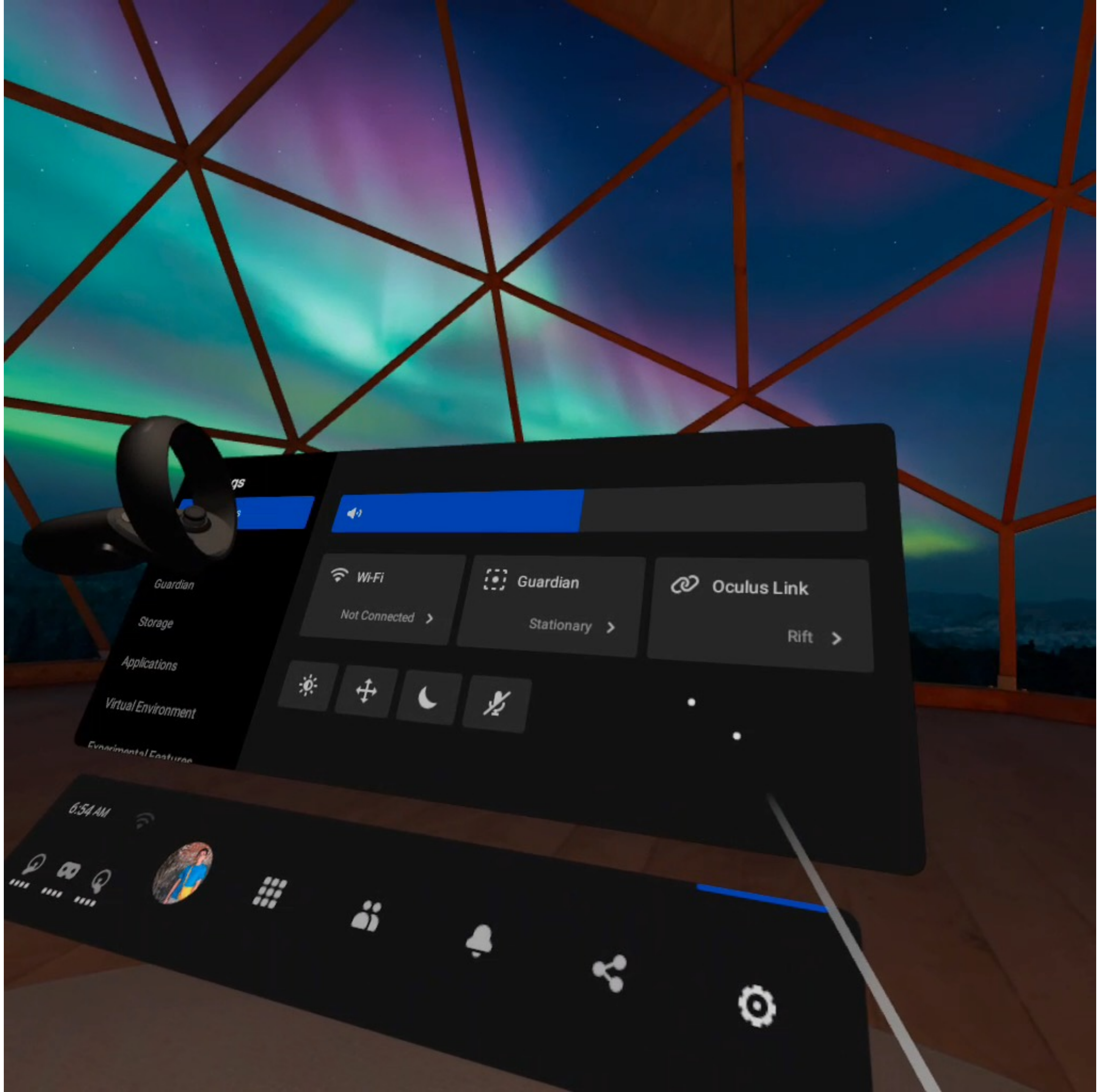
□ Unity Mock HMD

setup Oculus Link

Oculus Link requirement

- Quest can work as a Rift (stationary setup): Using Unity Editor to debug
- VR ready machine: see compatibility
- Cable: USB 3 C to C / USB A to C (Anker)
- Software: Install OculusSetup, update to the latest version
- Quest: update to the latest version

Enable Oculus Link



Wi-Fi: Not Connected

Guardian: Stationary

Oculus Link: Rift

VR selection + roll-a-ball

overview

3D manipulation tasks

selection

Acquiring or identifying a particular object or subset of objects from the entire set of objects available.

rotation

Changing the orientation of an object. E.g., what we just did in the roll-a-ball example.

positioning

Changing the 3D position of an object. E.g., moving an object from A to B.

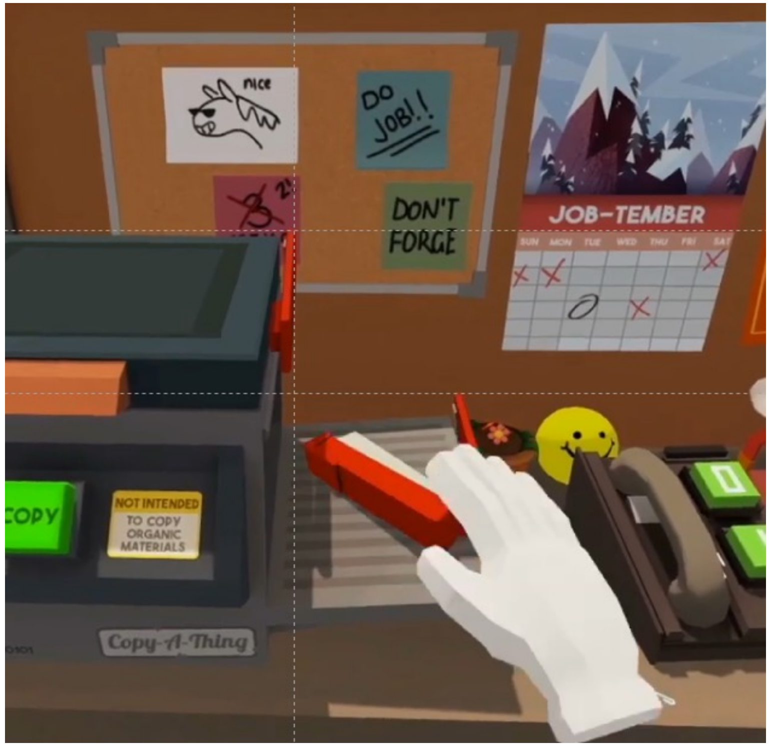
scaling

Changing the size of an object. E.g., resize a GUI on a laptop.

What selection techniques are there in VR?

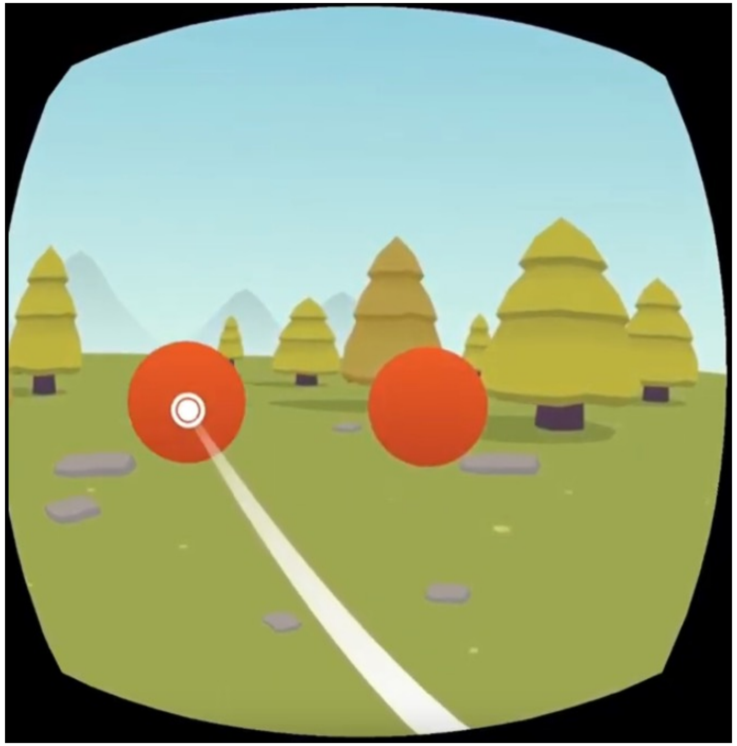
grasping

simple virtual hand


nice
DO JOB!!
DON'T FORGE
JOB-TEMBER
SUN MON TUE WED THU FRI SAT
COPY
NOT INTENDED TO COPY ORGANIC MATERIALS
Copy-A-Thing

pointing

ray-casting



	grasping	pointing
benefits		
limitations		

	grasping	pointing
benefits	• a direct way to manipulate • full degree of freedom (DoF)	• select things that are far away • fast
limitations	• the range is your arm length • lack of tactile feedback	• lack of DoF (e.g., depth) • what if the targets are far away - small and close to each other?

	grasping	pointing
benefits	- a direct way to manipulate - full degree of freedom (DoF)	- select things that are far away - fast
limitations	- the range is your arm length - lack of tactile feedback	- lack of DoF (e.g., depth) - what if the targets are small and close to each other?

application dependent: choose the interaction that suits your application best

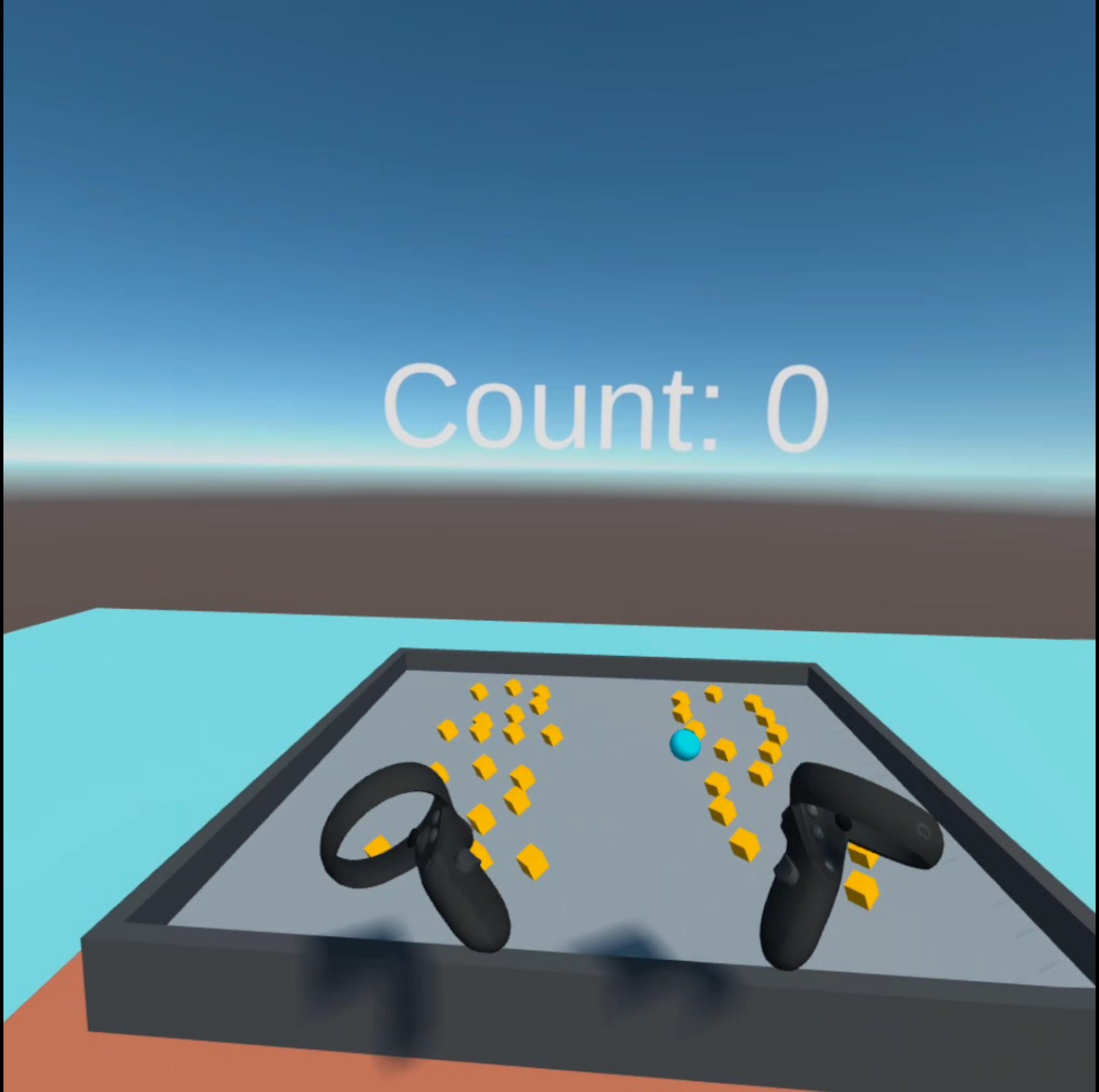
job simulator

There is no SUCCESS without JOB
WORK
Work
There is no SUCCESS without JOB
SRS BUSINESS INC.
JOBBOT
BURGERS BYTES
There is no
FAX-A-

for this lab

select with controller

example: we select and manipulate
the board of roll-a-ball using controllers

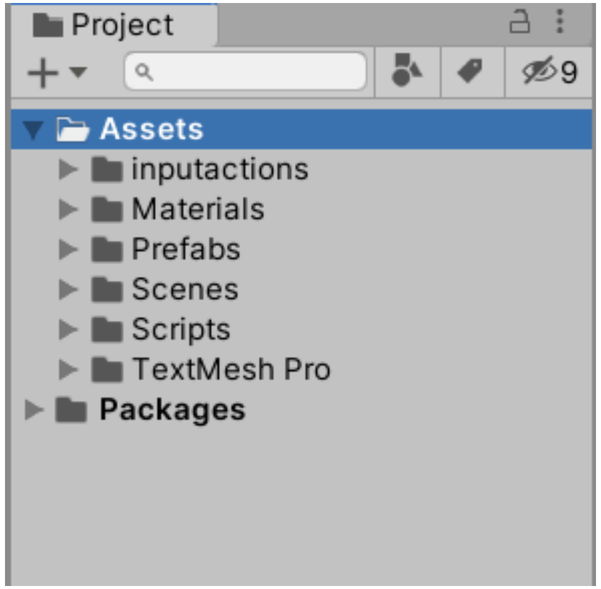

Count: 0

import the roll-a-ball project

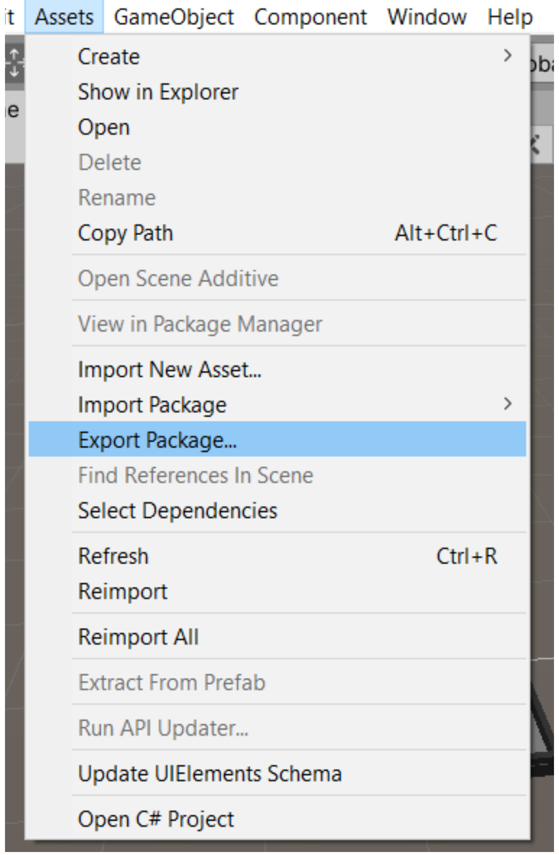
1) export project as .unitypackage
2) import custom package

Export the roll-a-ball project as .unitypacakge

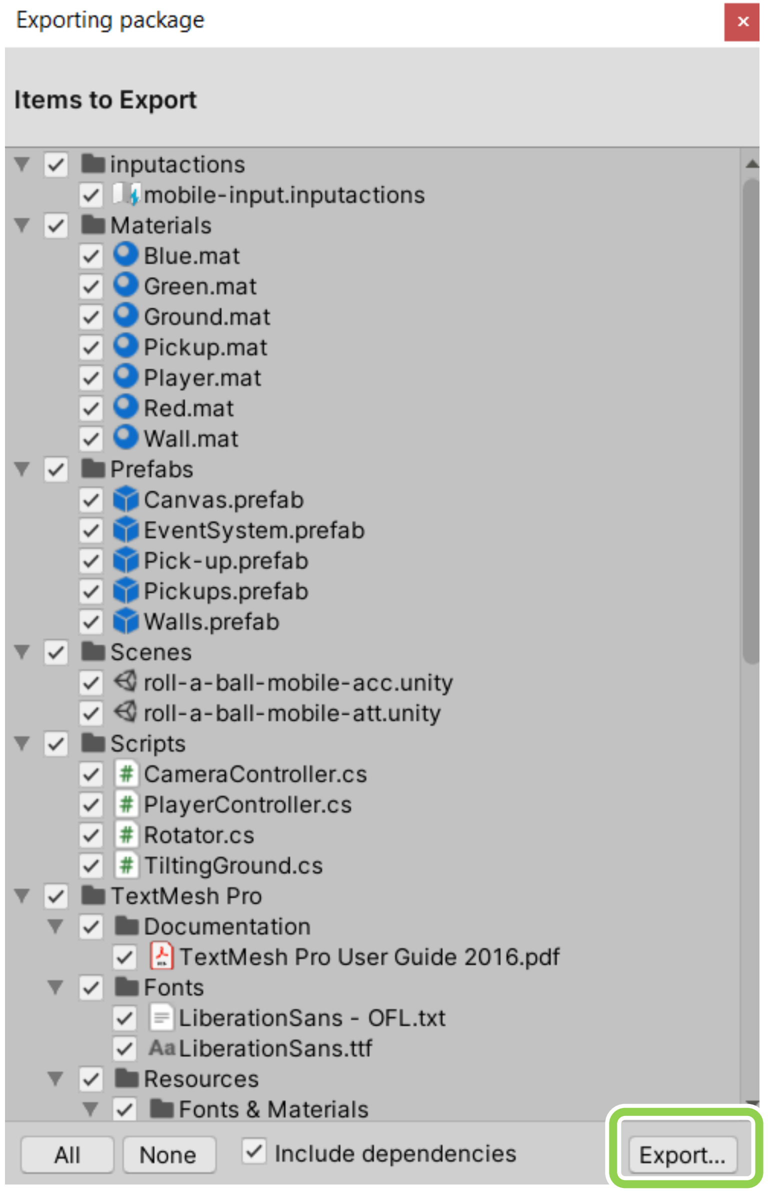
1 Select Assets in your Project Window



2 Assets > Export Package



3



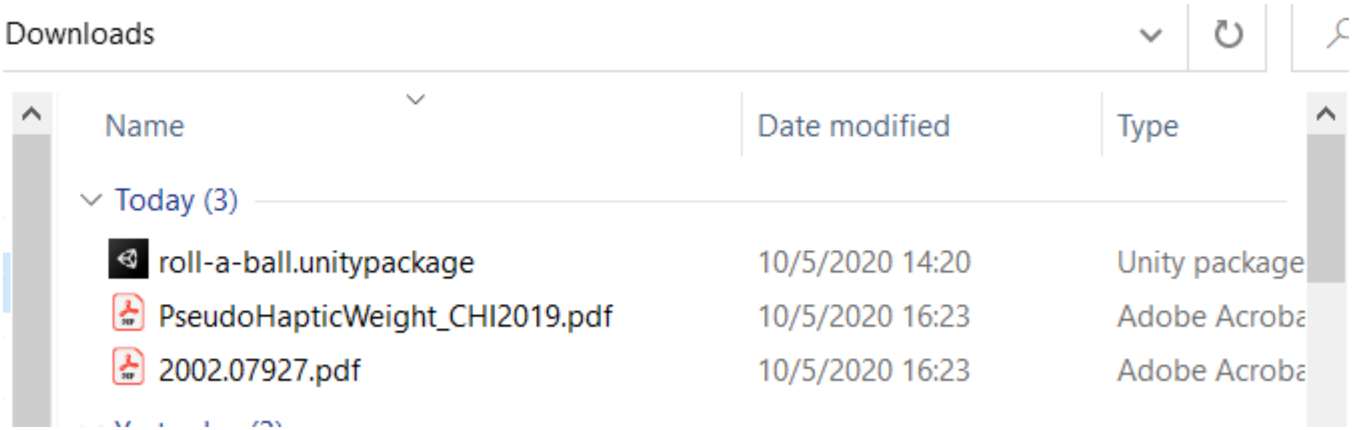
Exporting package

Items to Export

- ☑ inputactions
  - ☑ mobile-input.inputactions
- ☑ Materials
  - ☑ Blue.mat
  - ☑ Green.mat
  - ☑ Ground.mat
  - ☑ Pickup.mat
  - ☑ Player.mat
  - ☑ Red.mat
  - ☑ Wall.mat
- ☑ Prefabs
  - ☑ Canvas.prefab
  - ☑ EventSystem.prefab
  - ☑ Pick-up.prefab
  - ☑ Pickups.prefab
  - ☑ Walls.prefab
- ☑ Scenes
  - ☑ roll-a-ball-mobile-acc.unity
  - ☑ roll-a-ball-mobile-att.unity
- ☑ Scripts
  - ☑ CameraController.cs
  - ☑ PlayerController.cs
  - ☑ Rotator.cs
  - ☑ TiltingGround.cs
- ☑ TextMesh Pro
  - ☑ Documentation
    - ☑ TextMesh Pro User Guide 2016.pdf
  - ☑ Fonts
    - ☑ LiberationSans - OFL.txt
    - ☑ LiberationSans.ttf
  - ☑ Resources
    - ☑ Fonts & Materials

☑ Include dependencies

Export your project as .unitypackage

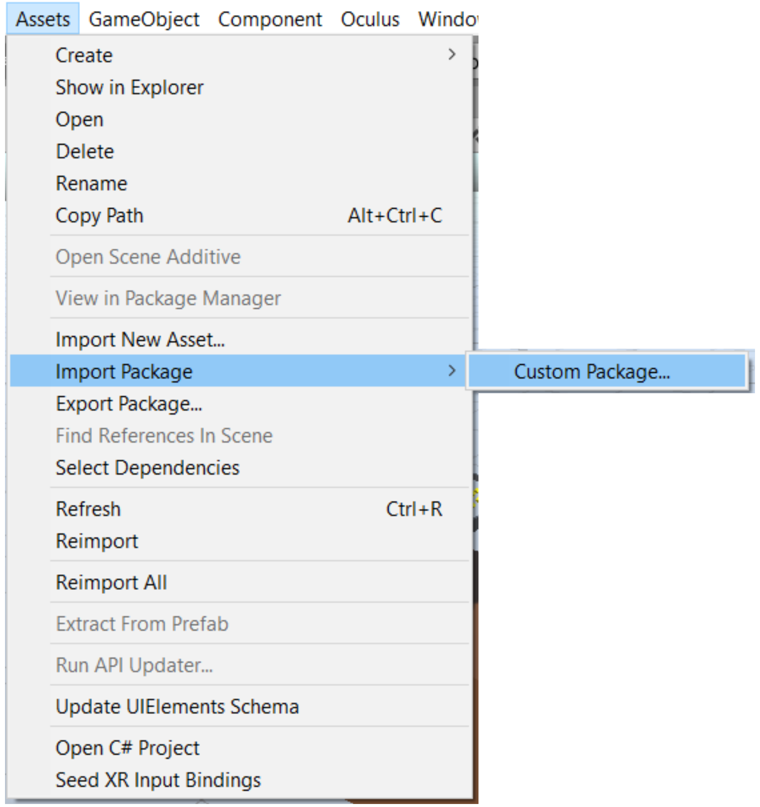


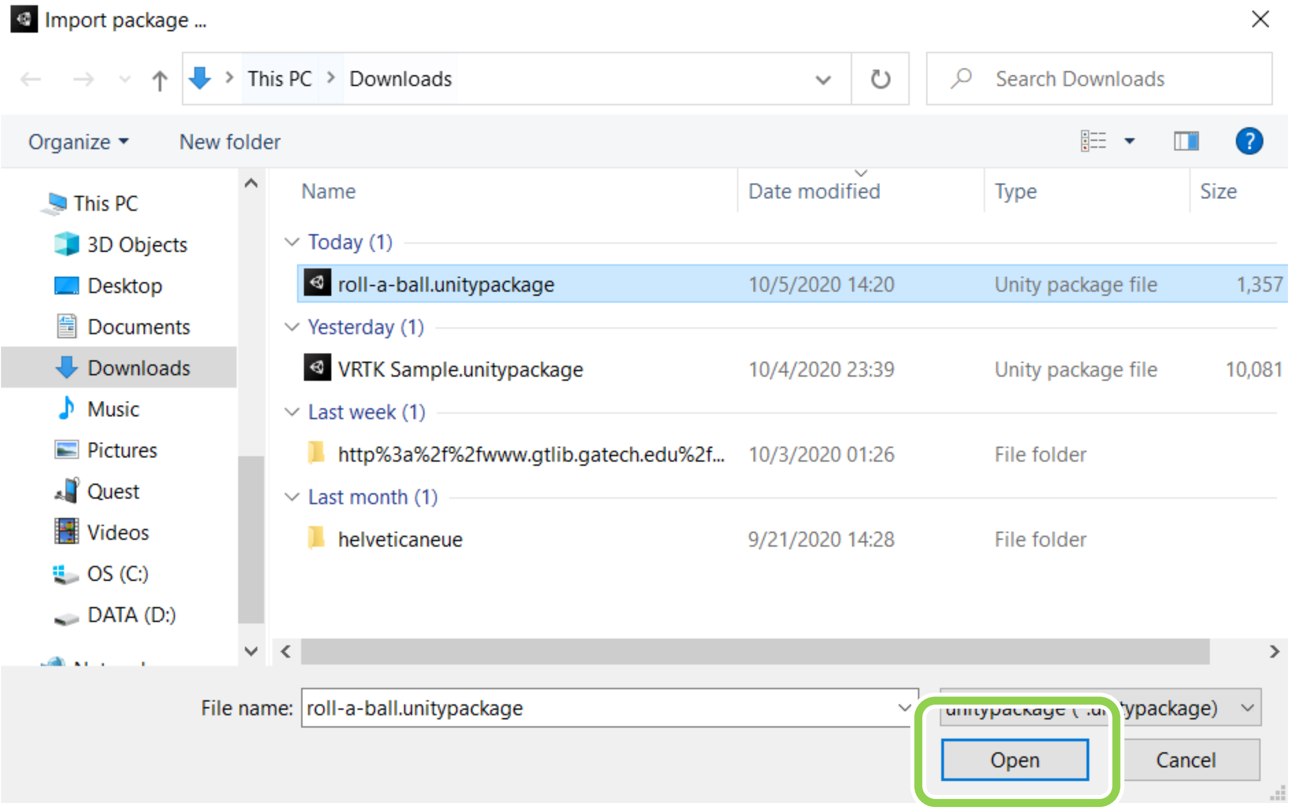
Downloads

Name	Date modified	Type
Today (3)		
roll-a-ball.unitypackage	10/5/2020 14:20	Unity package
PseudoHapticWeight_CHI2019.pdf	10/5/2020 16:23	Adobe Acroba
2002.07927.pdf	10/5/2020 16:23	Adobe Acroba

Import the roll-a-ball

- Assets > Import Package > Custom Package



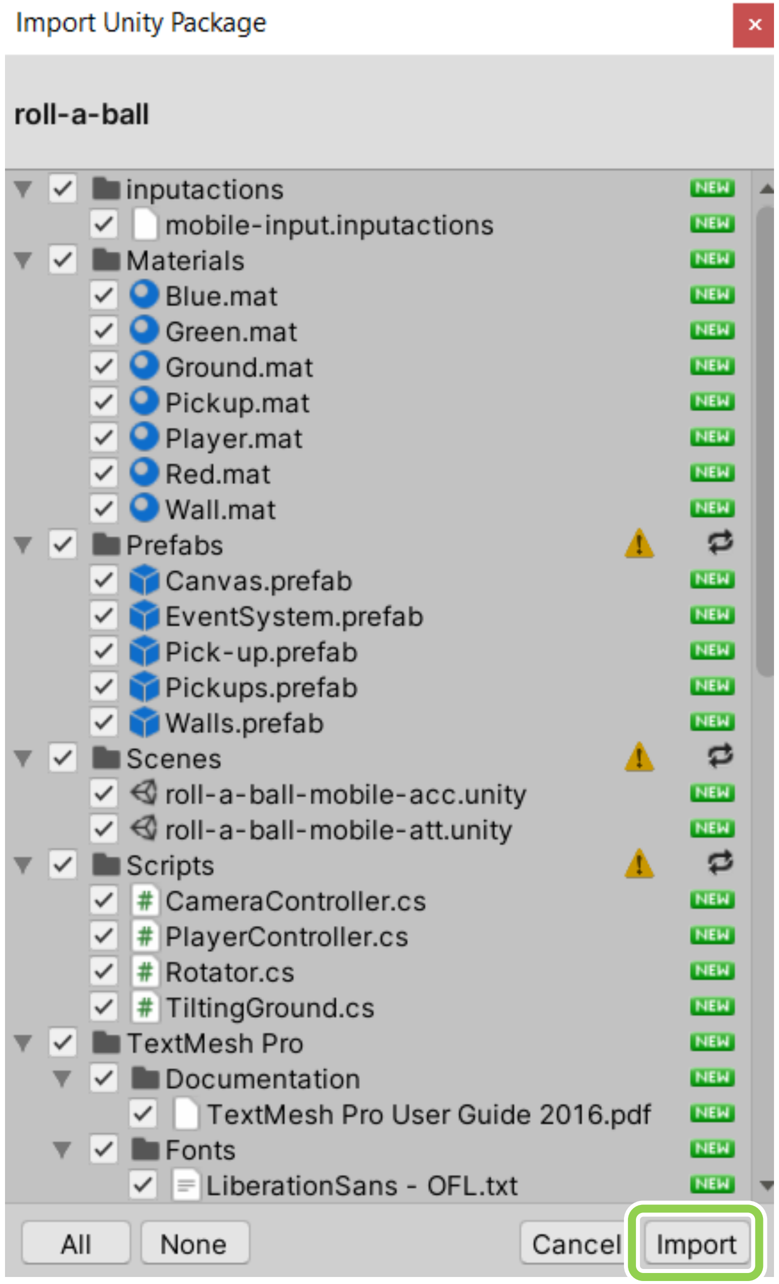


Name	Date modified	Type	Size
Today (1)			
roll-a-ball.unitypackage	10/5/2020 14:20	Unity package file	1,357
Yesterday (1)			
VRTK Sample.unitypackage	10/4/2020 23:39	Unity package file	10,081
Last week (1)			
http%3a%2f%2fwww.gtlib.gatech.edu%2f...	10/3/2020 01:26	File folder	
Last month (1)			
helveticaneue	9/21/2020 14:28	File folder	

File name: roll-a-ball.unitypackage

unitypackage (*.unitypackage)

Import !



Import Unity Package

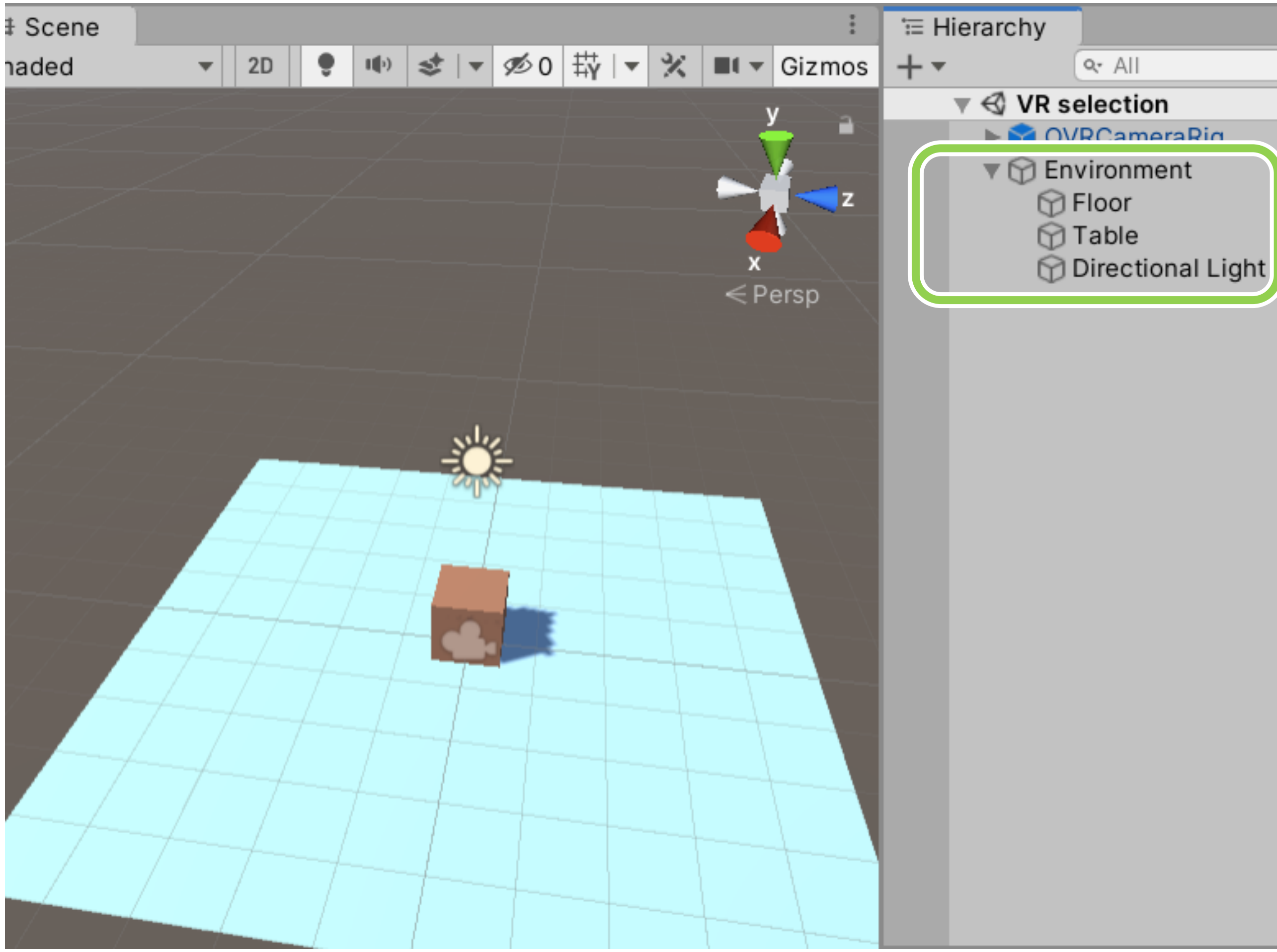
roll-a-ball

```
▼ ☑ inputactions                               NEW
    ☑ mobile-input.inputactions                NEW
▼ ☑ Materials                                  NEW
    ☑ Blue.mat                                 NEW
    ☑ Green.mat                                NEW
    ☑ Ground.mat                               NEW
    ☑ Pickup.mat                               NEW
    ☑ Player.mat                               NEW
    ☑ Red.mat                                  NEW
    ☑ Wall.mat                                 NEW
▼ ☑ Prefabs                                 ⚠  ⇄
    ☑ Canvas.prefab                            NEW
    ☑ EventSystem.prefab                       NEW
    ☑ Pick-up.prefab                           NEW
    ☑ Pickups.prefab                           NEW
    ☑ Walls.prefab                             NEW
▼ ☑ Scenes                                  ⚠  ⇄
    ☑ roll-a-ball-mobile-acc.unity             NEW
    ☑ roll-a-ball-mobile-att.unity             NEW
▼ ☑ Scripts                                 ⚠  ⇄
    ☑ # CameraController.cs                    NEW
    ☑ # PlayerController.cs                    NEW
    ☑ # Rotator.cs                             NEW
    ☑ # TiltingGround.cs                       NEW
▼ ☑ TextMesh Pro                               NEW
  ▼ ☑ Documentation                            NEW
      ☑ TextMesh Pro User Guide 2016.pdf       NEW
  ▼ ☑ Fonts                                    NEW
      ☑ LiberationSans - OFL.txt               NEW
```

scene

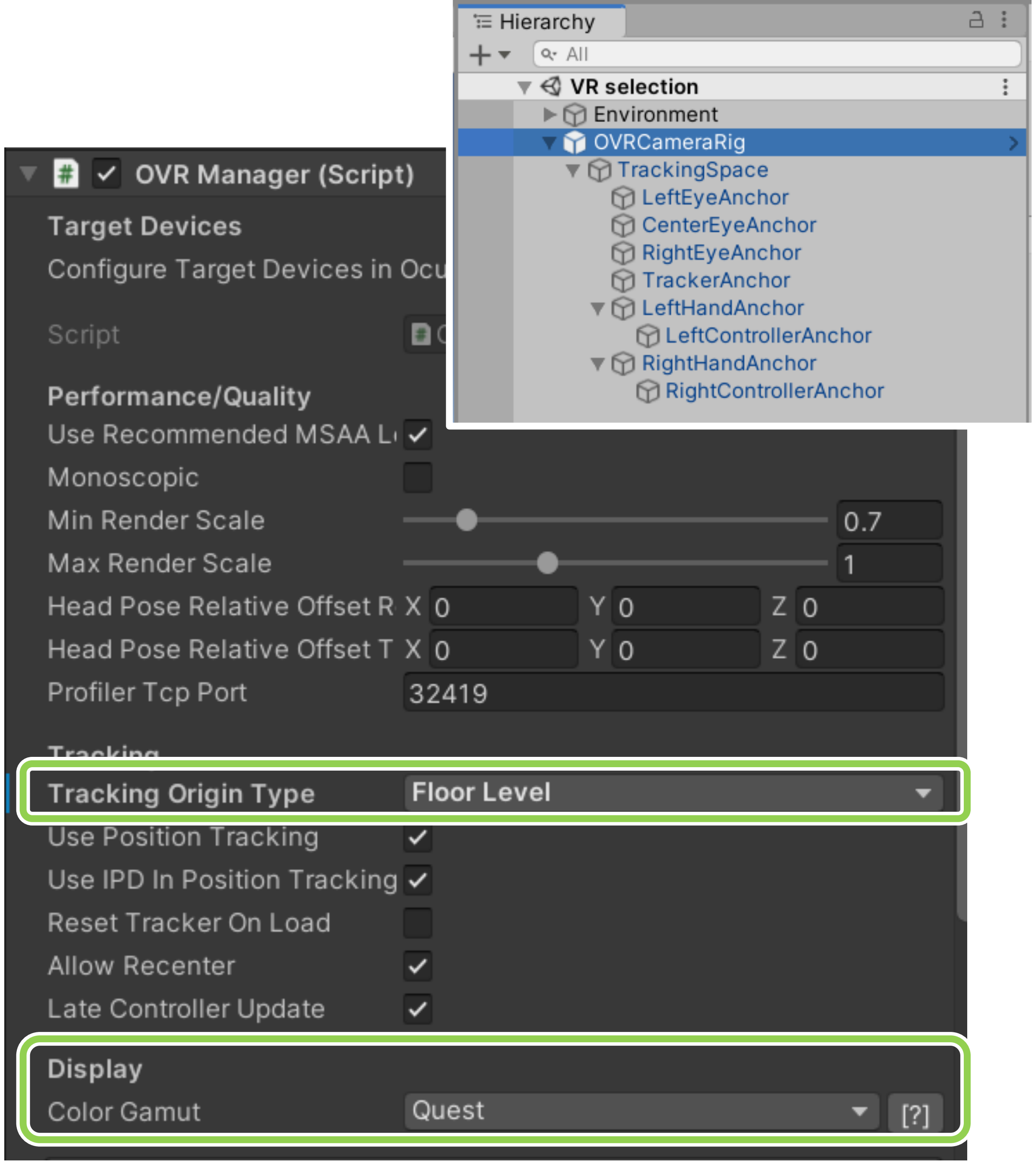
in your Scene

1. delete MainCamera
2. create a huge floor for VR
3. add a Cube as a table
4. Use an Empty GameObject (*Environment*) to collect non-interactable GOs



Add OVRCameraRig

- Project panel > Assets > Oculus > VR > Prefabs > OVRCameraRig
- Drag it into your scene
- Inspector > OVRManager > Tracking > select **Floor Level**



Hierarchy

VR selection
- Environment
- OVRCameraRig
  - TrackingSpace
    - LeftEyeAnchor
    - CenterEyeAnchor
    - RightEyeAnchor
    - TrackerAnchor
    - LeftHandAnchor
      - LeftControllerAnchor
    - RightHandAnchor
      - RightControllerAnchor

OVR Manager (Script)

Target Devices

Configure Target Devices in Ocu

Script

Performance/Quality

Use Recommended MSAA L	✓
Monoscopic	□
Min Render Scale	0.7
Max Render Scale	1
Head Pose Relative Offset R	X 0 Y 0 Z 0
Head Pose Relative Offset T	X 0 Y 0 Z 0
Profiler Tcp Port	32419

Tracking

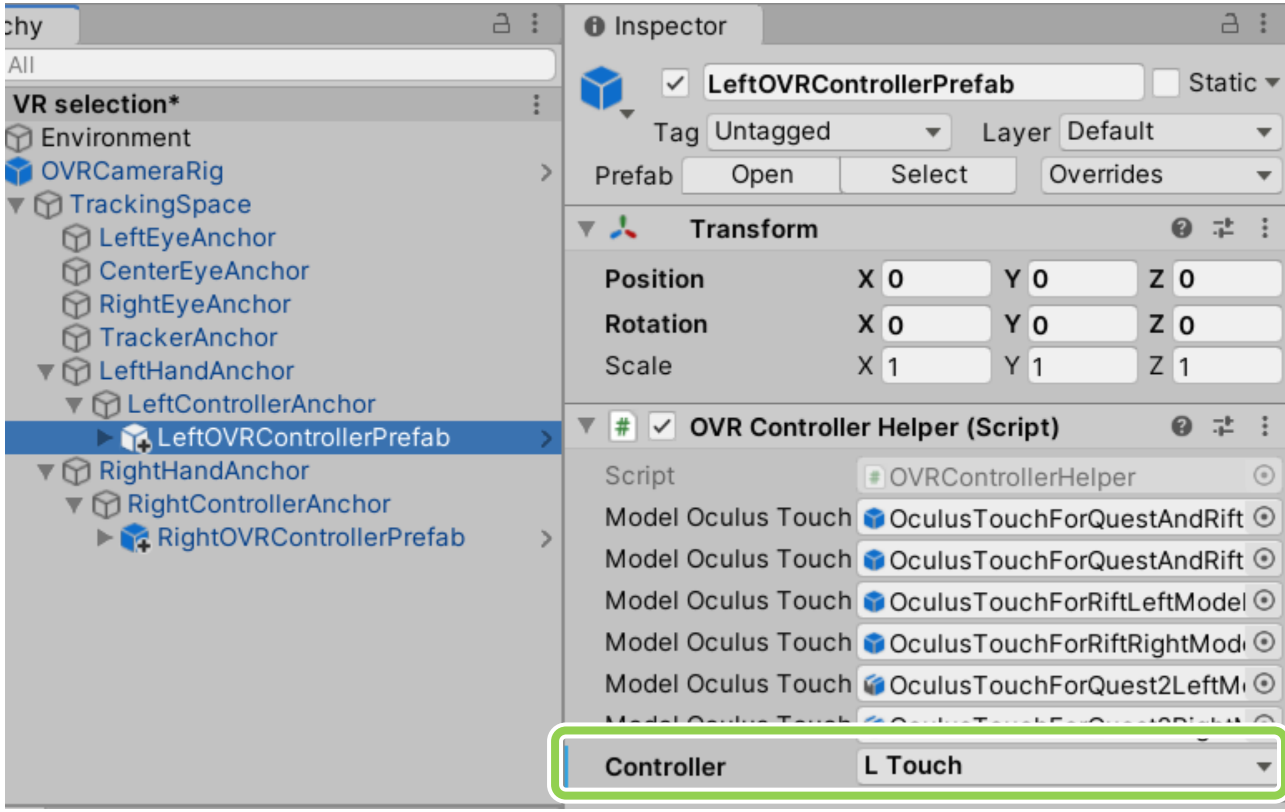
Tracking Origin Type	Floor Level
Use Position Tracking	✓
Use IPD In Position Tracking	✓
Reset Tracker On Load	□
Allow Recenter	✓
Late Controller Update	✓

Display

Color Gamut	Quest [?]

Add OVRControllerPrefab

- Project panel > Assets > Oculus > VR > Prefabs > OVRControllerPrefab
- Drag it as a Child of LeftControllerAnchor
- Select L Touch
- Same for the Right Controller



VR selection*
Environment
OVRCameraRig
TrackingSpace
    LeftEyeAnchor
    CenterEyeAnchor
    RightEyeAnchor
    TrackerAnchor
    LeftHandAnchor
        LeftControllerAnchor
            LeftOVRControllerPrefab
    RightHandAnchor
        RightControllerAnchor
            RightOVRControllerPrefab

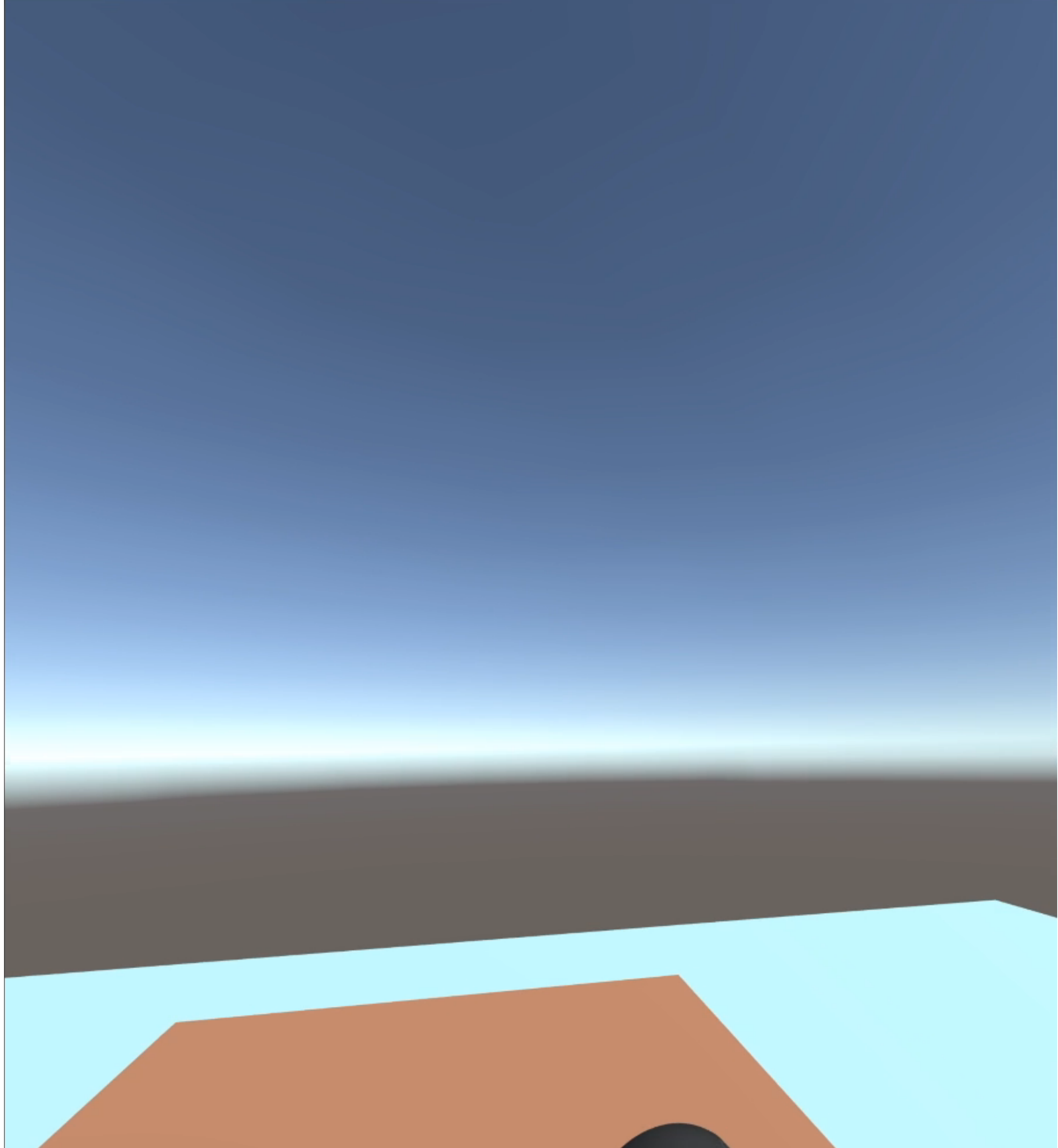
☑ LeftOVRControllerPrefab □ Static
Tag Untagged Layer Default
Prefab Open Select Overrides

Transform
Position X 0 Y 0 Z 0
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

☑ OVR Controller Helper (Script)
Script OVRControllerHelper
Model Oculus Touch OculusTouchForQuestAndRift
Model Oculus Touch OculusTouchForQuestAndRift
Model Oculus Touch OculusTouchForRiftLeftModel
Model Oculus Touch OculusTouchForRiftRightMod
Model Oculus Touch OculusTouchForQuest2LeftM
Model Oculus Touch OculusTouchForQuest2RightM
Controller L Touch

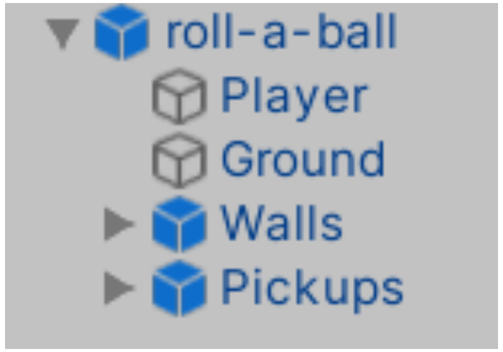
Add OVRControllerPrefab

- If you have Oculus Link, enter play mode and test the scene.
- Feel free to edit your scene.



add old stuffs from roll-a-ball

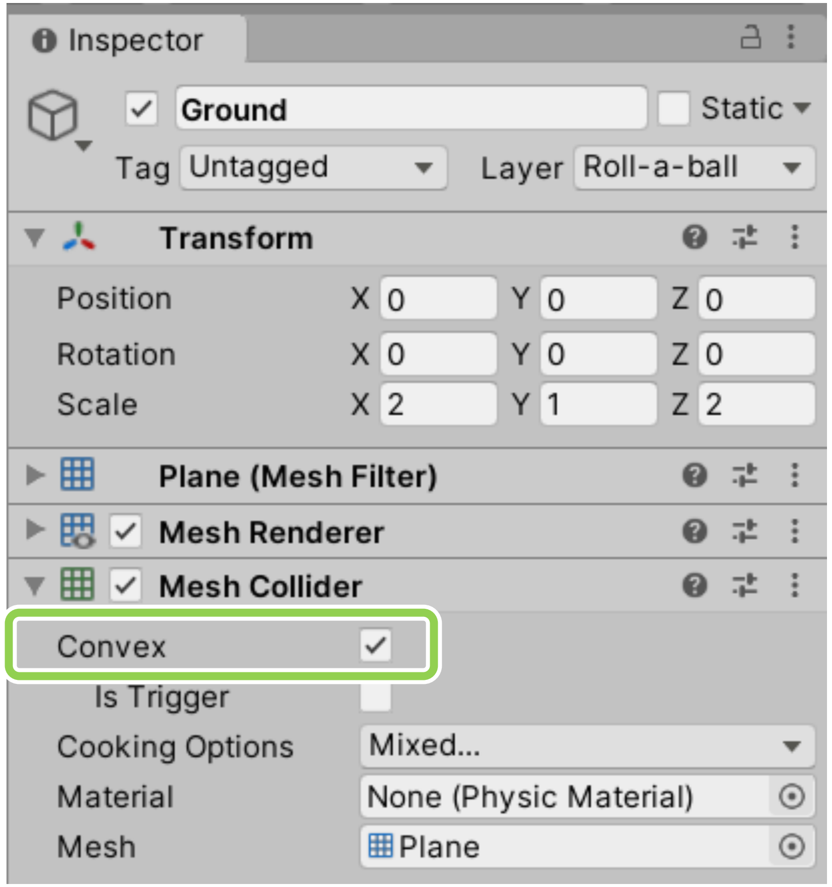
- Use an Empty GameObject (roll-a-ball) to collect
  - Player
  - Ground
  - Walls
  - Pickups



- They are at the same ‘Child’ hierarchy.
- Scale down to a size you like (check and edit with Oculus Link)

Ground (roll-a-ball)

- select Convex in Mesh Collider



Inspector

☑ Ground □ Static

Tag Untagged Layer Roll-a-ball

Transform

Position X 0 Y 0 Z 0

Rotation X 0 Y 0 Z 0

Scale X 2 Y 1 Z 2

Plane (Mesh Filter)

☑ Mesh Renderer

☑ Mesh Collider

Convex ☑

Is Trigger □

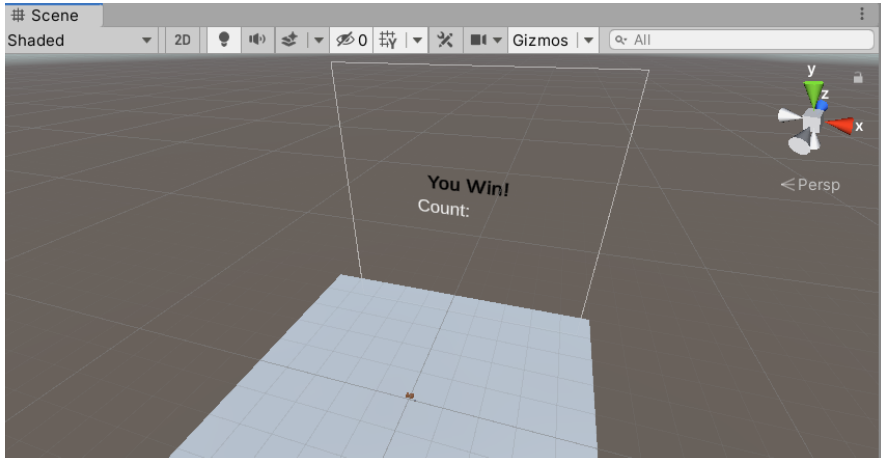
Cooking Options Mixed...

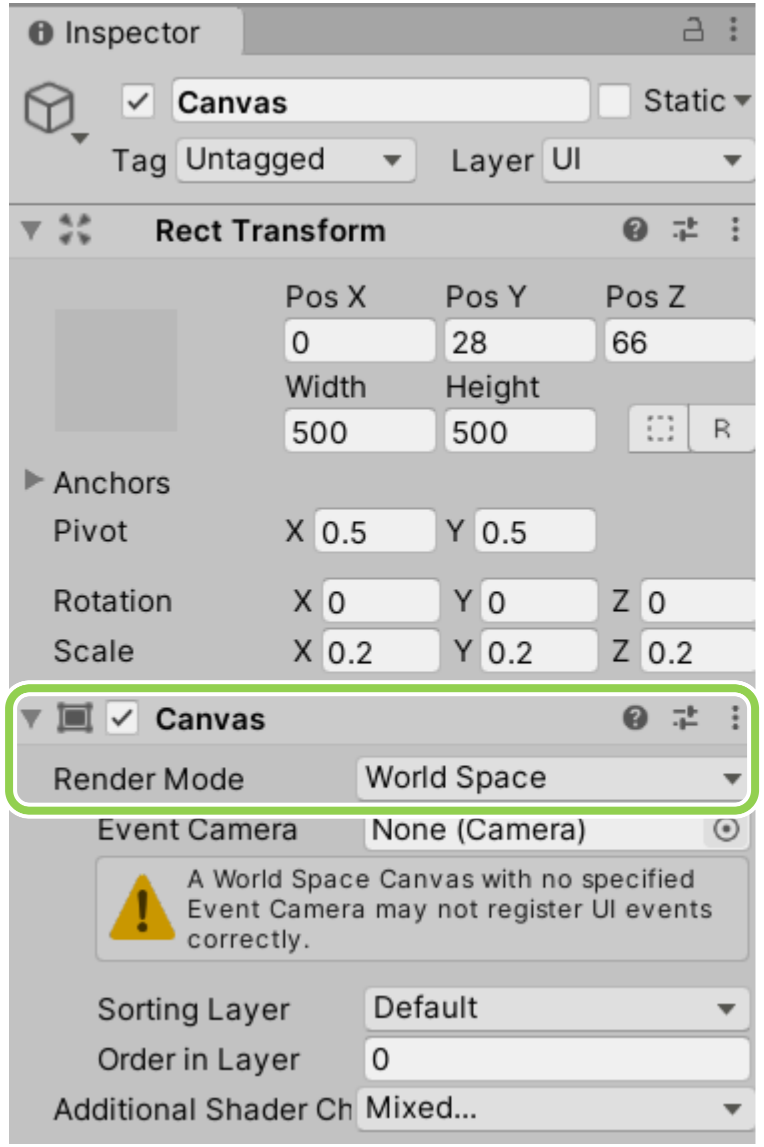
Material None (Physic Material)

Mesh Plane

UI text

- GameObject > UI > Text – TextMeshPro
  - Add two TMP, one for Count, one for Win.
- In the inspector of Canvas > Render Mode > **select World Space**
- The Text would be like a 3D object in the scene.





☑ Canvas □ Static
Tag Untagged Layer UI

Rect Transform

	Pos X	Pos Y	Pos Z
	0	28	66
	Width	Height	
	500	500	R

Anchors
Pivot X 0.5 Y 0.5
Rotation X 0 Y 0 Z 0
Scale X 0.2 Y 0.2 Z 0.2

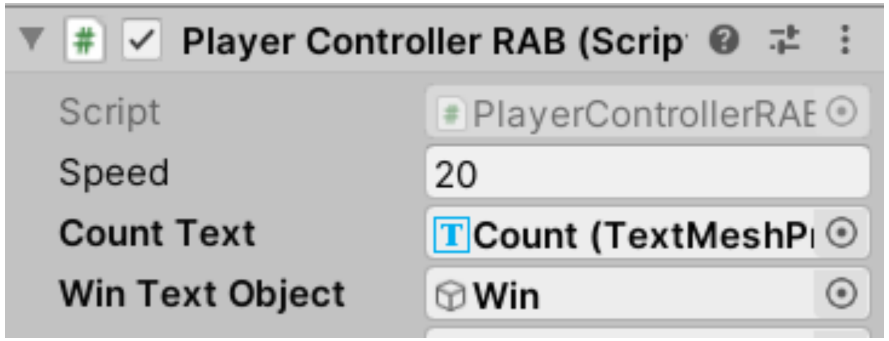
☑ Canvas
Render Mode World Space
Event Camera None (Camera)

A World Space Canvas with no specified Event Camera may not register UI events correctly.

Sorting Layer Default
Order in Layer 0
Additional Shader Ch Mixed...

UI text

- Remember to set reference back to our PlayerController script of roll-a-ball.



☑ Player Controller RAB (Scrip

Script PlayerControllerRAE

Speed 20

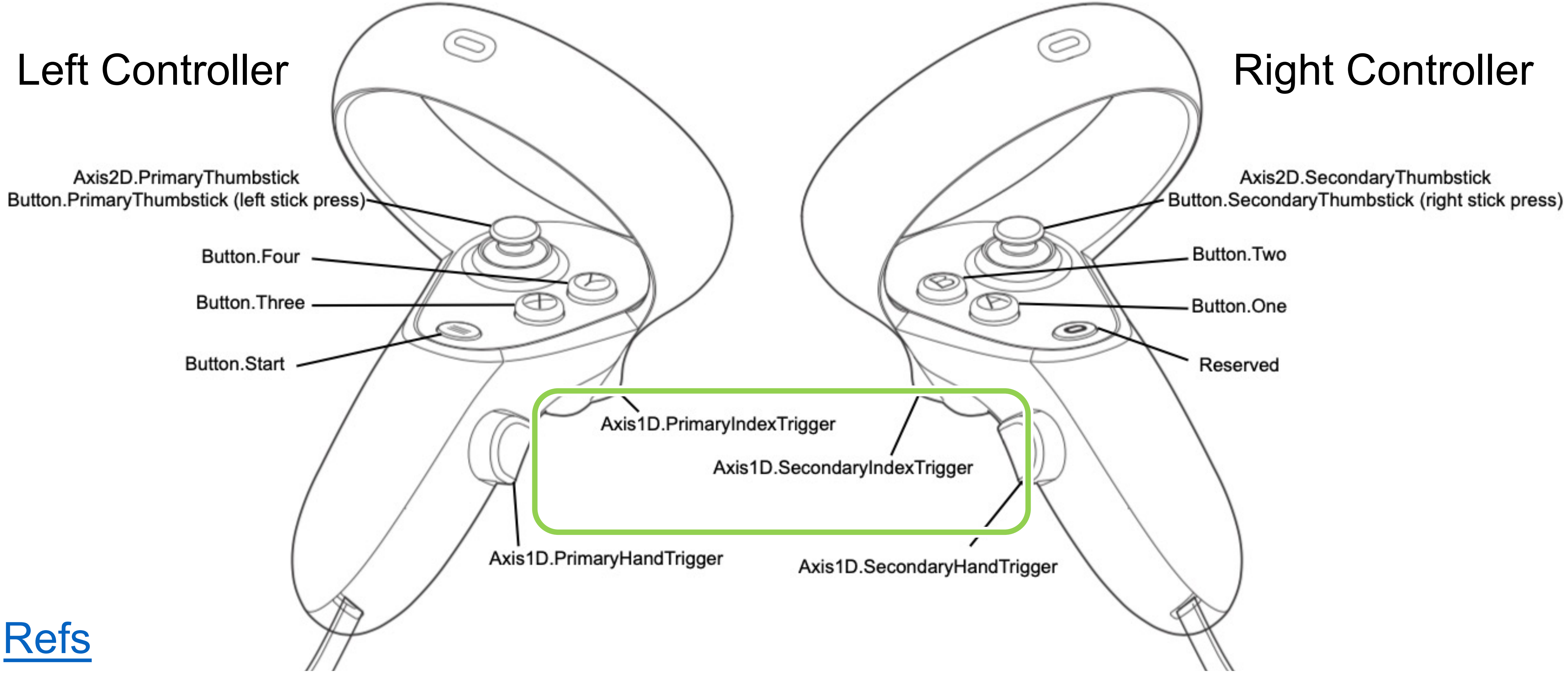
Count Text Count (TextMeshPı

Win Text Object Win

interaction

```
if (controller is in the collider of roll-a-ball)
    if (not selected and pull the trigger)
        selects roll-a-ball
    else if (selected and release the trigger)
        releases roll-a-ball
```

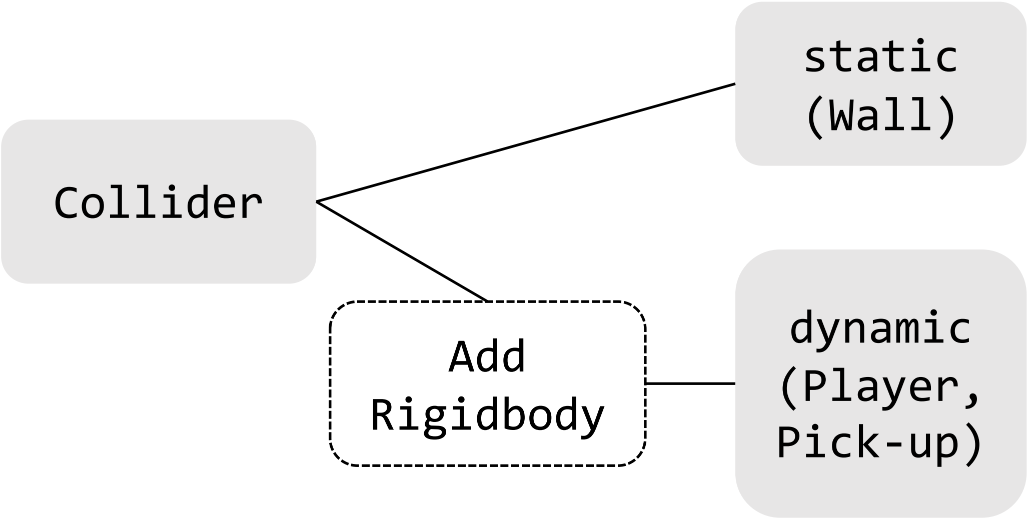
Use IndexTrigger as input


Left Controller
Right Controller
Axis2D.PrimaryThumbstick
Button.PrimaryThumbstick (left stick press)
Button.Four
Button.Three
Button.Start
Axis2D.SecondaryThumbstick
Button.SecondaryThumbstick (right stick press)
Button.Two
Button.One
Reserved
Axis1D.PrimaryIndexTrigger
Axis1D.SecondaryIndexTrigger
Axis1D.PrimaryHandTrigger
Axis1D.SecondaryHandTrigger

Refs

Let’s have a look in our game

- Unity Colliders



detect collision:

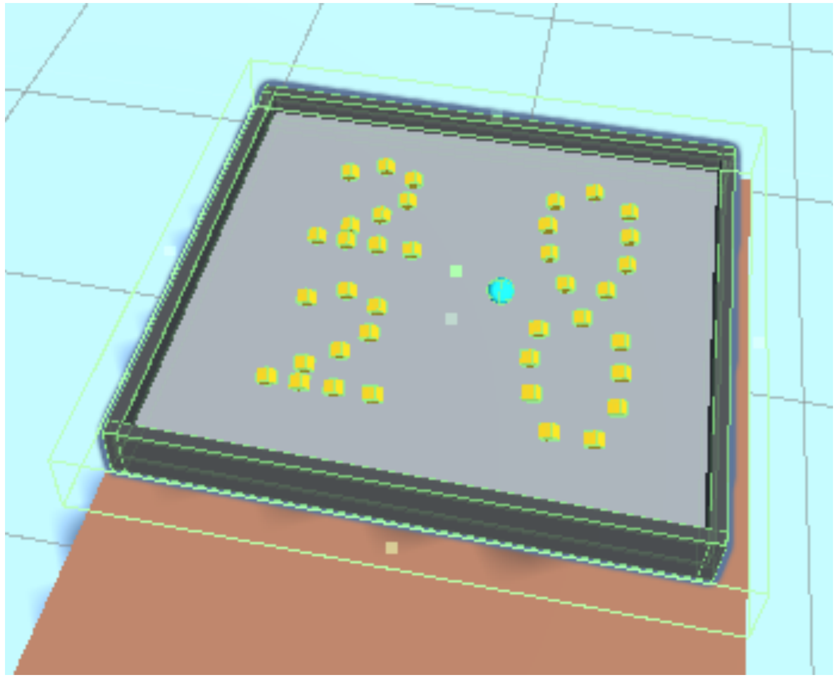
- OnCollisionEnter()
- OnTriggerEnter()

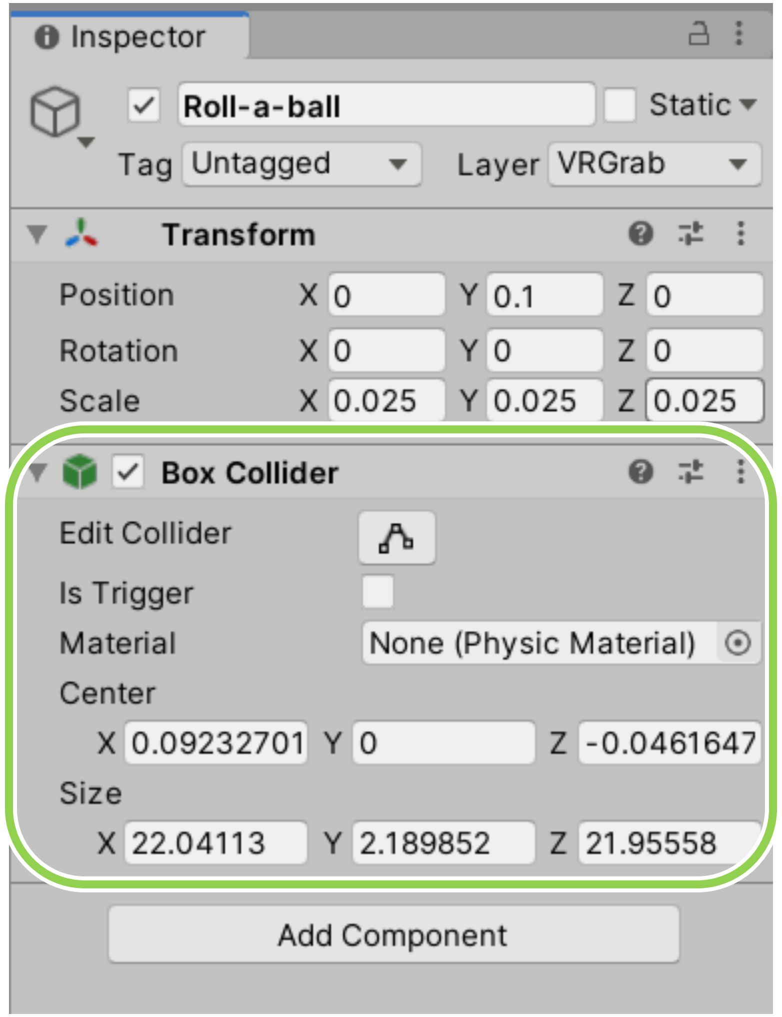
detect when one collider enters the space of another without creating a collision

In this example:
Controller has OnTriggerEnter
Roll-a-ball is triggered

Roll-a-ball > add Box Collider

- Use Edit Collider to modify the boundary to fit the size of Ground.





Inspector

☑ Roll-a-ball □ Static

Tag Untagged Layer VRGrab

Transform

Position X 0 Y 0.1 Z 0

Rotation X 0 Y 0 Z 0

Scale X 0.025 Y 0.025 Z 0.025

☑ Box Collider

Edit Collider

Is Trigger □

Material None (Physic Material)

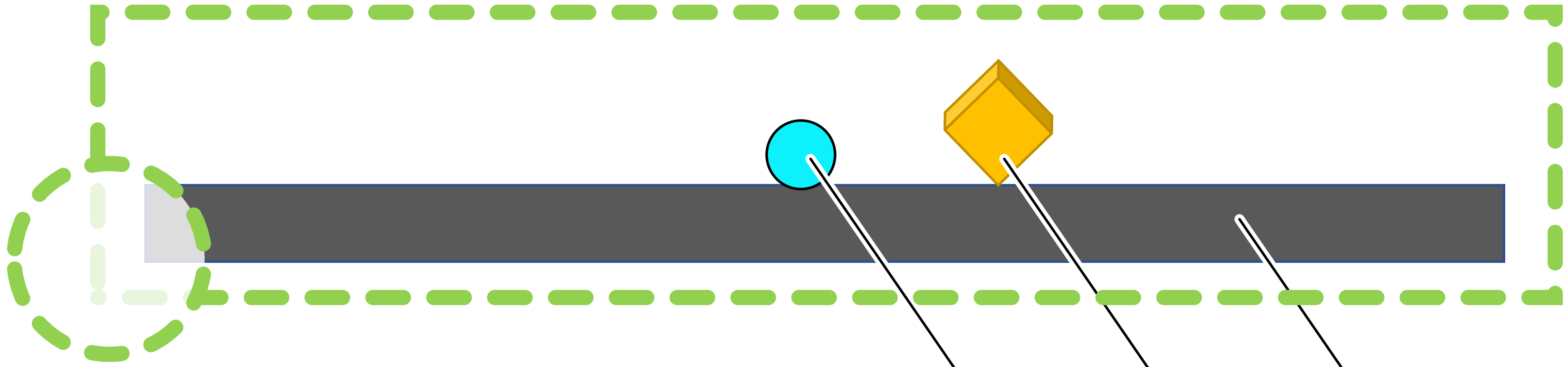
Center

X 0.09232701 Y 0 Z -0.0461647

Size

X 22.04113 Y 2.189852 Z 21.95558

One problem about Colliders

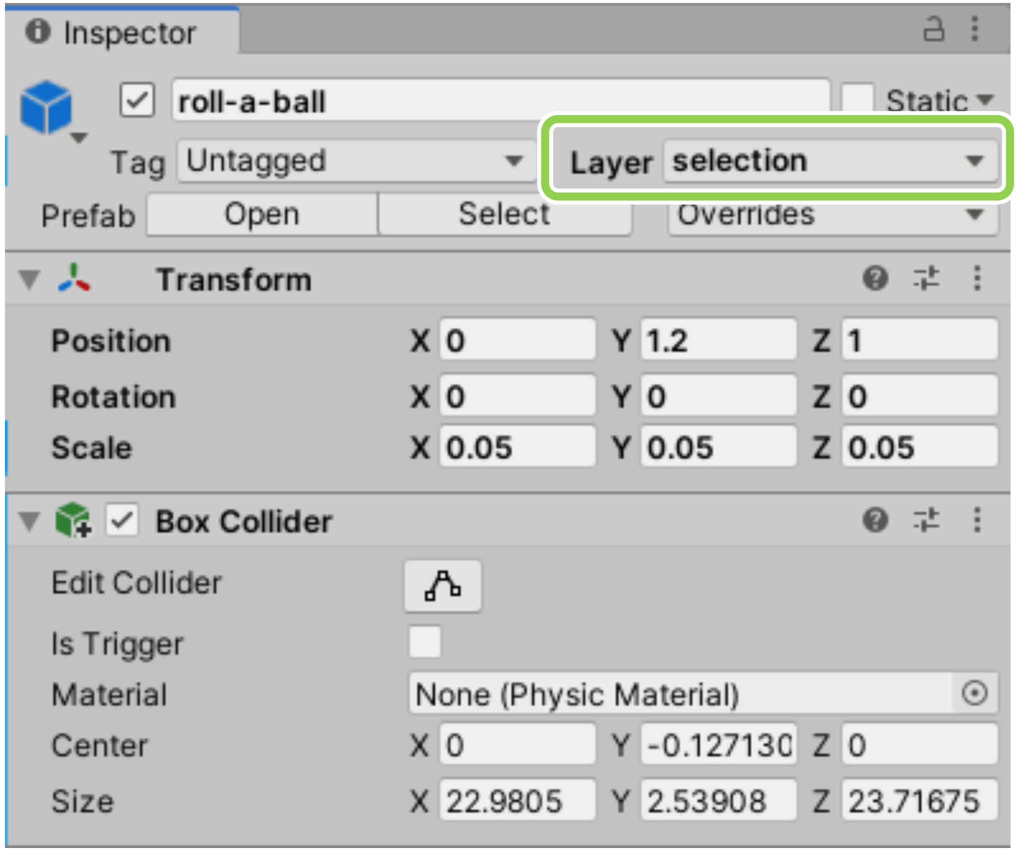


which collider does the controller trigger?

have their own colliders

Layer

- We create different layers so that the colliders of roll-a-ball and colliders of selection won't affect each other.



☑ roll-a-ball □ Static

Tag Untagged

Layer selection

Prefab Open Select Overrides

Position X 0 Y 1.2 Z 1

Rotation X 0 Y 0 Z 0

Scale X 0.05 Y 0.05 Z 0.05

☑ Box Collider

Edit Collider

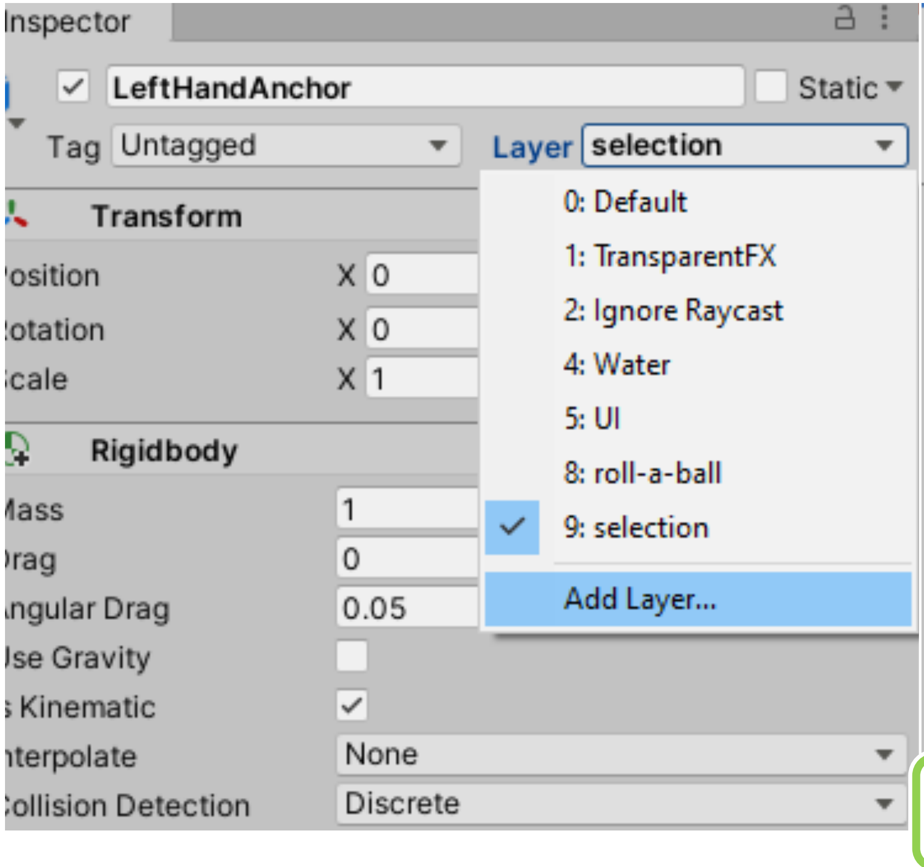
Is Trigger □

Material None (Physic Material)

Center X 0 Y -0.127130 Z 0

Size X 22.9805 Y 2.53908 Z 23.71675

Add Layer



Inspector

☑ LeftHandAnchor □ Static

Tag Untagged Layer selection

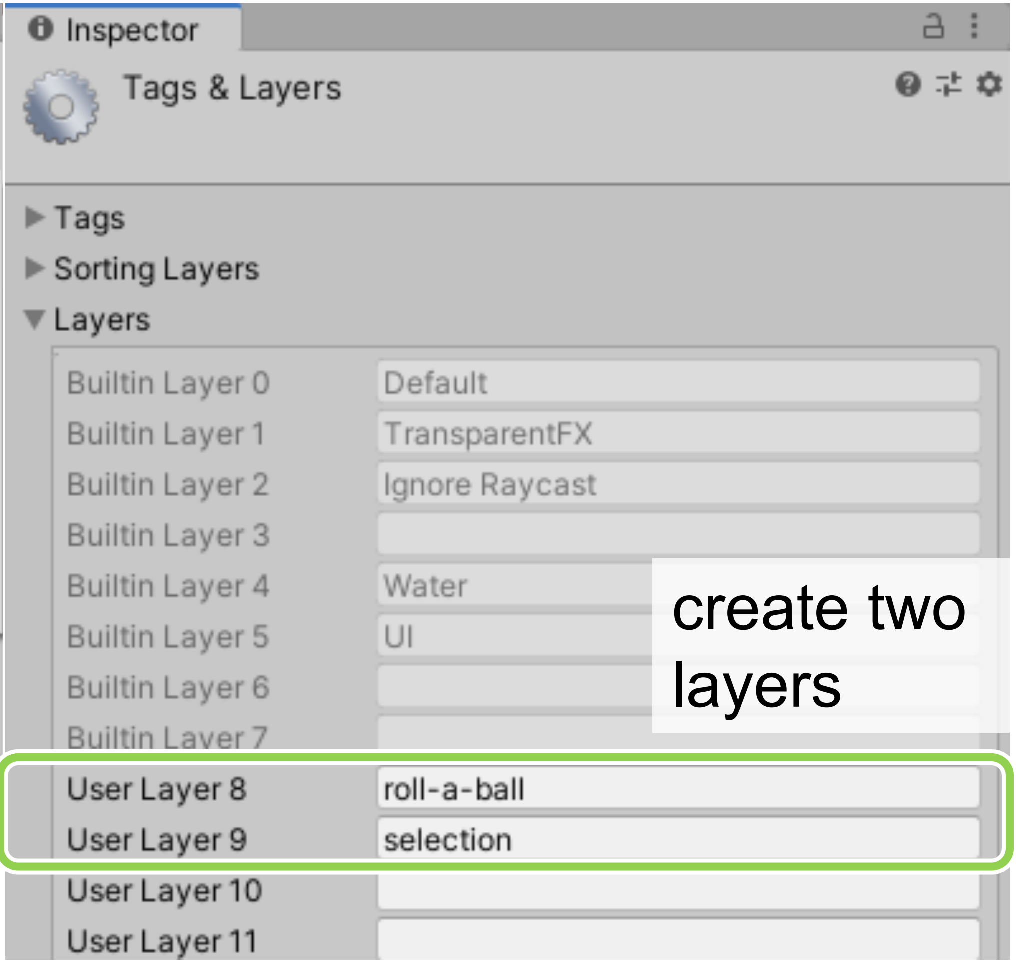
- 0: Default
- 1: TransparentFX
- 2: Ignore Raycast
- 4: Water
- 5: UI
- 8: roll-a-ball
- ✓ 9: selection
- Add Layer...

Transform

'osition X 0
'otation X 0
'cale X 1

Rigidbody

'lass 1
'rag 0
'ngular Drag 0.05
'se Gravity □
'; Kinematic ☑
'nterpolate None
'ollision Detection Discrete



Inspector

Tags & Layers

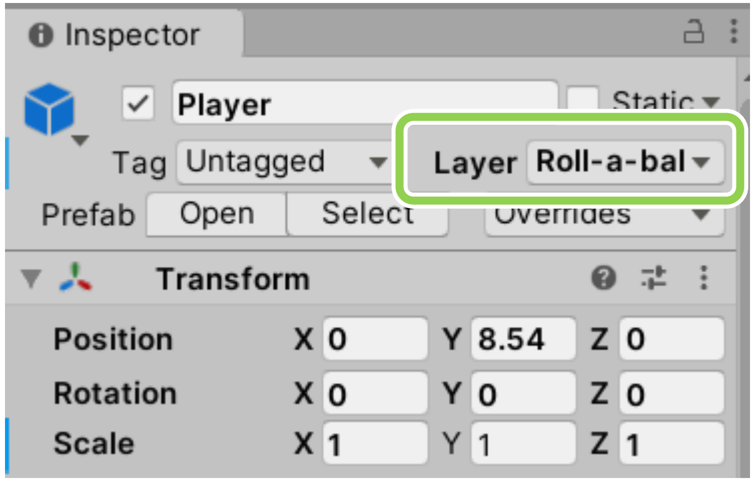
- ▶ Tags
- ▶ Sorting Layers
- ▼ Layers

Builtin Layer 0	Default
Builtin Layer 1	TransparentFX
Builtin Layer 2	Ignore Raycast
Builtin Layer 3	
Builtin Layer 4	Water
Builtin Layer 5	UI
Builtin Layer 6	
Builtin Layer 7	
User Layer 8	roll-a-ball
User Layer 9	selection
User Layer 10	
User Layer 11	

create two layers

roll-a-ball layer

- Player
- Pickups
- Walls
- Ground



Inspector

☑ Player Static

Tag Untagged Layer Roll-a-bal

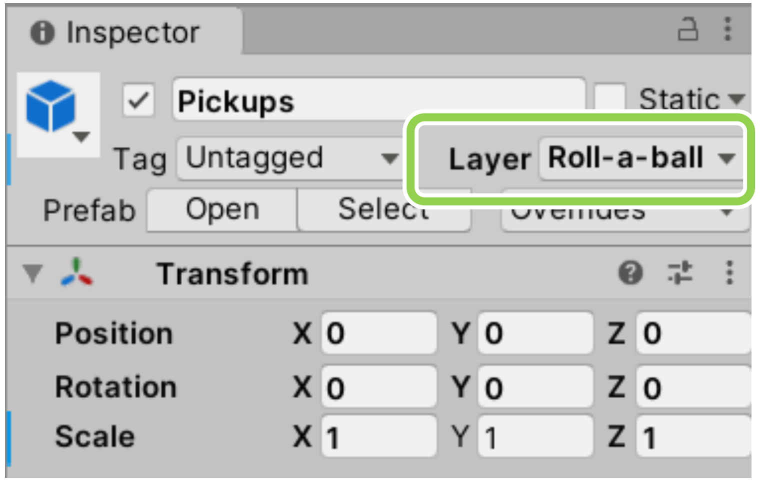
Prefab Open Select Overrides

Transform

Position X 0 Y 8.54 Z 0

Rotation X 0 Y 0 Z 0

Scale X 1 Y 1 Z 1



Inspector

☑ Pickups Static

Tag Untagged Layer Roll-a-ball

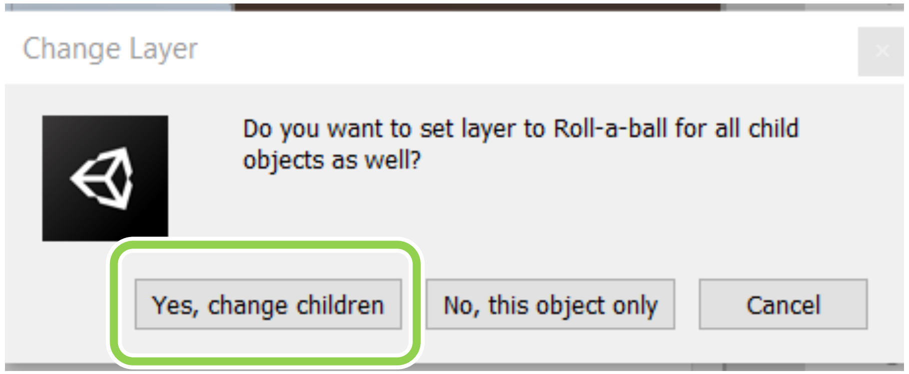
Prefab Open Select Overrides

Transform

Position X 0 Y 0 Z 0

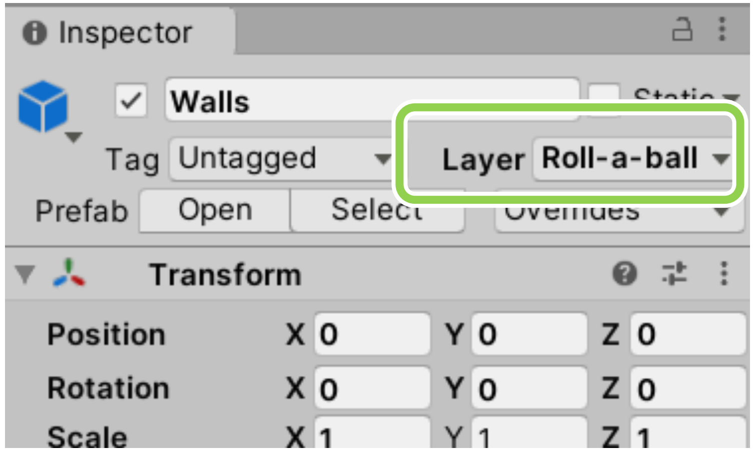
Rotation X 0 Y 0 Z 0

Scale X 1 Y 1 Z 1



Change Layer

Do you want to set layer to Roll-a-ball for all child objects as well?



Inspector

☑ Walls Static

Tag Untagged Layer Roll-a-ball

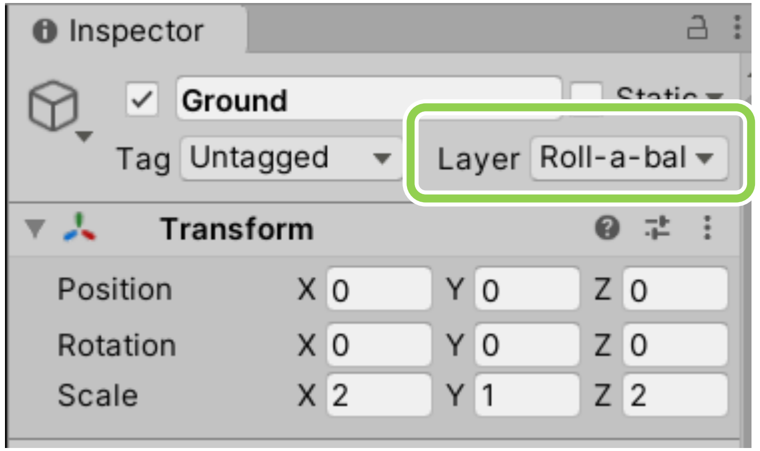
Prefab Open Select Overrides

Transform

Position X 0 Y 0 Z 0

Rotation X 0 Y 0 Z 0

Scale X 1 Y 1 Z 1



Inspector

☑ Ground Static

Tag Untagged Layer Roll-a-bal

Transform

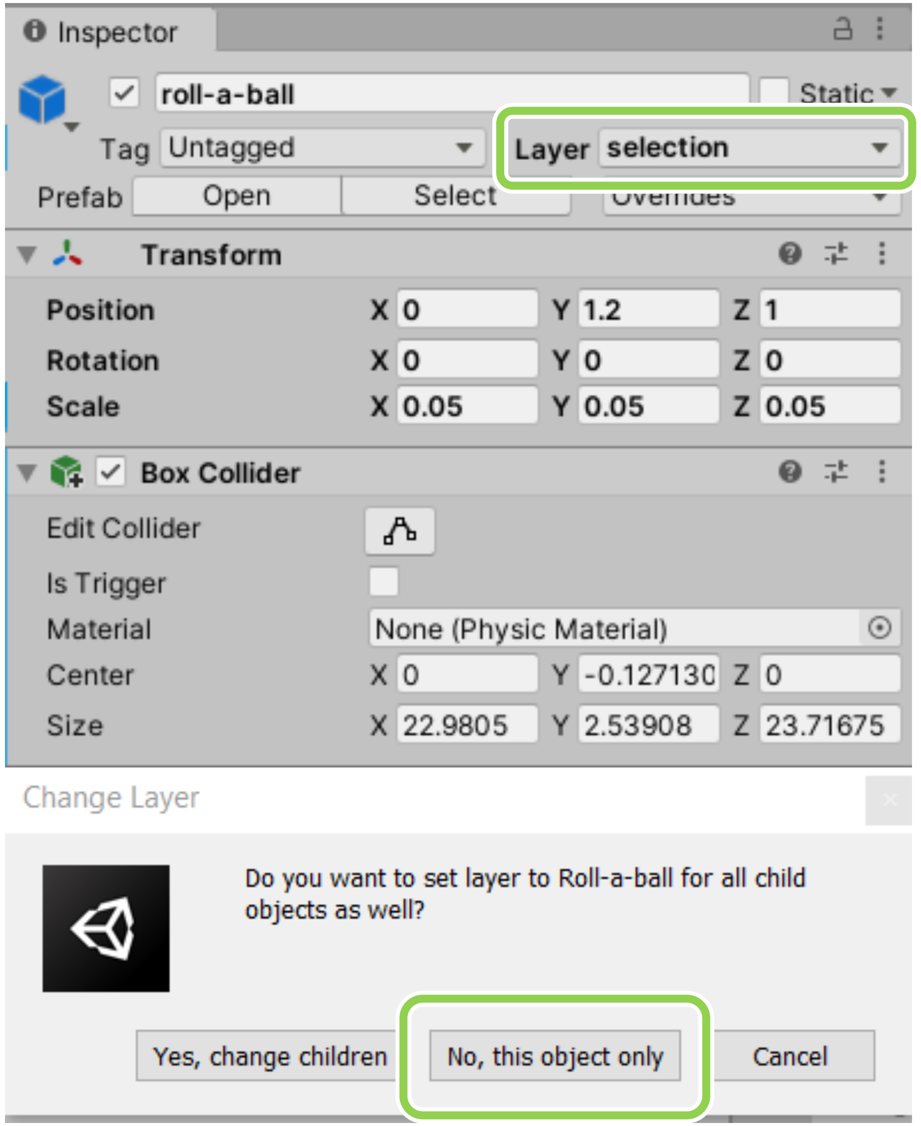
Position X 0 Y 0 Z 0

Rotation X 0 Y 0 Z 0

Scale X 2 Y 1 Z 2

selection layer

- Empty GameObject roll-a-ball



☑ roll-a-ball

Tag Untagged

Layer selection

Transform

Position	X	0	Y	1.2	Z	1
Rotation	X	0	Y	0	Z	0
Scale	X	0.05	Y	0.05	Z	0.05

☑ Box Collider

Is Trigger □

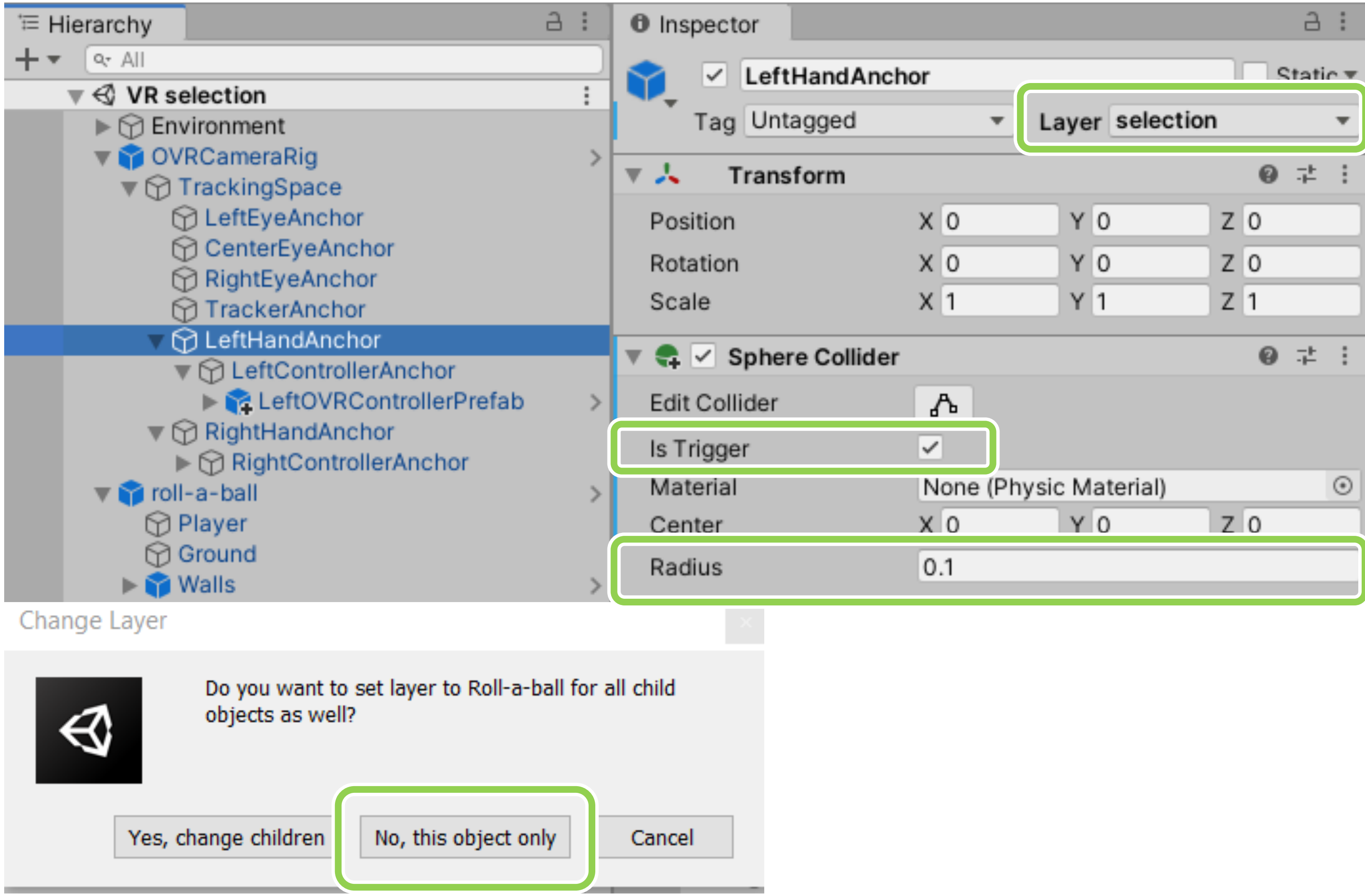
Material None (Physic Material)

Center	X	0	Y	-0.127130	Z	0
Size	X	22.9805	Y	2.53908	Z	23.71675

Do you want to set layer to Roll-a-ball for all child objects as well?

selection layer

- LeftHandAnchor
- RightHandAnchor
- **Add Collider**
  - **isTrigger**
  - **Adjust collider size**



☑ LeftHandAnchor

Tag Untagged

Layer selection

Position X 0 Y 0 Z 0

Rotation X 0 Y 0 Z 0

Scale X 1 Y 1 Z 1

Is Trigger ☑

Material None (Physic Material)

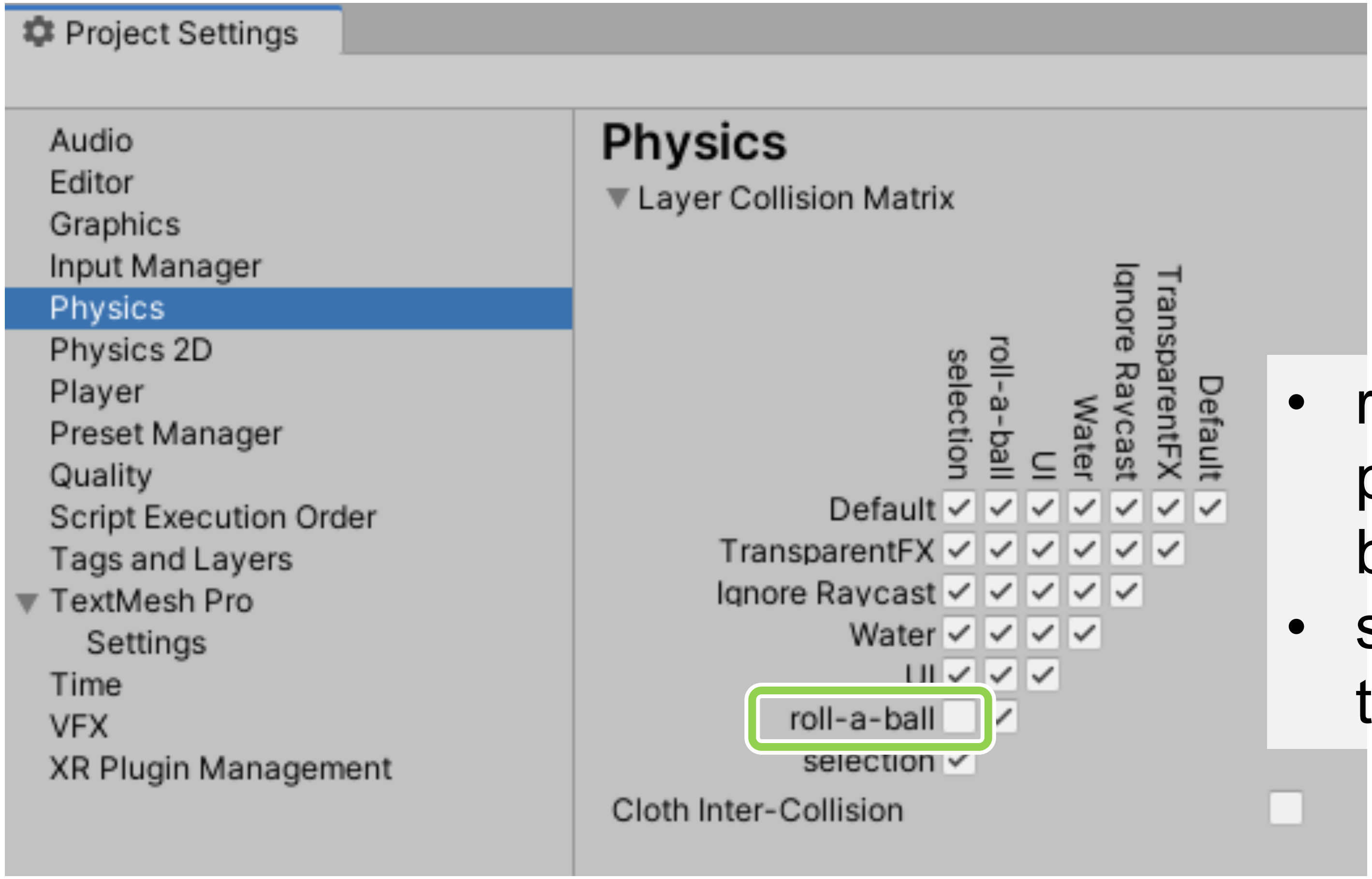
Center X 0 Y 0 Z 0

Radius 0.1

Change Layer

Do you want to set layer to Roll-a-ball for all child objects as well?

Edit > Project Settings > Physics > layer collision matrix



Physics

Layer Collision Matrix

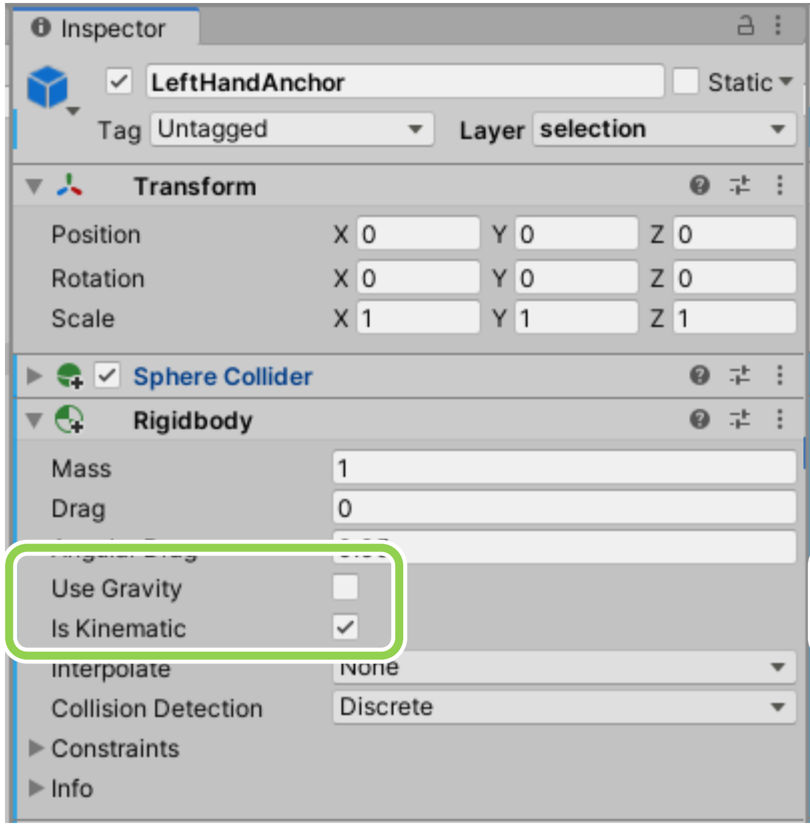
	selection	roll-a-ball	UI	Water	Ignore Raycast	TransparentFX	Default
Default	✓	✓	✓	✓	✓	✓	✓
TransparentFX	✓	✓	✓	✓	✓	✓	
Ignore Raycast	✓	✓	✓	✓	✓		
Water	✓	✓	✓	✓			
UI	✓	✓	✓				
roll-a-ball	□	✓					
selection	✓						

Cloth Inter-Collision □

- roll-a-ball objects have physics within roll-a-ball objects.
- selection objects won't trigger roll-a-ball

Add Rigidbody on

LeftHandAnchor



Inspector

☑ LeftHandAnchor □ Static

Tag Untagged Layer selection

Transform

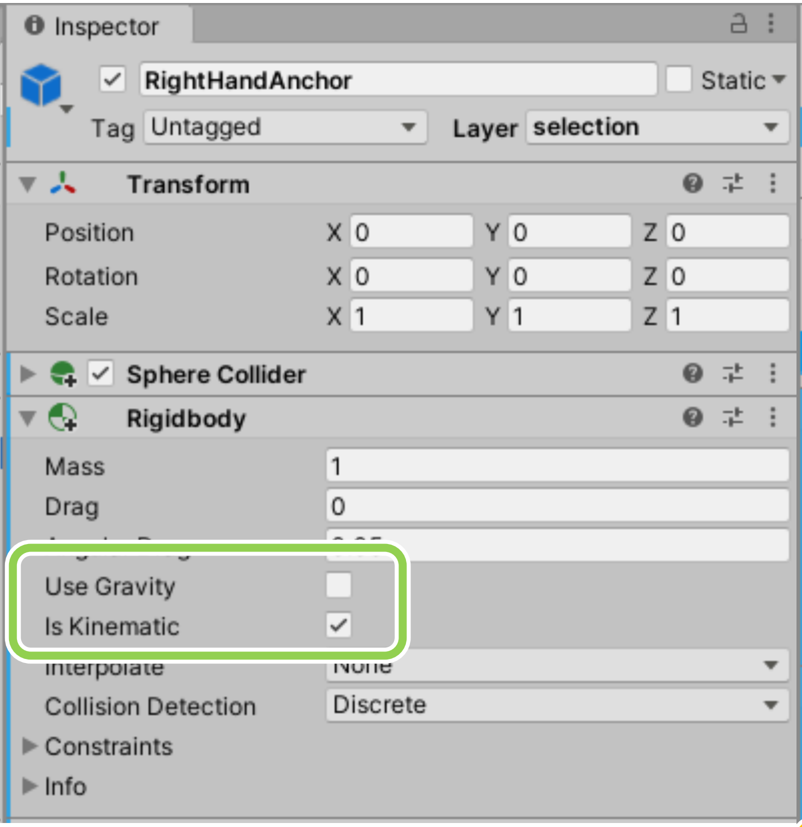
Position X 0 Y 0 Z 0
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

☑ Sphere Collider

Rigidbody

Mass 1
Drag 0
Angular Drag 0.05
Use Gravity □
Is Kinematic ☑
Interpolate None
Collision Detection Discrete
Constraints
Info

RightHandAnchor



Inspector

☑ RightHandAnchor □ Static

Tag Untagged Layer selection

Transform

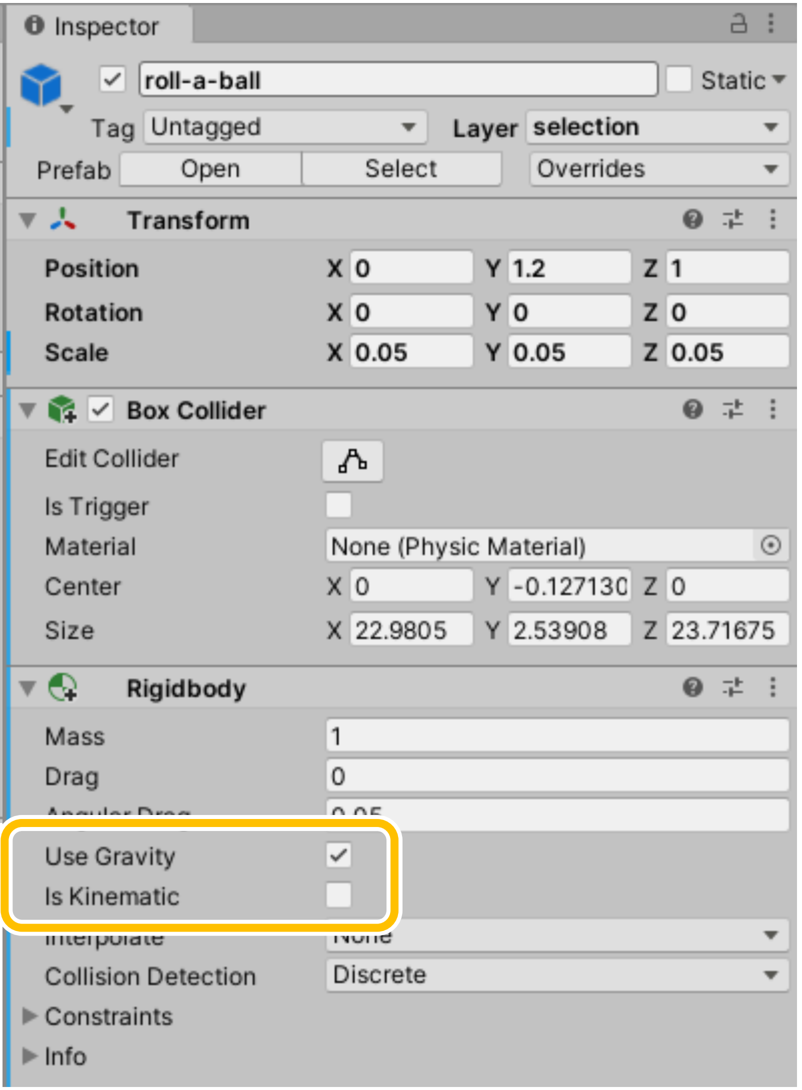
Position X 0 Y 0 Z 0
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

☑ Sphere Collider

Rigidbody

Mass 1
Drag 0
Angular Drag 0.05
Use Gravity □
Is Kinematic ☑
Interpolate None
Collision Detection Discrete
Constraints
Info

Roll-a-ball



Inspector

☑ roll-a-ball □ Static

Tag Untagged Layer selection

Prefab Open Select Overrides

Transform

Position X 0 Y 1.2 Z 1
Rotation X 0 Y 0 Z 0
Scale X 0.05 Y 0.05 Z 0.05

☑ Box Collider

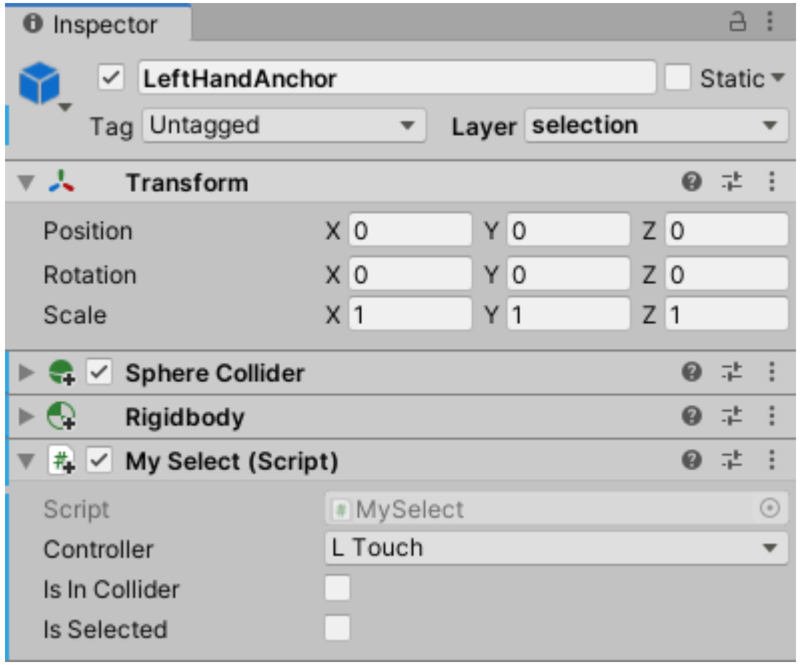
Edit Collider
Is Trigger □
Material None (Physic Material)
Center X 0 Y -0.127130 Z 0
Size X 22.9805 Y 2.53908 Z 23.71675

Rigidbody

Mass 1
Drag 0
Angular Drag 0.05
Use Gravity ☑
Is Kinematic □
Interpolate None
Collision Detection Discrete
Constraints
Info

Add a new script ‘MySelect.cs’ on

LeftHandAnchor



☑ LeftHandAnchor □ Static

Tag Untagged Layer selection

Position X 0 Y 0 Z 0

Rotation X 0 Y 0 Z 0

Scale X 1 Y 1 Z 1

☑ Sphere Collider

Rigidbody

☑ My Select (Script)

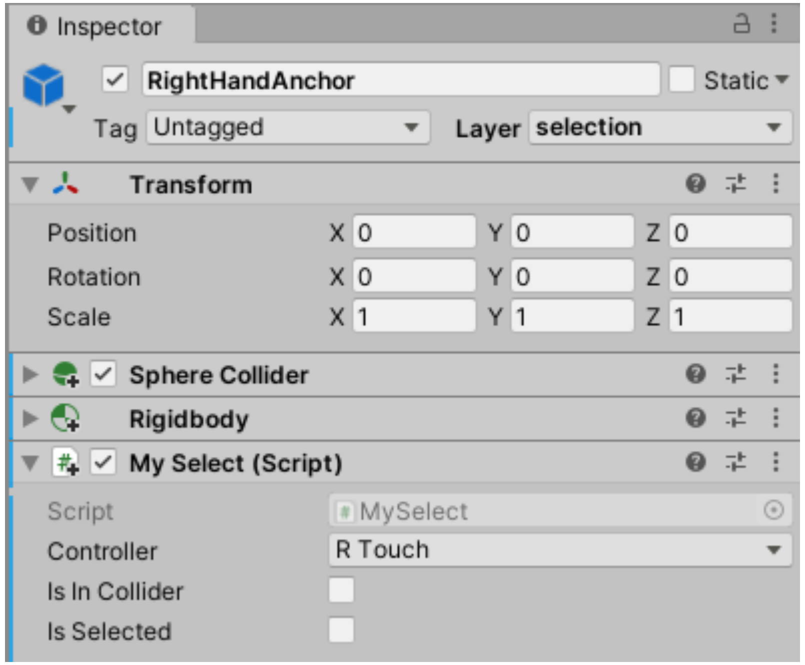
Script MySelect

Controller L Touch

Is In Collider □

Is Selected □

RightHandAnchor



☑ RightHandAnchor □ Static

Tag Untagged Layer selection

Position X 0 Y 0 Z 0

Rotation X 0 Y 0 Z 0

Scale X 1 Y 1 Z 1

☑ Sphere Collider

Rigidbody

☑ My Select (Script)

Script MySelect

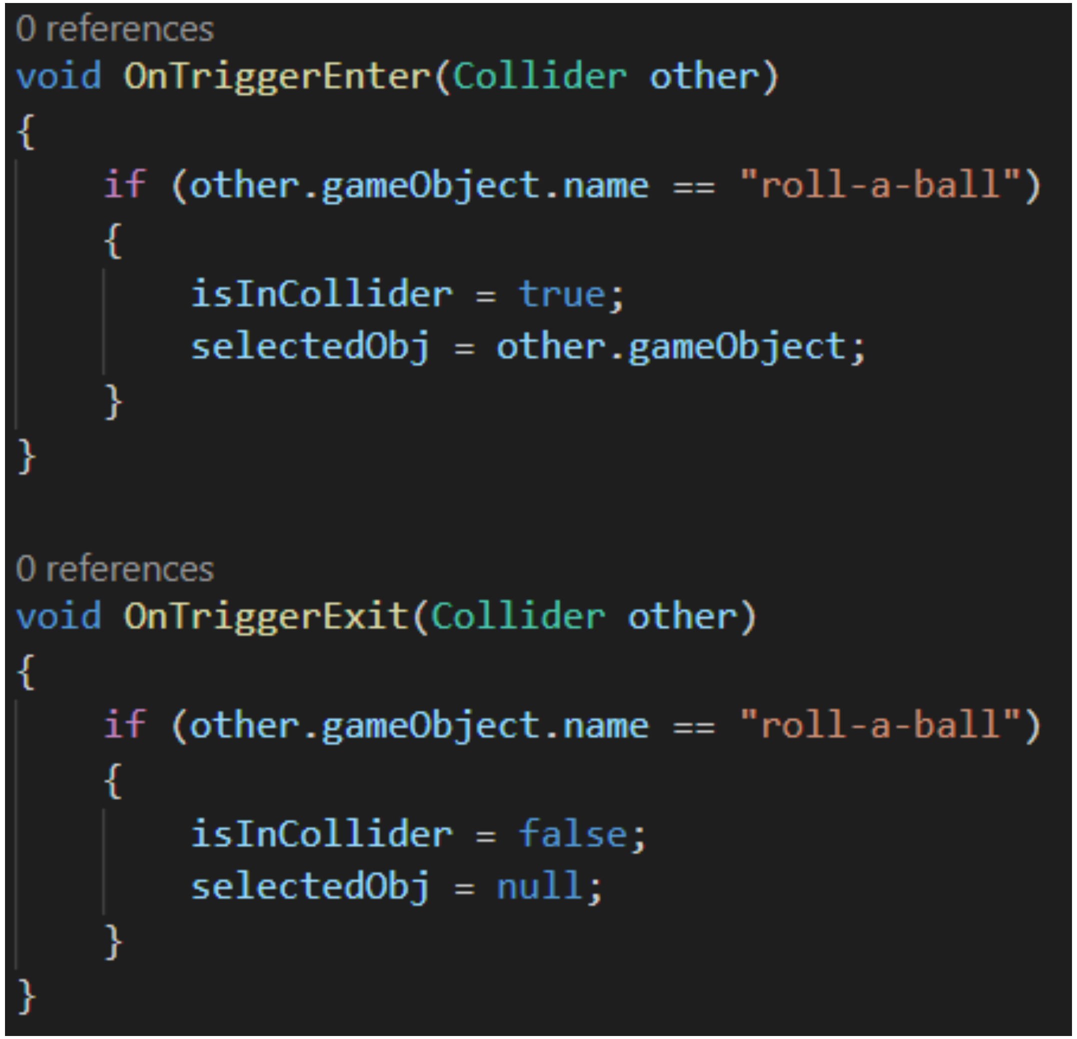
Controller R Touch

Is In Collider □

Is Selected □

In MySelect.cs

- Detecting whether controller is in the collider of roll-a-ball

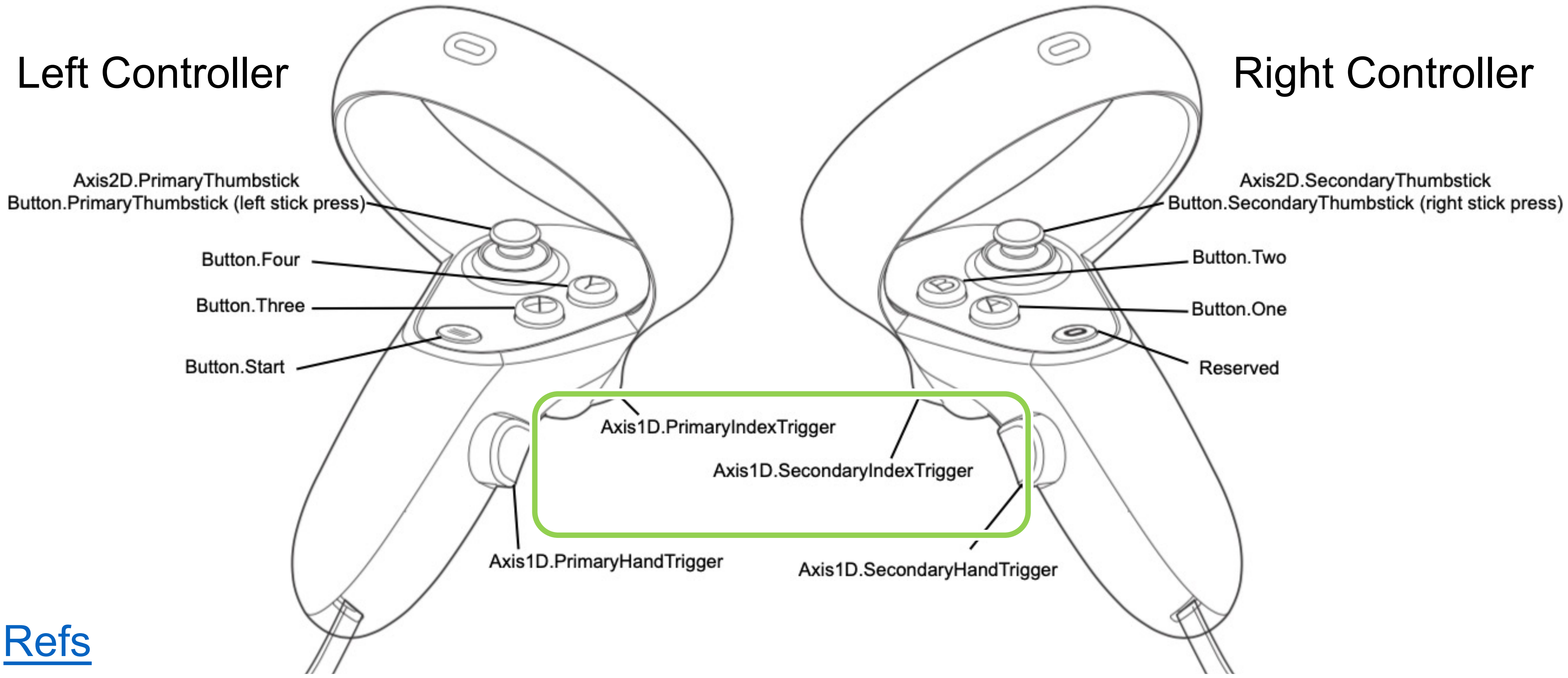


```
0 references
void OnTriggerEnter(Collider other)
{
    if (other.gameObject.name == "roll-a-ball")
    {
        isInCollider = true;
        selectedObj = other.gameObject;
    }
}

0 references
void OnTriggerExit(Collider other)
{
    if (other.gameObject.name == "roll-a-ball")
    {
        isInCollider = false;
        selectedObj = null;
    }
}
```

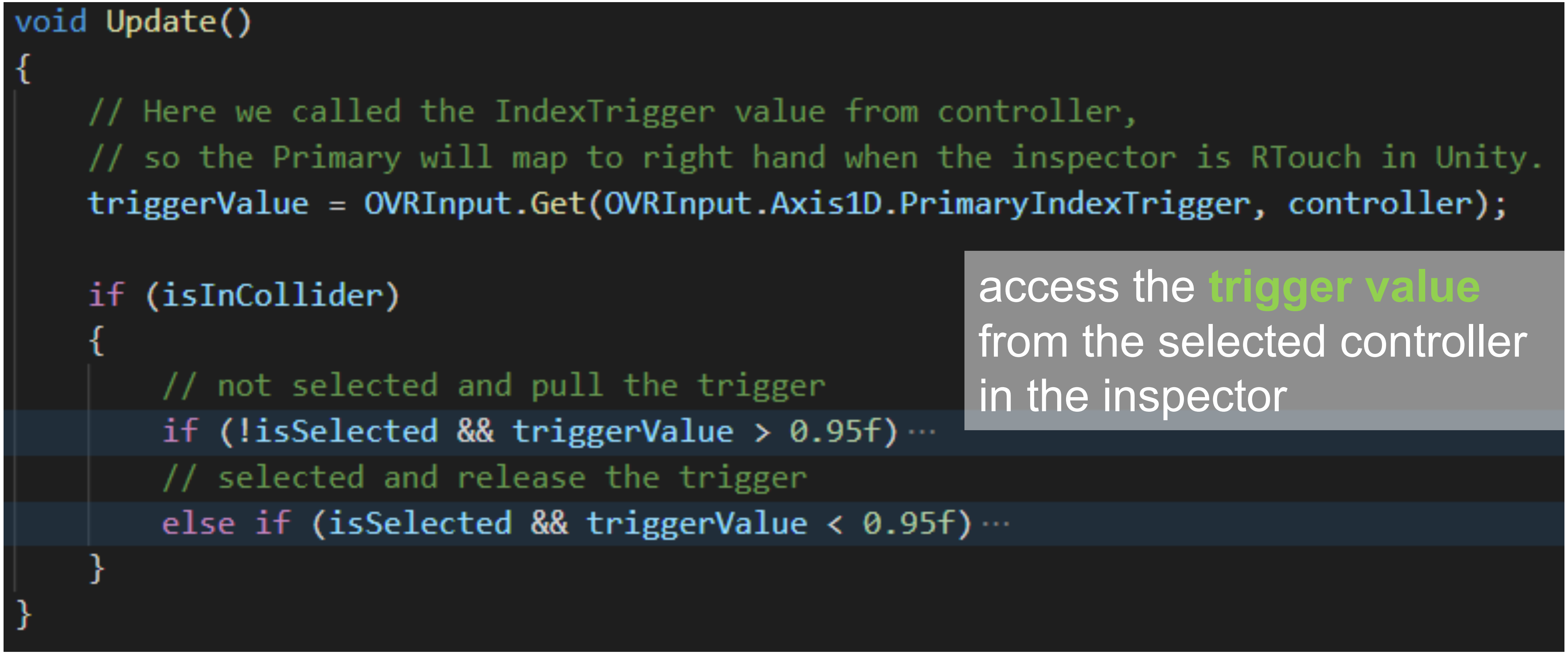
```
if (controller is in the collider of roll-a-ball)
    if (not selected and pull the trigger)
        selects roll-a-ball
    else if (selected and release the trigger)
        releases roll-a-ball
```

Use IndexTrigger as input


Left Controller
Right Controller
Axis2D.PrimaryThumbstick
Button.PrimaryThumbstick (left stick press)
Button.Four
Button.Three
Button.Start
Axis2D.SecondaryThumbstick
Button.SecondaryThumbstick (right stick press)
Button.Two
Button.One
Reserved
Axis1D.PrimaryIndexTrigger
Axis1D.SecondaryIndexTrigger
Axis1D.PrimaryHandTrigger
Axis1D.SecondaryHandTrigger

Refs

In MySelect.cs



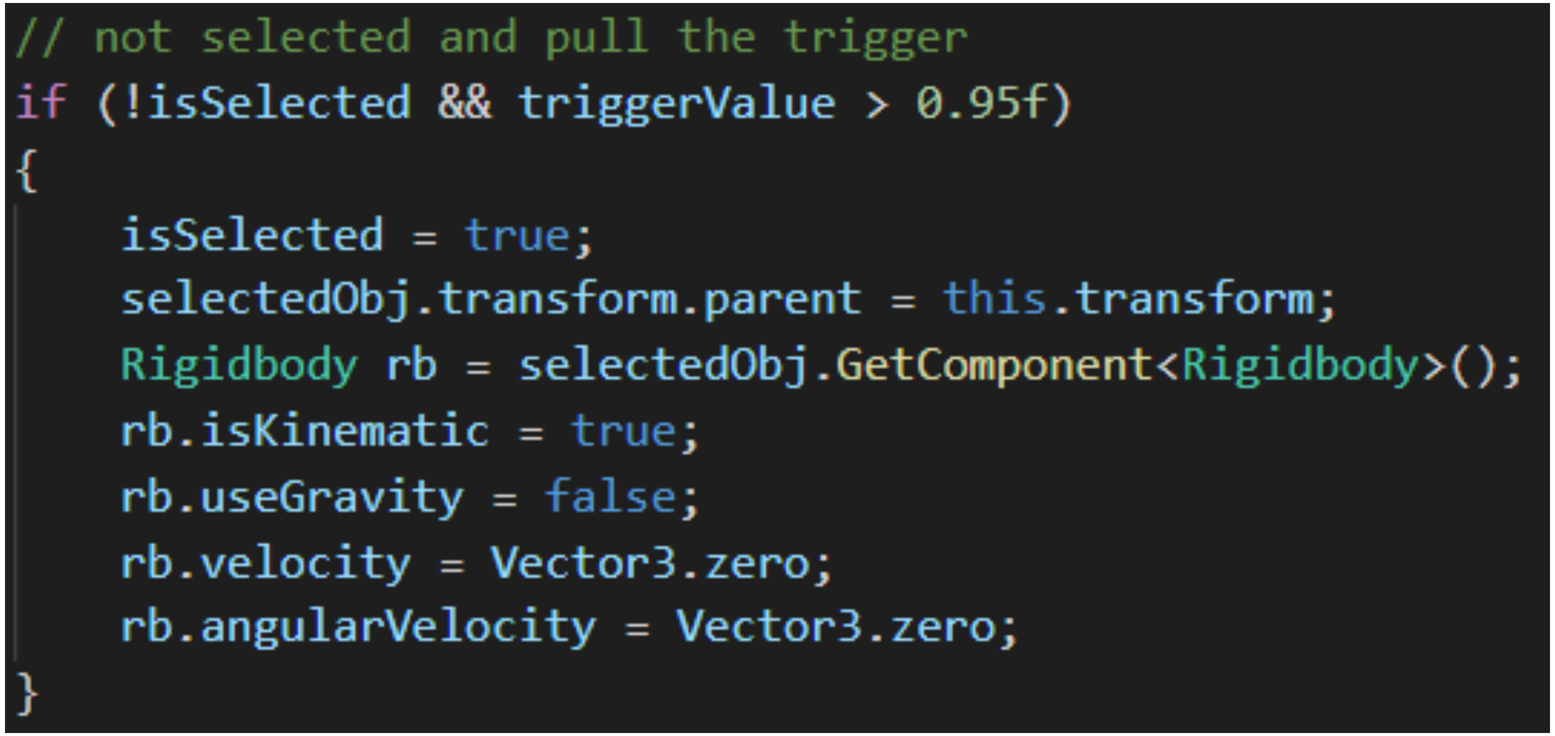
```
void Update()
{
    // Here we called the IndexTrigger value from controller,
    // so the Primary will map to right hand when the inspector is RTouch in Unity.
    triggerValue = OVRInput.Get(OVRInput.Axis1D.PrimaryIndexTrigger, controller);

    if (isInCollider)
    {
        // not selected and pull the trigger
        if (!isSelected && triggerValue > 0.95f)⋯
        // selected and release the trigger
        else if (isSelected && triggerValue < 0.95f)⋯
    }
}
```

access the **trigger value** from the selected controller in the inspector

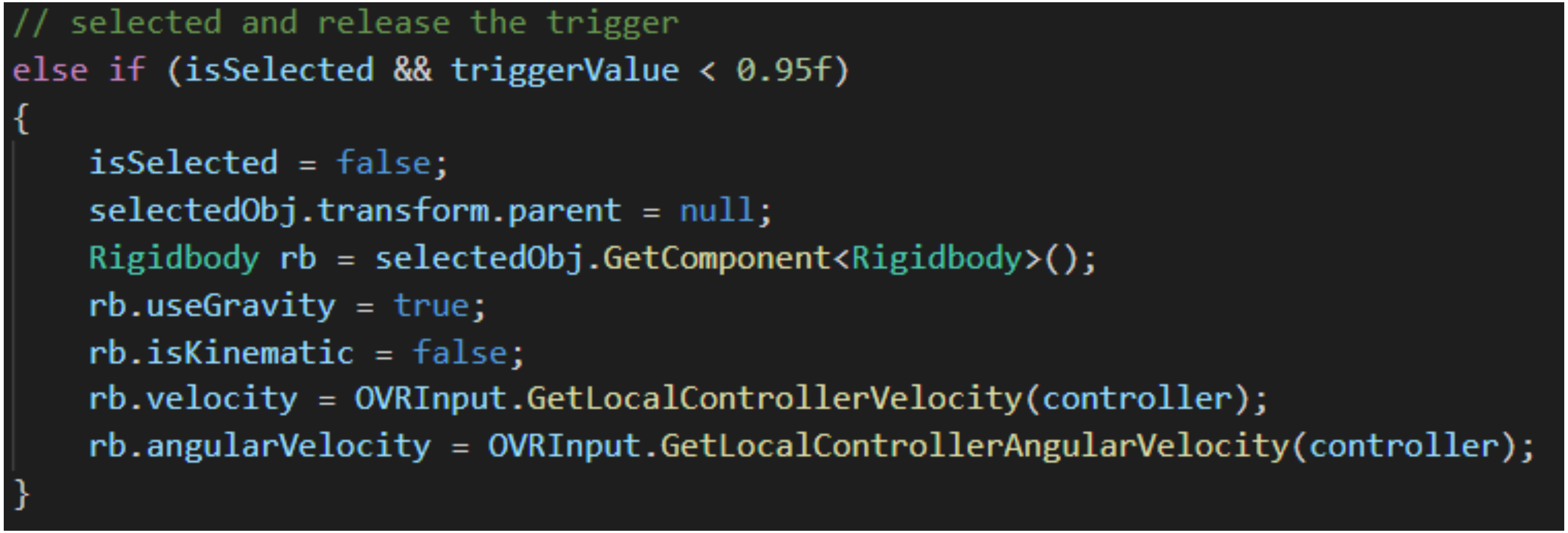
select

make roll-a-ball as the
Child of HandAnchor



```
// not selected and pull the trigger
if (!isSelected && triggerValue > 0.95f)
{
    isSelected = true;
    selectedObj.transform.parent = this.transform;
    Rigidbody rb = selectedObj.GetComponent<Rigidbody>();
    rb.isKinematic = true;
    rb.useGravity = false;
    rb.velocity = Vector3.zero;
    rb.angularVelocity = Vector3.zero;
}
```

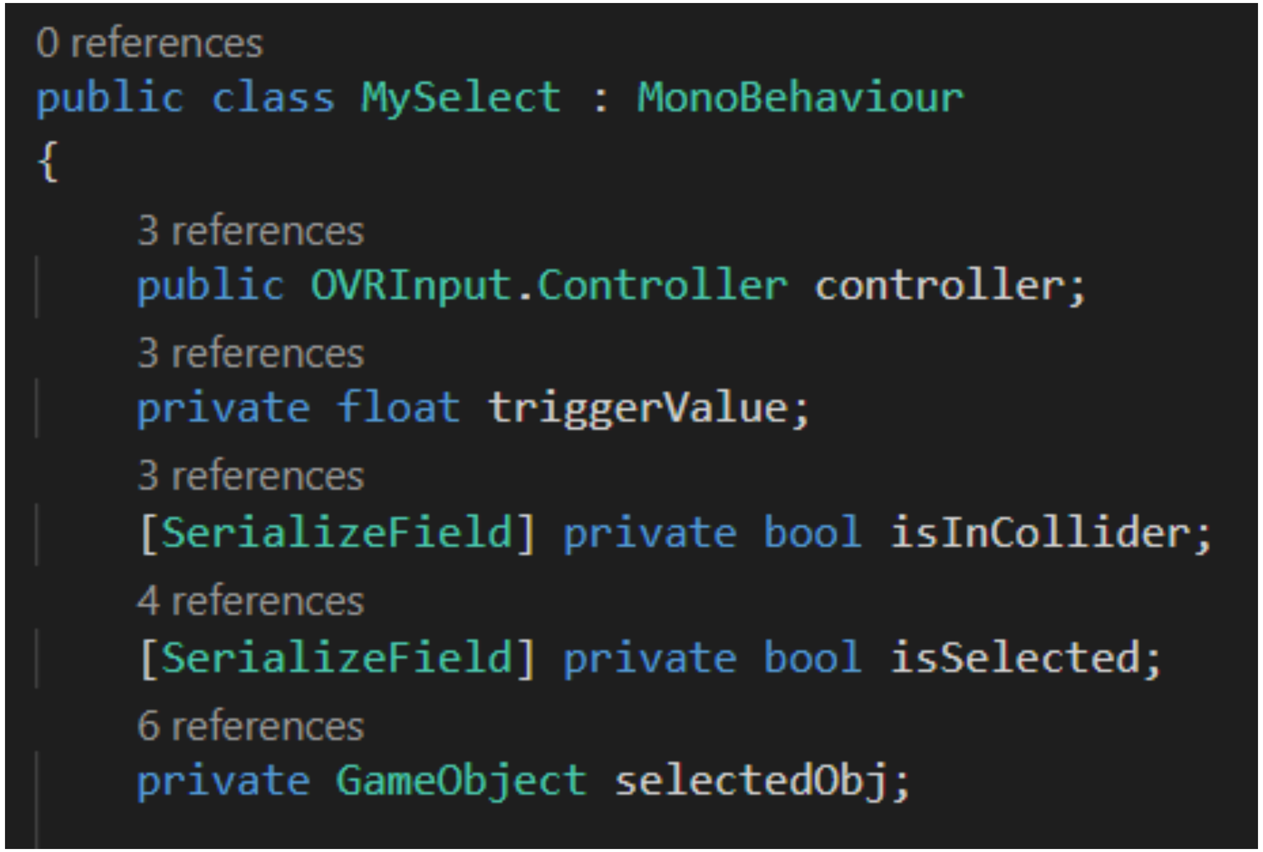
release



```
// selected and release the trigger
else if (isSelected && triggerValue < 0.95f)
{
    isSelected = false;
    selectedObj.transform.parent = null;
    Rigidbody rb = selectedObj.GetComponent<Rigidbody>();
    rb.useGravity = true;
    rb.isKinematic = false;
    rb.velocity = OVRInput.GetLocalControllerVelocity(controller);
    rb.angularVelocity = OVRInput.GetLocalControllerAngularVelocity(controller);
}
```

- remove Parent
- adjust all the physics back
- velocity and angular velocity have to use the tracked value from OVRInput

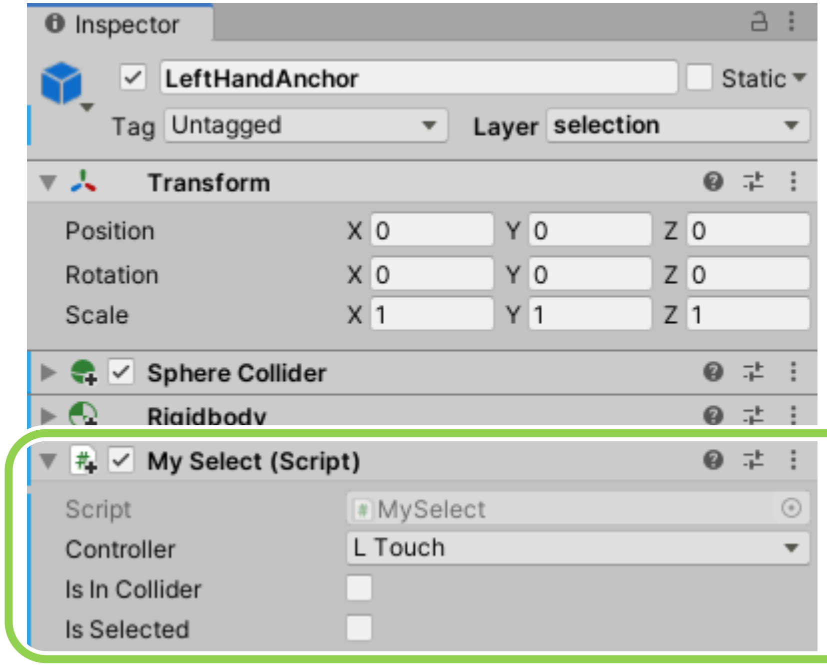
variables



```
0 references
public class MySelect : MonoBehaviour
{
        3 references
        public OVRInput.Controller controller;
        3 references
        private float triggerValue;
        3 references
        [SerializeField] private bool isInCollider;
        4 references
        [SerializeField] private bool isSelected;
        6 references
        private GameObject selectedObj;
```

Select L & R Touch in the inspector

LeftHandAnchor



Inspector

☑ LeftHandAnchor □ Static

Tag Untagged Layer selection

Transform

Position	X 0	Y 0	Z 0
Rotation	X 0	Y 0	Z 0
Scale	X 1	Y 1	Z 1

☑ Sphere Collider

Rigidbody

☑ My Select (Script)

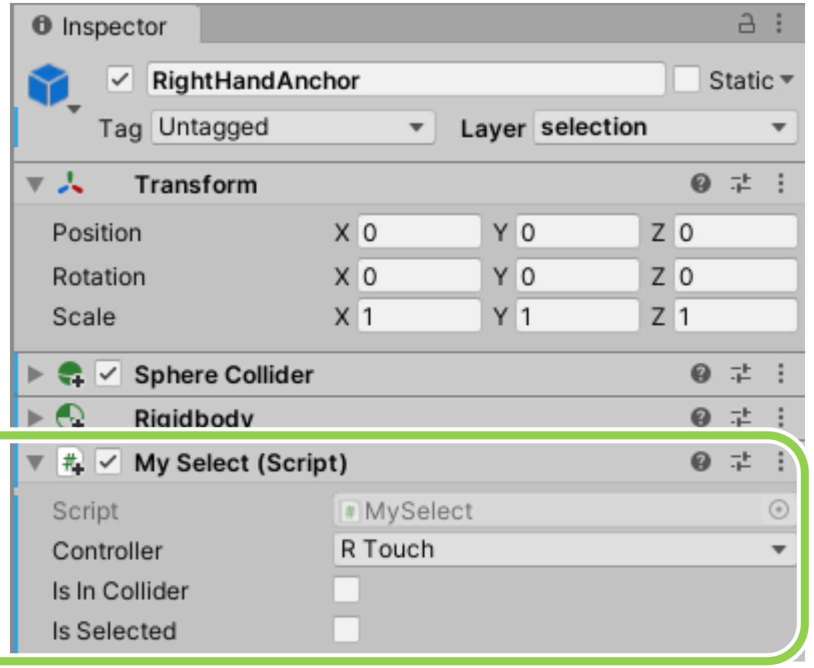
Script: MySelect

Controller: L Touch

Is In Collider: □

Is Selected: □

RightHandAnchor



Inspector

☑ RightHandAnchor □ Static

Tag Untagged Layer selection

Transform

Position	X 0	Y 0	Z 0
Rotation	X 0	Y 0	Z 0
Scale	X 1	Y 1	Z 1

☑ Sphere Collider

Rigidbody

☑ My Select (Script)

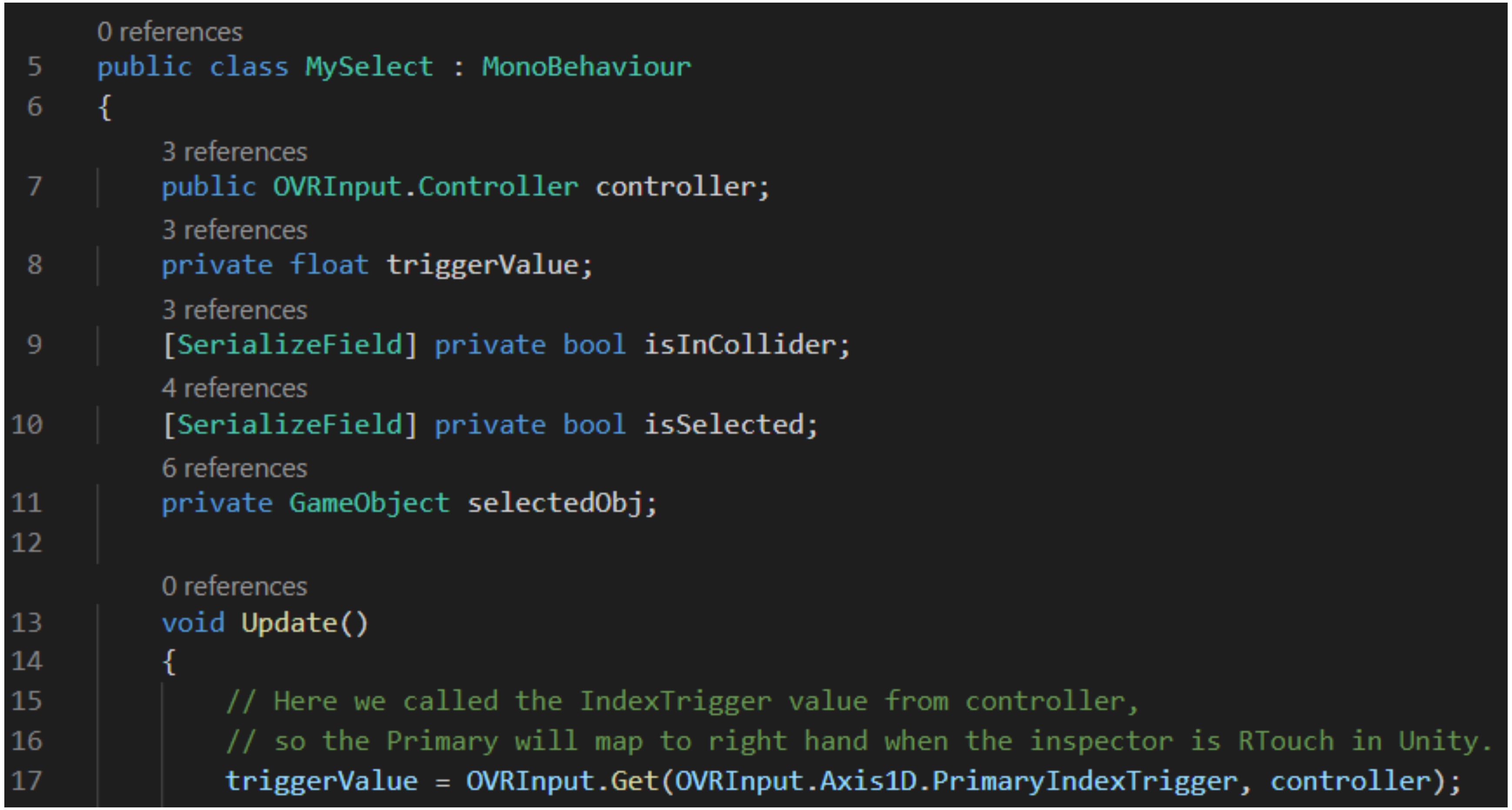
Script: MySelect

Controller: R Touch

Is In Collider: □

Is Selected: □

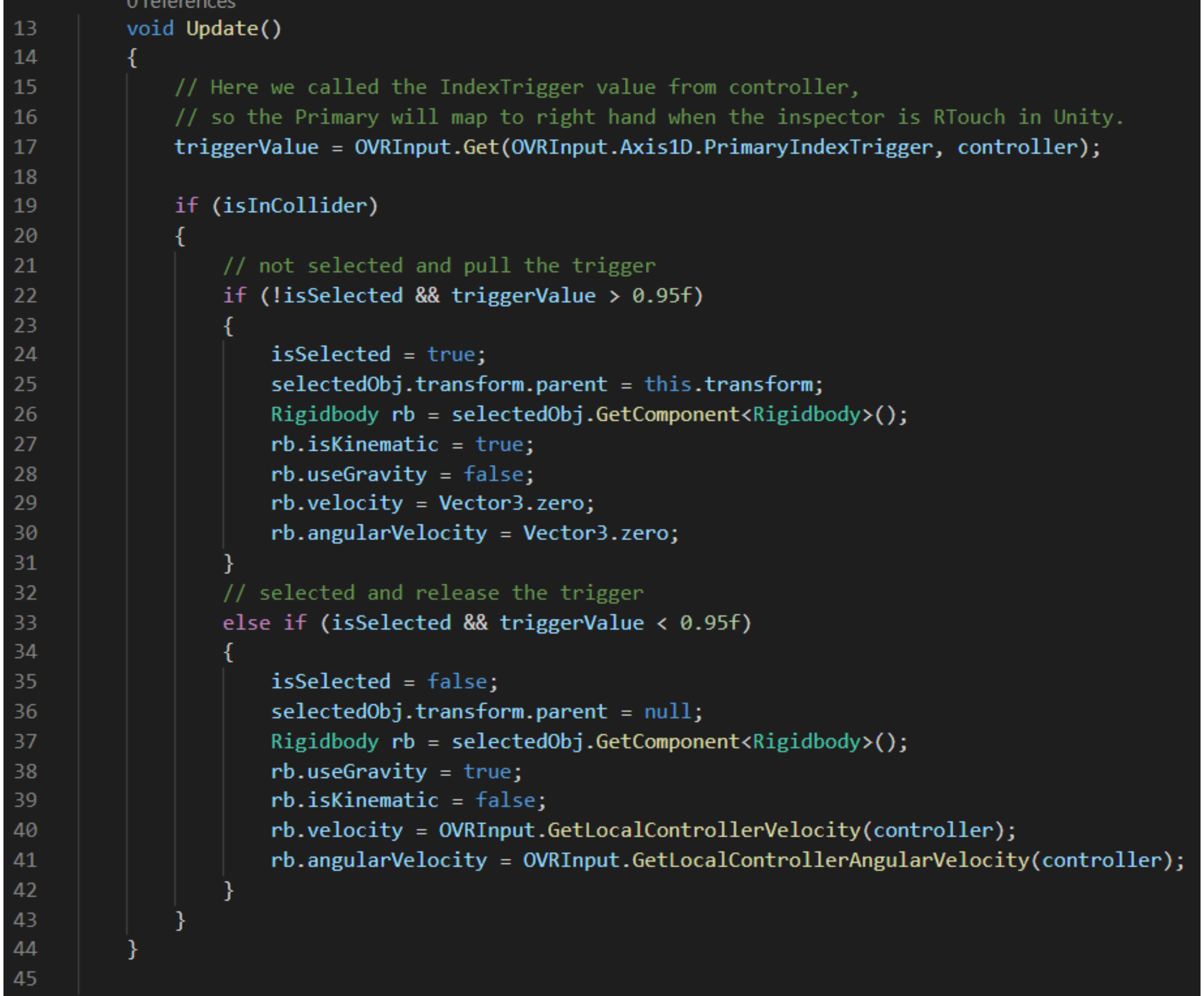
code 1/3



```
0 references
public class MySelect : MonoBehaviour
{
    3 references
    public OVRInput.Controller controller;
    3 references
    private float triggerValue;
    3 references
    [SerializeField] private bool isInCollider;
    4 references
    [SerializeField] private bool isSelected;
    6 references
    private GameObject selectedObj;

    0 references
    void Update()
    {
        // Here we called the IndexTrigger value from controller,
        // so the Primary will map to right hand when the inspector is RTouch in Unity.
        triggerValue = OVRInput.Get(OVRInput.Axis1D.PrimaryIndexTrigger, controller);
```

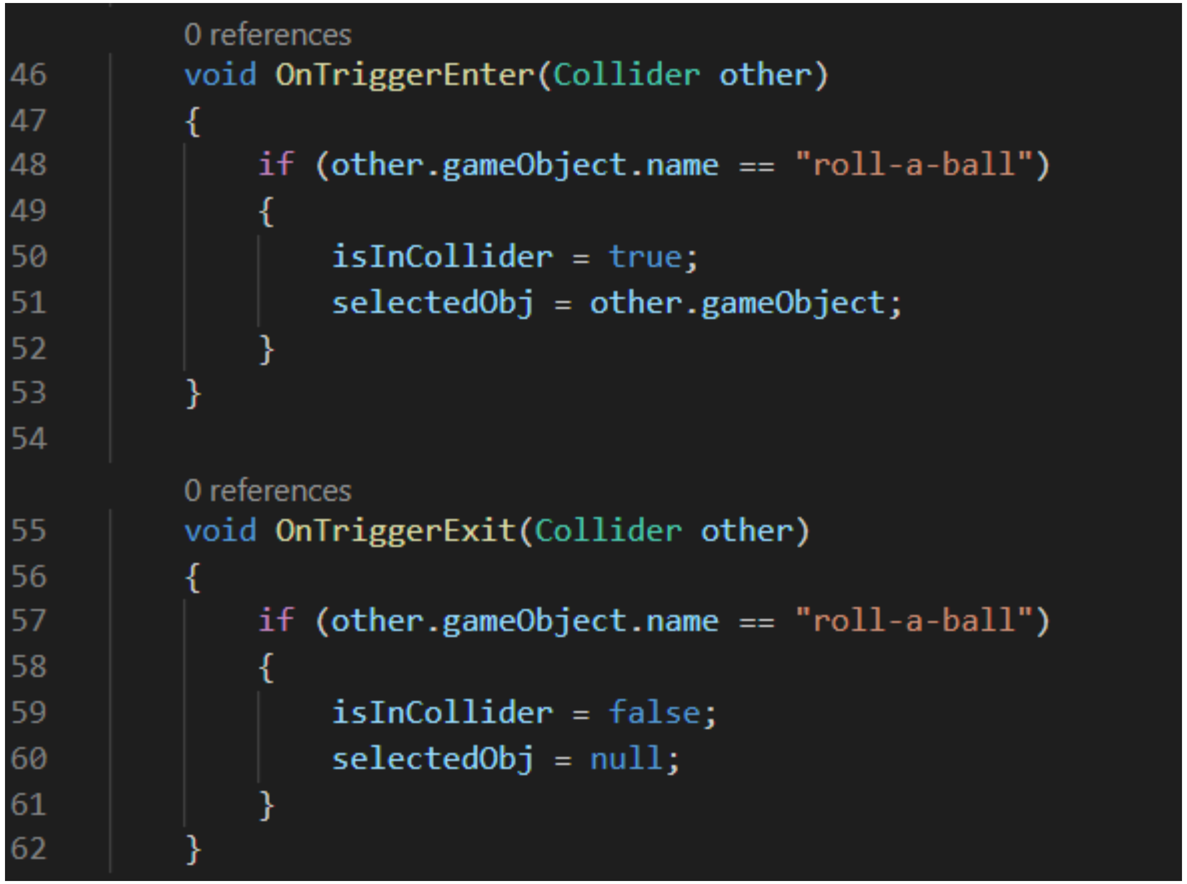
code 2/3



```
0 references
void Update()
{
    // Here we called the IndexTrigger value from controller,
    // so the Primary will map to right hand when the inspector is RTouch in Unity.
    triggerValue = OVRInput.Get(OVRInput.Axis1D.PrimaryIndexTrigger, controller);

    if (isInCollider)
    {
        // not selected and pull the trigger
        if (!isSelected && triggerValue > 0.95f)
        {
            isSelected = true;
            selectedObj.transform.parent = this.transform;
            Rigidbody rb = selectedObj.GetComponent<Rigidbody>();
            rb.isKinematic = true;
            rb.useGravity = false;
            rb.velocity = Vector3.zero;
            rb.angularVelocity = Vector3.zero;
        }
        // selected and release the trigger
        else if (isSelected && triggerValue < 0.95f)
        {
            isSelected = false;
            selectedObj.transform.parent = null;
            Rigidbody rb = selectedObj.GetComponent<Rigidbody>();
            rb.useGravity = true;
            rb.isKinematic = false;
            rb.velocity = OVRInput.GetLocalControllerVelocity(controller);
            rb.angularVelocity = OVRInput.GetLocalControllerAngularVelocity(controller);
        }
    }
}
```

code 3/3



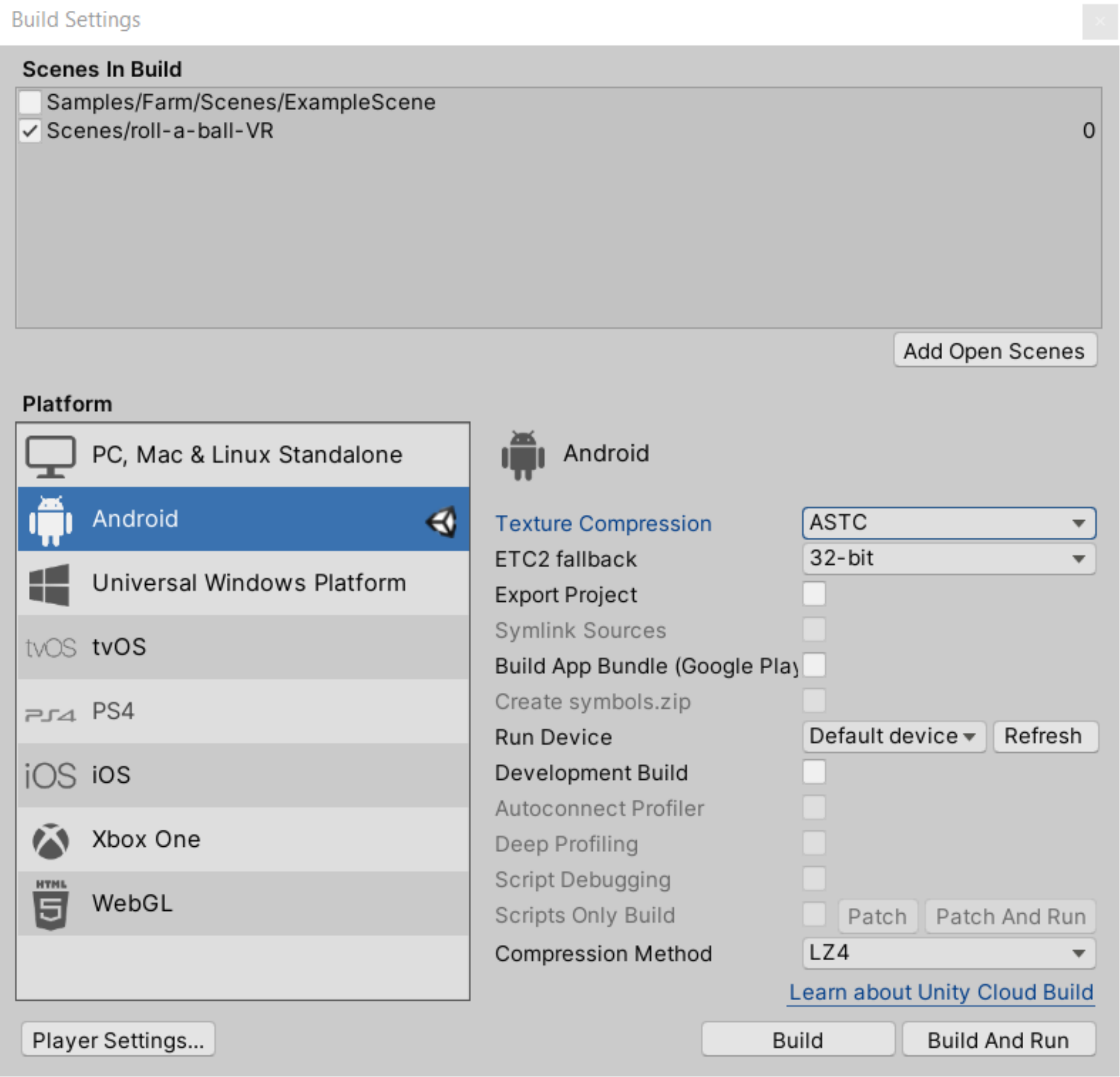
```
    0 references
    void OnTriggerEnter(Collider other)
    {
        if (other.gameObject.name == "roll-a-ball")
        {
            isInCollider = true;
            selectedObj = other.gameObject;
        }
    }

    0 references
    void OnTriggerExit(Collider other)
    {
        if (other.gameObject.name == "roll-a-ball")
        {
            isInCollider = false;
            selectedObj = null;
        }
    }
```

deploy

File > Build Setting > **Build And Run**

It takes a while to build project



Build Settings

Scenes In Build

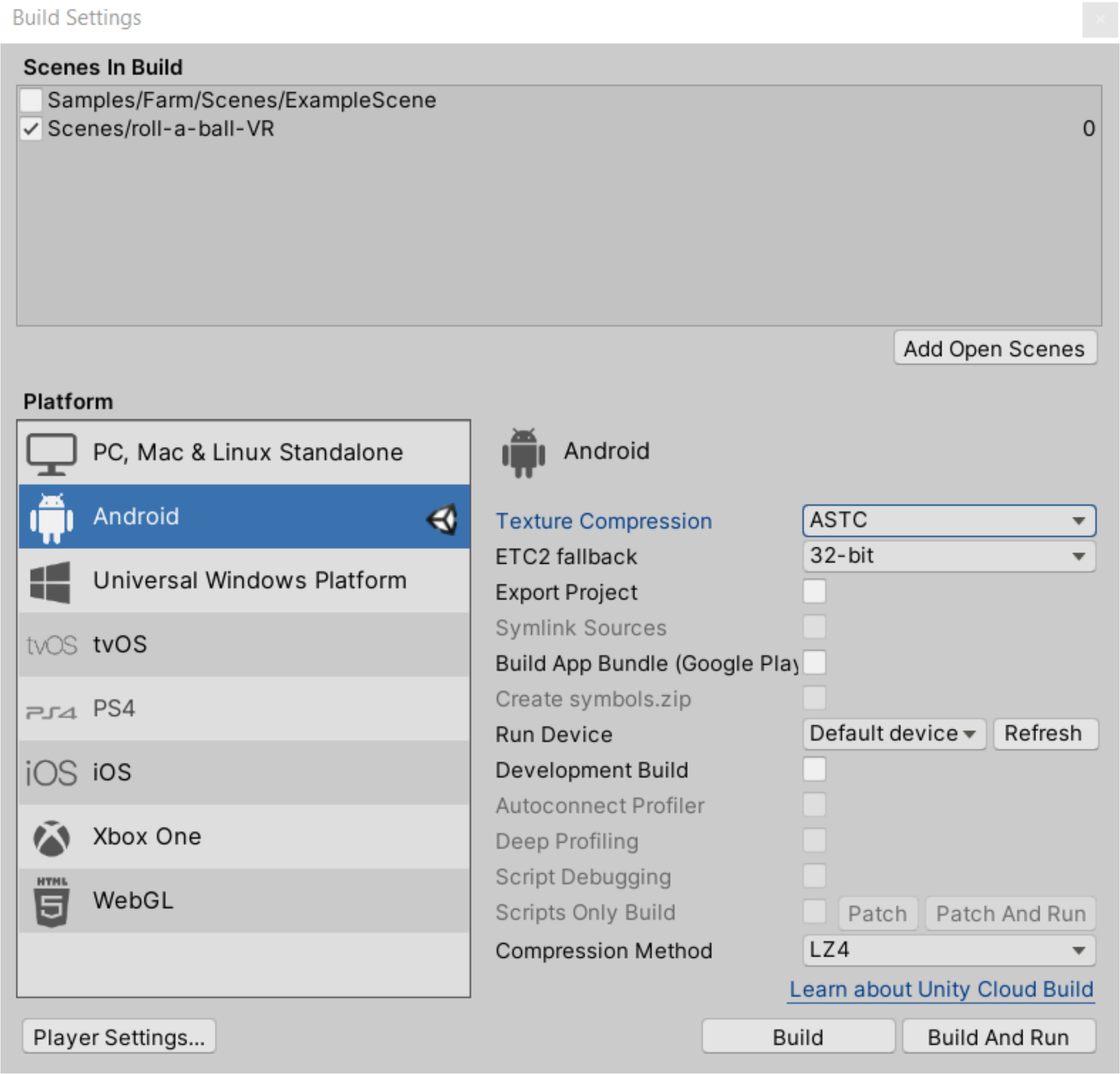
- □ Samples/Farm/Scenes/ExampleScene
- ☑ Scenes/roll-a-ball-VR 0

Platform

Texture Compression	ASTC
ETC2 fallback	32-bit
Export Project	□
Symlink Sources	□
Build App Bundle (Google Play	□
Create symbols.zip	□
Run Device	Default device
Development Build	□
Autoconnect Profiler	□
Deep Profiling	□
Script Debugging	□
Scripts Only Build	□
Compression Method	LZ4

File > Build Setting > **Build**

It takes a while to build project



Build Settings

Scenes In Build

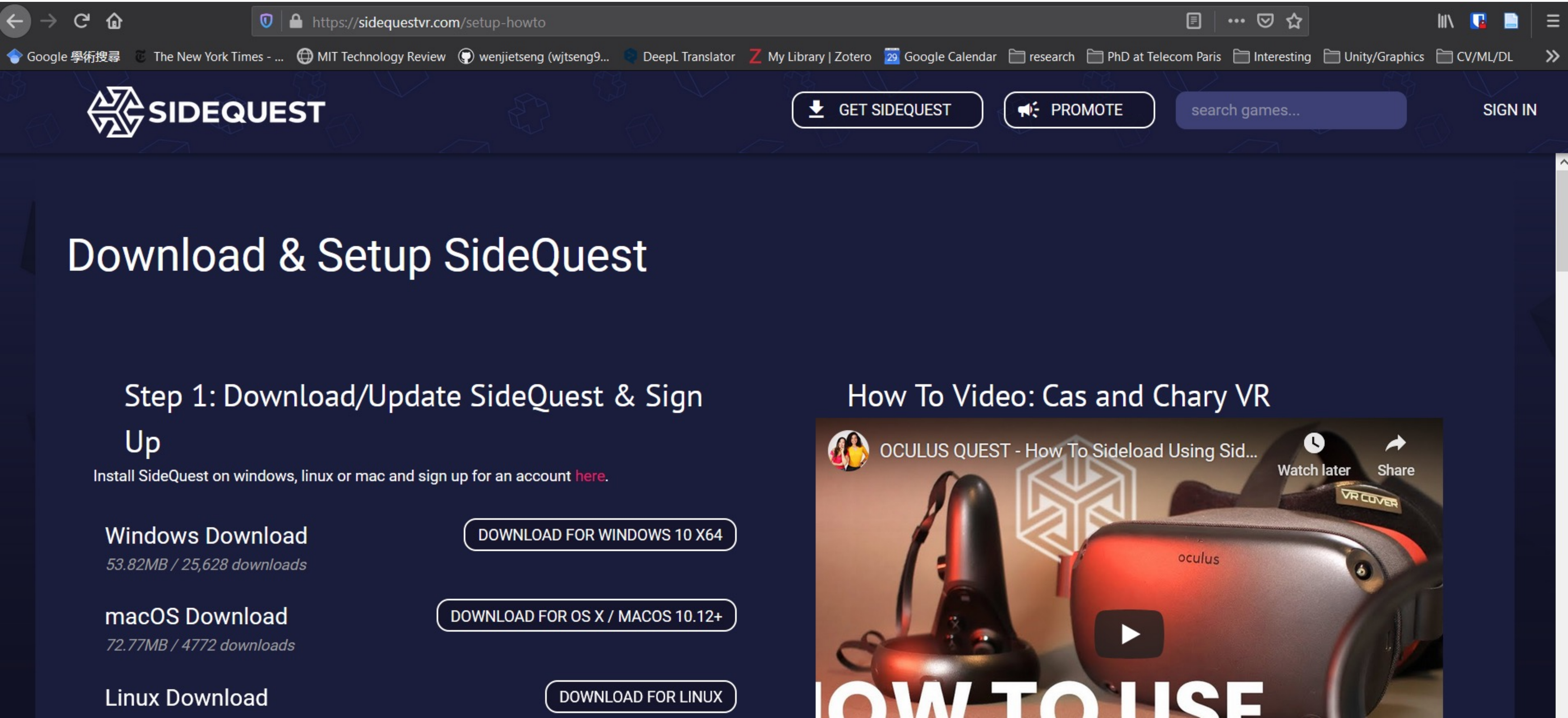
□ Samples/Farm/Scenes/ExampleScene
☑ Scenes/roll-a-ball-VR 0

Platform

Android

Texture Compression: ASTC
ETC2 fallback: 32-bit
Export Project □
Symlink Sources □
Build App Bundle (Google Play □
Create symbols.zip □
Run Device: Default device
Development Build □
Autoconnect Profiler □
Deep Profiling □
Script Debugging □
Scripts Only Build □
Compression Method: LZ4

SideQuest (link to download)



Download & Setup SideQuest

Step 1: Download/Update SideQuest & Sign Up

Install SideQuest on windows, linux or mac and sign up for an account here.

Windows Download

53.82MB / 25,628 downloads

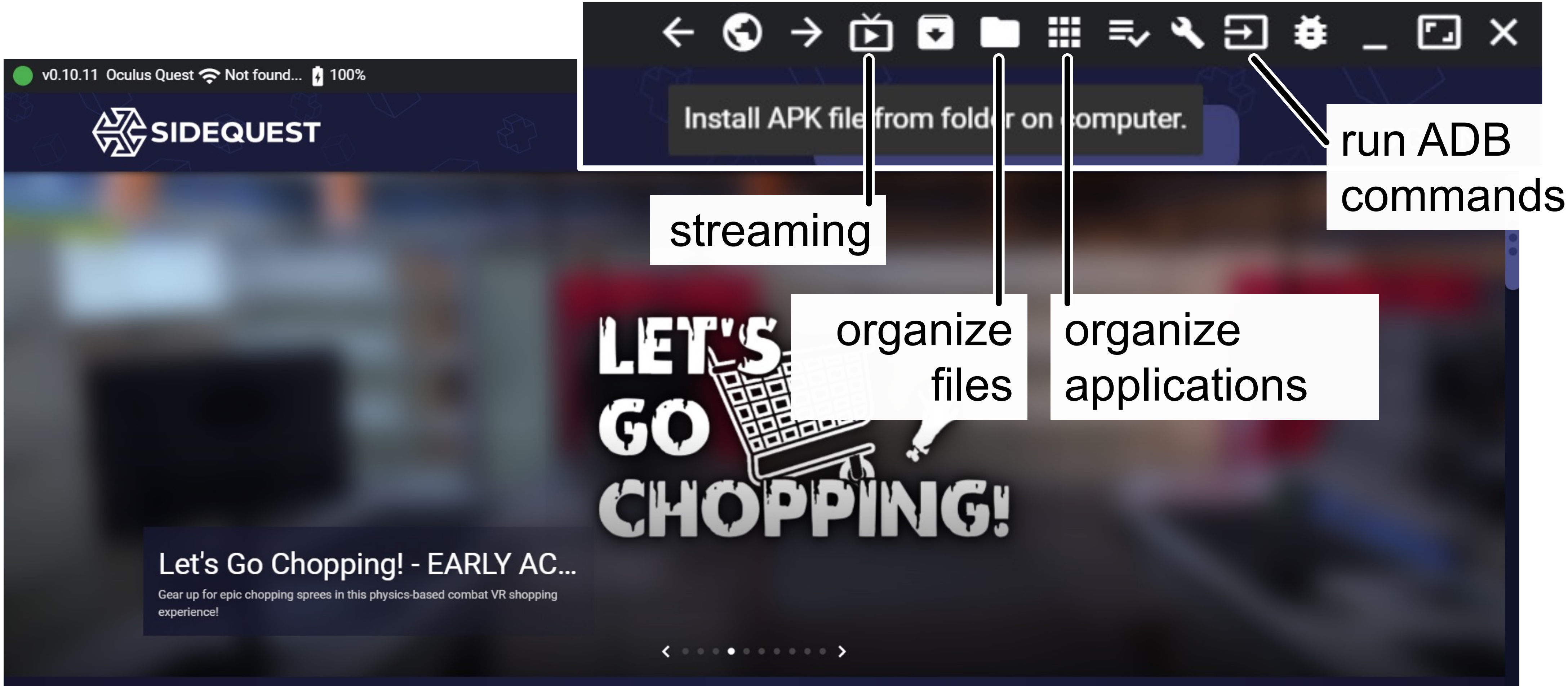
macOS Download

72.77MB / 4772 downloads

Linux Download

How To Video: Cas and Chary VR

SideQuest also has other tools!



v0.10.11 Oculus Quest Not found... 100%

Install APK file from folder on computer.

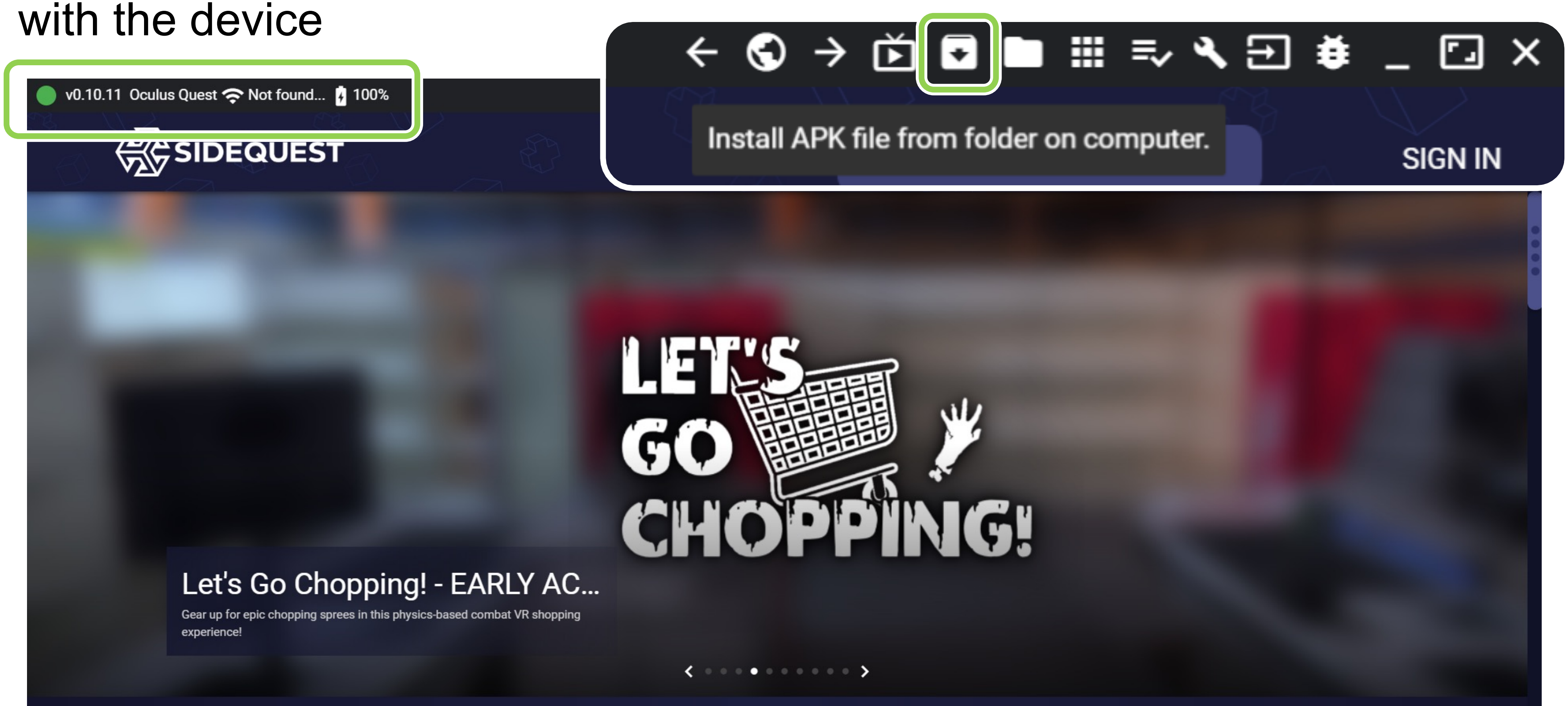
Let's Go Chopping! - EARLY AC...

Gear up for epic chopping sprees in this physics-based combat VR shopping experience!

SideQuest > upload apk

shows connected with the device

press this icon to install



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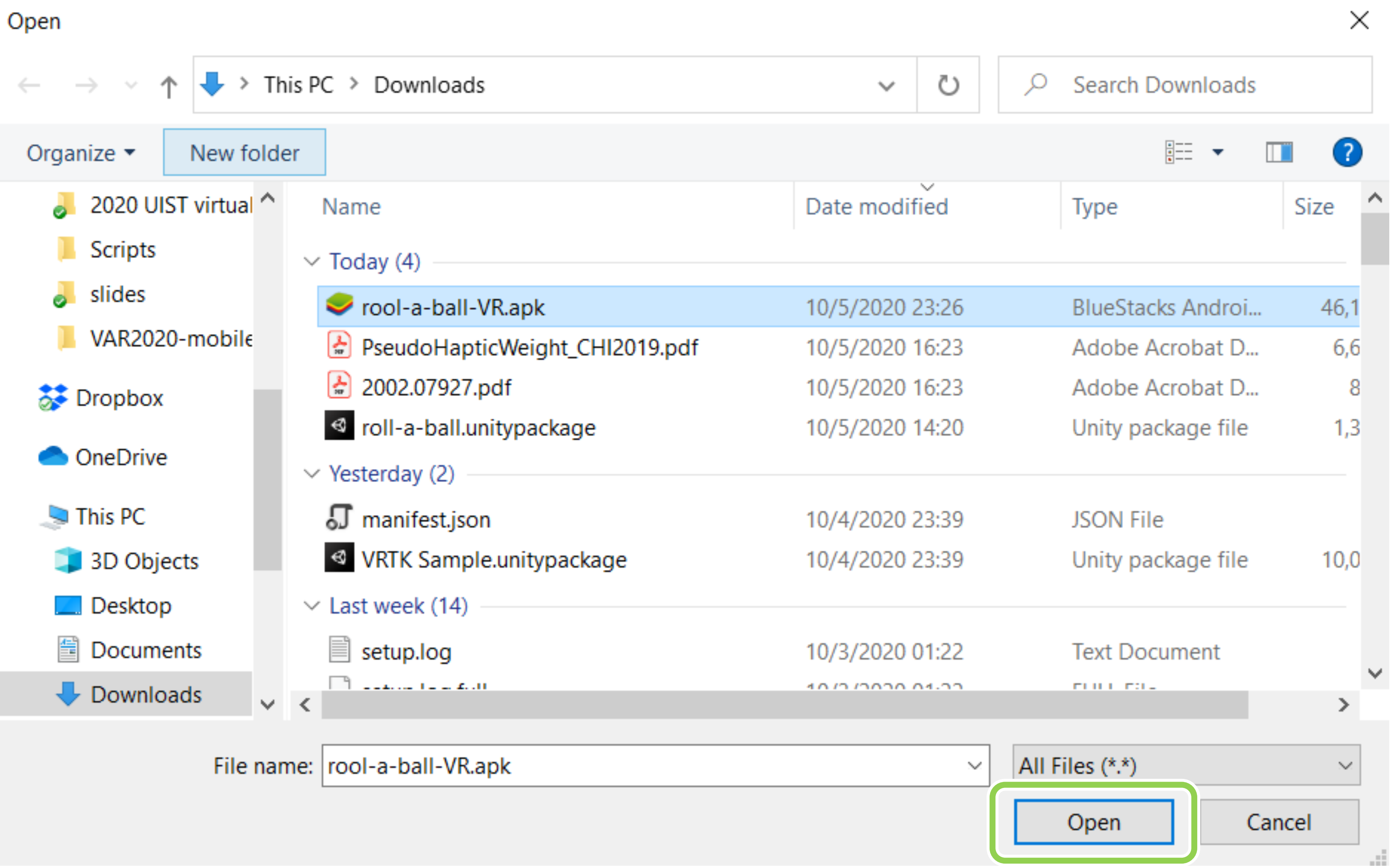


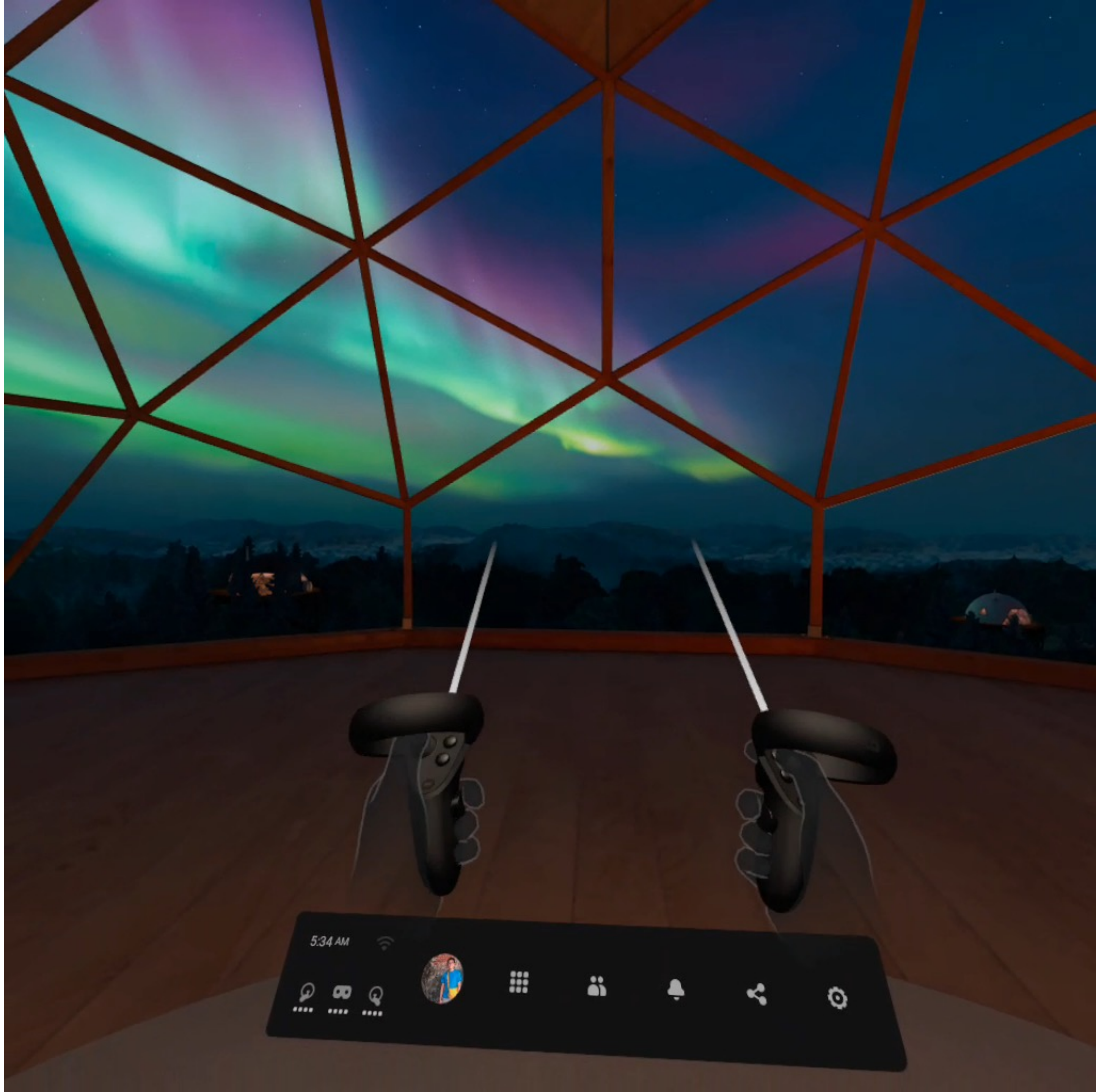
Name	Date modified	Type	Size
Today (4)			
rool-a-ball-VR.apk	10/5/2020 23:26	BlueStacks Androi...	46,1
PseudoHapticWeight_CHI2019.pdf	10/5/2020 16:23	Adobe Acrobat D...	6,6
2002.07927.pdf	10/5/2020 16:23	Adobe Acrobat D...	8
roll-a-ball.unitypackage	10/5/2020 14:20	Unity package file	1,3
Yesterday (2)			
manifest.json	10/4/2020 23:39	JSON File	
VRTK Sample.unitypackage	10/4/2020 23:39	Unity package file	10,0
Last week (14)			
setup.log	10/3/2020 01:22	Text Document	
setup.log.full	10/3/2020 01:22	FULL File	

File name: rool-a-ball-VR.apk

All Files (*.*)

Where is the apk on the Quest?

- Apps (the grid icon)
- top-right tab
- **unknown sources**
- scroll down and find your project (or select most recent)



Expected outcome

- Set up your Quest 2
- Adapt your minimal roll-a-ball game into a VR version
- Play around with your Quest and Oculus Integration API (e.g., controllers)

Questions?

Pick up your Meta Quest

31.10 Tue. 14-16h
01.11 Wed. 9-12h, 13-16h
02.11 Thur. 9-12h, 13-16h

Come to **A307, S2|02**, to pick up your Quest 2!

If you could not make it, please contact
wen-jie.tseng@tu-darmstadt.de or
willich@tk.tu-darmstadt.de