

Augmented Reality

Introduction to AR Foundation and AR Core

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Fabio Solari – fabio.solari@unige.it



DIBRIS DIPARTIMENTO
DI INFORMATICA, BIOINGEGNERIA,
ROBOTICA E INGEGNERIA DEI SISTEMI

Basic Setup for AR Foundation (+AR Core)

Basic Setup for AR Foundation (+AR Core)

- 1. Create a New Project**
- 2. Install AR Foundation from the Package Manager**
- 3. Install AR Core from the Package Manager**
- 4. Enable XR Simulator**

templates

Search Core templates

 Universal 2D
Core Universal 3D
Core High Definition 3D
Core Small Scale Competitive Multiplayer
Core 3D Mobile
Core Universal 3D
This template includes the settings and assets you need to start creating with the Universal Render Pipeline (URP).
[Read more](#) 2D Mobile
Core Mixed Reality (MR)
Core VR
Core AR Mobile
Core Competitive Action Multiplayer
Core

PROJECT SETTINGS

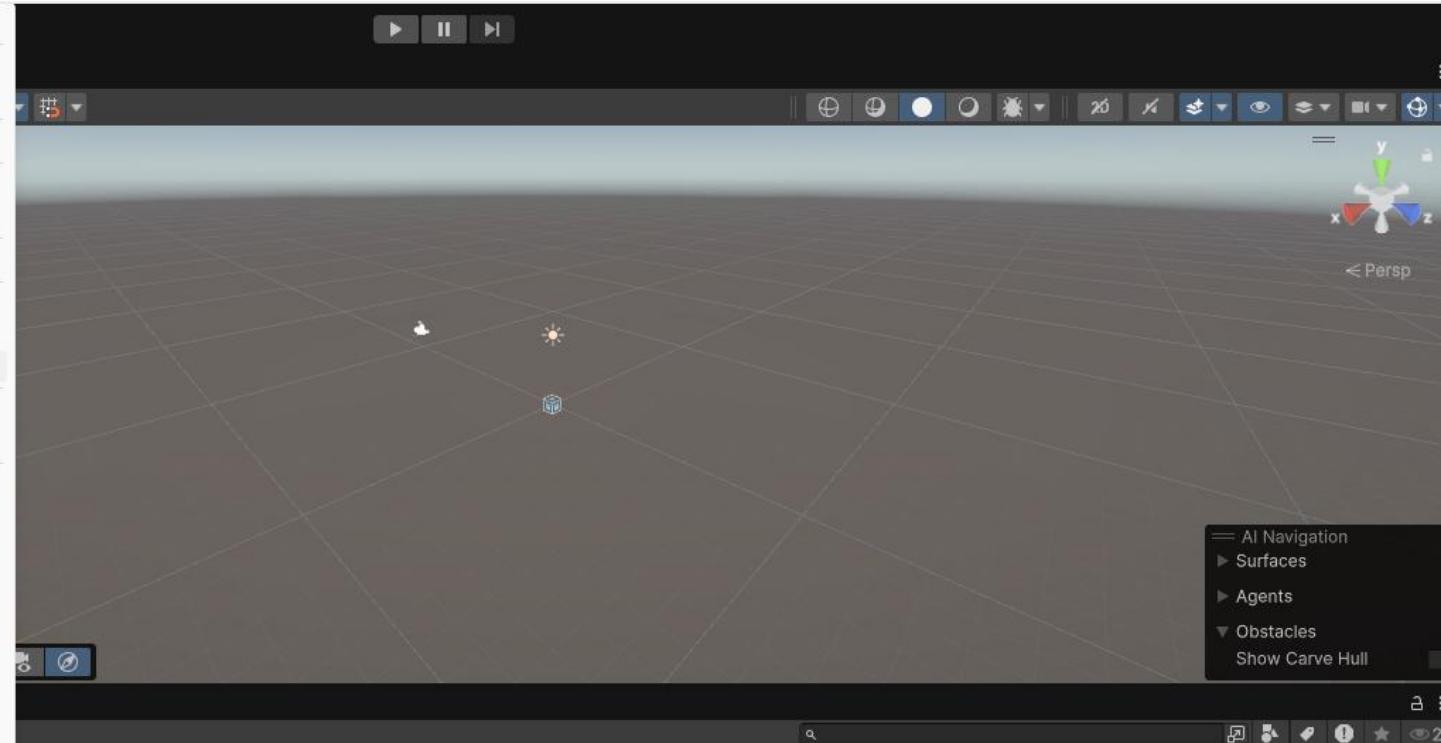
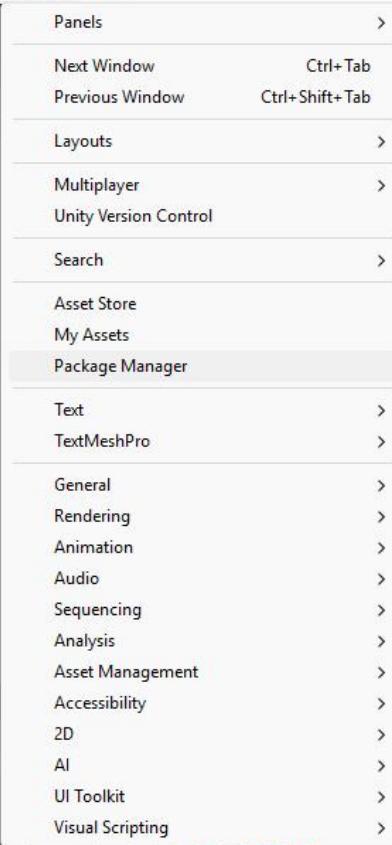
Project name
Lecture_ARFoundationLocation
C:\Users\ManuelaChessa\OneDrive - ...Unity Organization
manuelachessa Connect to Unity Cloud ? Use Unity Version Control ?

Cancel

Create project

[Assets](#) [GameObject](#) [Component](#) [Services](#) [Jobs](#) [Window](#) [Help](#)[MC](#) [Asset Store](#) [?](#)SampleScene
Main Camera
Directional Light
Global Volume

Console

Materials
Scenes
Settings
TutorialInfo
InputSystem...
Readme

URP Empty Template

Welcome to the Universal Render Pipeline

This template includes the settings and assets you need to start creating with the Universal Render Pipeline.

URP Documentation
[Read more about URP](#)

Forums
[Get answers and support](#)

Report bugs
[Submit a report](#)

Remove Readme Assets

Asset Labels

AssetBundle None Nor

Sort: Name (asc)

Filters

Clear Filters

 AR

AR Foundation

6.0.5 · January 25, 2025

From Unity Registry by Unity Technologies Inc.

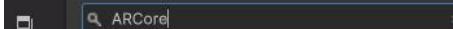
com.unity.xr.arfoundation

[Documentation](#) [Changelog](#) [Licenses](#)[Install](#)[Description](#) [Version History](#) [Dependencies](#)

AR Foundation enables you to create multi-platform augmented reality (AR) apps with Unity. To learn more about AR Foundation, click the Documentation link above.

Package Manager

+ Sort: Name (asc) ▾ Filters ▾ Clear Filters



ARCore

Google ARCore XR Plugin

6.0.5 · January 25, 2025

From Unity Registry by Unity Technologies Inc.
com.unity.xr.arcore

[Documentation](#) [Changelog](#) [Licenses](#)[Install](#)[Description](#) [Version History](#) [Dependencies](#)

Provides native Google ARCore integration for use with Unity's multi-platform XR API.

Supports the following features:

- Efficient Background Rendering
- Horizontal Planes
- Depth Data
- Anchors
- Hit Testing
- Occlusion

File Edit Assets GameObject Component Services Jobs Window Help

Undo Select Readme (Assets/Readm... Ctrl+Z

Redo Ctrl+Y

Undo History Ctrl+U

Select All Ctrl+A

Deselect All Shift+D

Select Children Shift+C

Select Prefab Root Ctrl+Shift+R

Invert Selection Ctrl+I

Selection Groups >

Cut Ctrl+X

Copy Ctrl+C

Paste Ctrl+V

Paste Special >

Duplicate Ctrl+D

Rename

Delete Del

Frame Selected in Scene

Frame Selected in Window under Cursor F

Lock View to Selected Shift+F

Search >

Play Ctrl+P

Pause Ctrl+Shift+P

Step Ctrl+Alt+P

Project Settings...

Preferences...

Shortcuts...

Clear All PlayerPrefs

Lighting >

Graphics Tier >

Rendering >

Burst

Collections

Core RP Library

Custom NUnit

Editor Coroutines

Input System

JetBrains Rider Editor

Mathematics

Mono Cecil

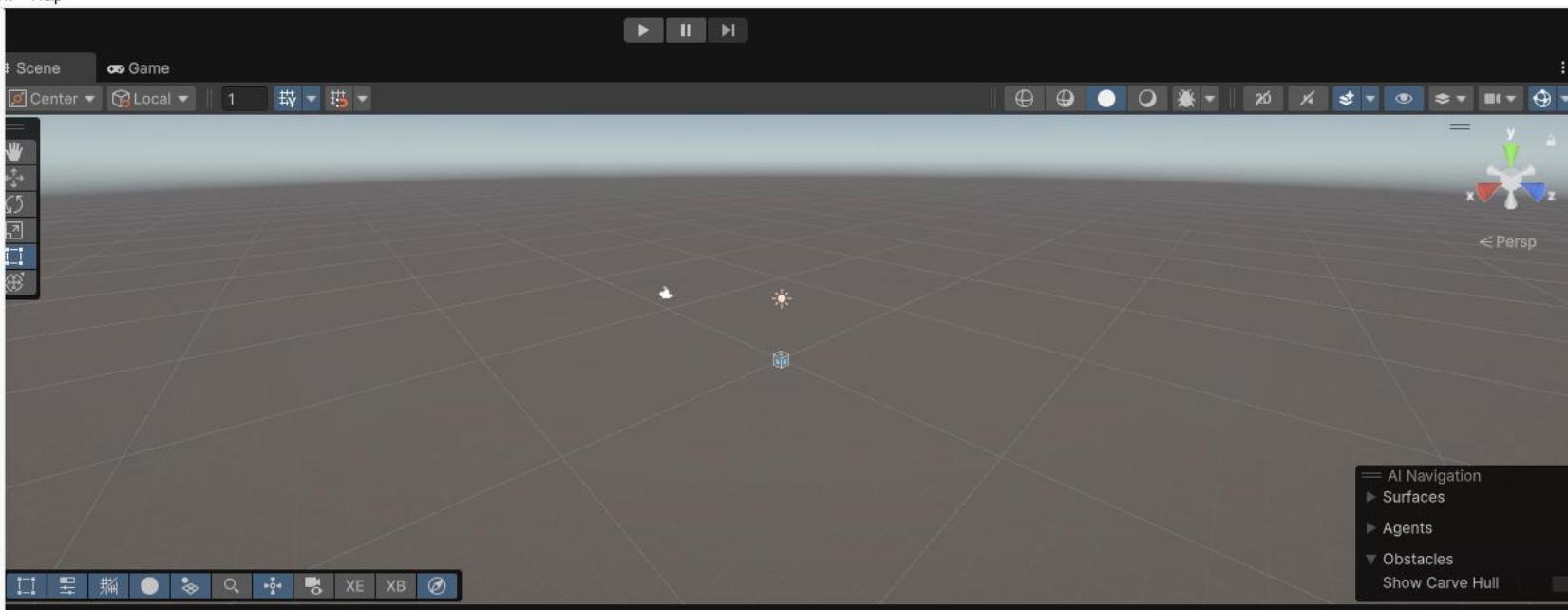
Multiplayer Center

Performance testing API

Searcher

Shader Graph

Test Framework



URP Empty Template

Welcome to the Universal Render Pipeline

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URP Documentation
[Read more about URP](#)

Forums
[Get answers and support](#)

Report bugs
[Submit a report](#)

Remove Readme Assets

Created initial copy of settings: SimulationEnvironmentAssetsManager at Assets/XR/UserSimulationSettings/SimulationEnvironmentAssetsManager.asset

Adaptive Performance
Audio
Burst AOT Settings
Editor
Graphics

Input Manager
Input System Package
 Settings
Memory Settings
Package Manager
Physics
 Settings
Physics 2D
Player
Preset Manager
Quality

Scene Template
Script Execution Order
Services
ShaderGraph
Tags and Layers
TextMeshPro
Time
Timeline
UI Toolkit
Version Control
Visual Scripting

XR Plug-in Management
 Google ARCore
 Project Validation
 XR Simulation

XR Plug-in Management

Initialize XR on Startup

Plug-in Providers [?](#)

- Oculus
- Open XR
- XR Simulation
- Unity Mock HMD

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

[View Documentation](#)

URP
Empty
Template

Welcome to the Universal Render Pipeline

This template includes the
settings and assets you need
to start creating with the
Universal Render Pipeline.

URP Documentation

[Read more about URP](#)

Forums

[Get answers and support](#)

Report bugs

[Submit a report](#)

[Remove Readme Assets](#)

Asset Labels

AssetBundle None Nor

Basic Setup for AR Foundation (+AR Core)

Change the Renderer

<https://docs.unity3d.com/Packages/com.unity.xr.arfoundation@6.1/manual/project-setup/universal-render-pipeline.html>

[File](#) [Edit](#) [Assets](#) [GameObject](#) [Component](#) [Services](#) [Jobs](#) [Window](#) [Help](#)

Unity 6 | MC Asset Store

Hierarchy

SampleScene
Main Camera
Directional Light
Global Volume

Scene Game

▶ □ ▶

Inspector
Settings (Default Asset)
Open

- Create >
- Show in Explorer
- Open
- Delete
- Rename
- Copy Path Alt+Ctrl+C
- Open Scene Additive
- View in Package Manager
- Import New Asset...
- Import Package >
- Export Package...
- Find References In Scene
- Find References In Project
- Select Dependencies
- Refresh Ctrl+R
- Reimport
- Reimport All
- Extract From Prefab
- AR Foundation >
- Update UXML Schema
- Open C# Project
- View in Import Activity Window
- Seed XR Input Bindings
- Properties... Alt+P

- Folder
- Material
- MonoBehaviour Script
- Prefab Variant
- 2D >
- Animation >
- Audio >
- Rendering > **Material**
- Scene >
- Scripting >
- Search >
- Shader >
- Shader Graph >
- Testing >
- Terrain >
- Text Core >
- TextMeshPro >
- Timeline >
- UI Toolkit >
- Visual Scripting >
- XR >
- Physics Material
- GUI Skin
- Custom Font
- Input Actions
- Lens Flare (SRP)
- URP Asset (with 2D Renderer)
- URP Asset (with Universal Renderer)
- URP Renderer Feature
- URP 2D Renderer
- URP Universal Renderer
- URP Post-processing Effect (Renderer Feature with Volume)
- URP Post-process Data
- Environment Library (Look Dev)

Project

Console

+

★ Favorites

All Materials
All Models
All Prefabs

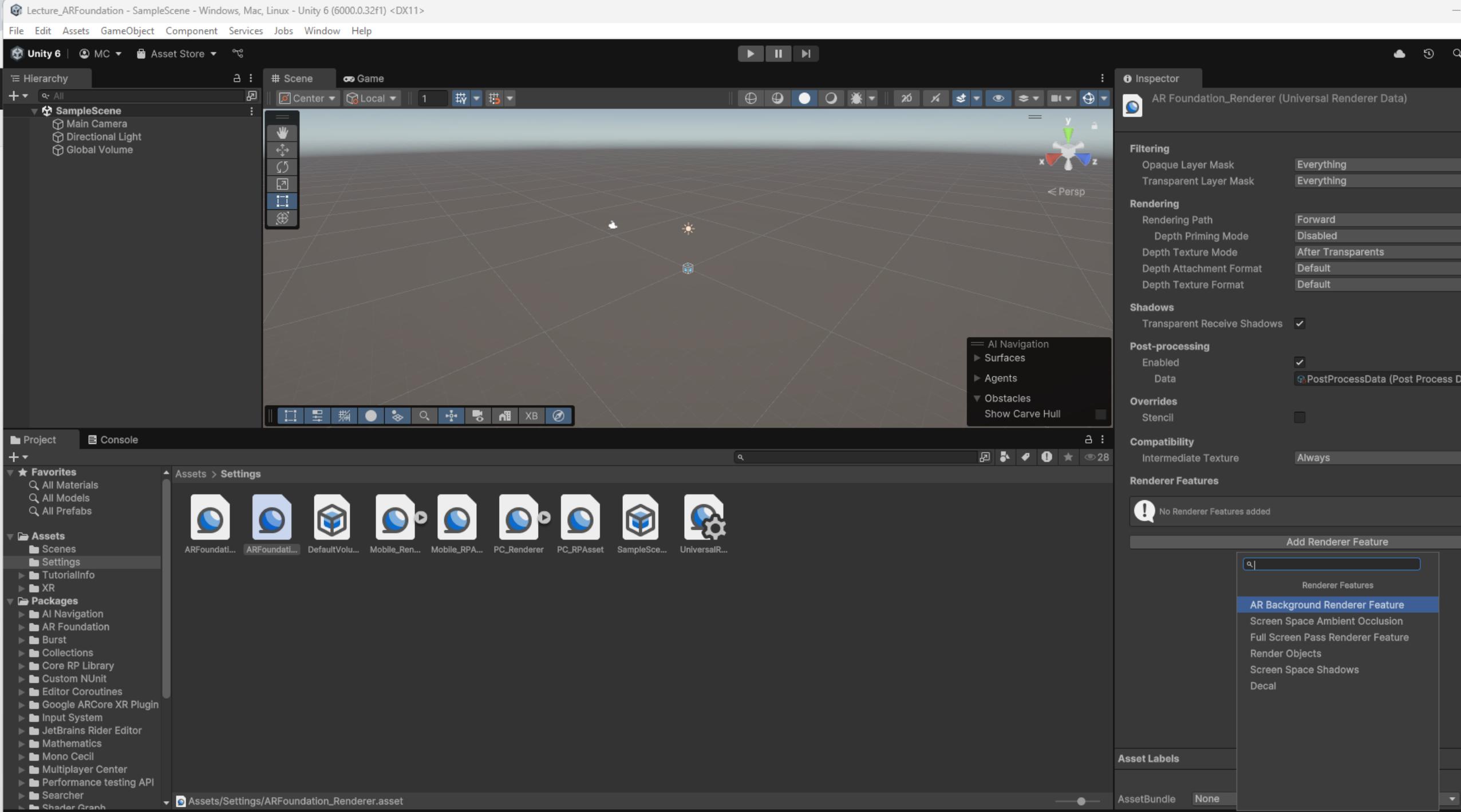
Assets

Scenes
Settings
TutorialInfo
XR
AI Navigation
AR Foundation
Burst
Collections
Core RP Library
Custom NUnit
Editor Coroutines
Google ARCore XR Plugin
Input System
JetBrains Rider Editor
Mathematics
Mono Cecil
Multiplayer Center
Performance testing API
Searcher
Shader Graph

Assets > Settings

Asset Labels

AssetBundle None Nor

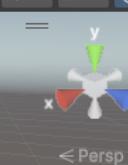


Hierarchy

SampleScene*

- AR Session
- XR Origin

Scene Game



AI Navigation
Surfaces
Agents
Obstacles
Show Carve Hull

Project

Console

Favorites

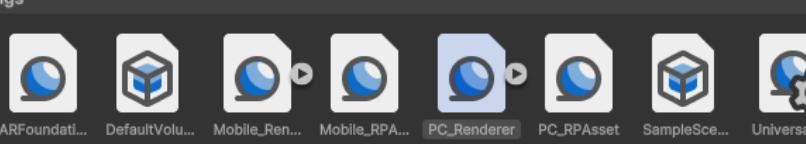
- All Materials
- All Models
- All Prefabs

Assets

- Scenes
- Settings
- TutorialInfo
- XR

Packages

- AI Navigation
- AR Foundation
- Burst
- Collections
- Core RP Library
- Custom NUnit
- Editor Coroutines
- Google ARCore XR Plugin
- Input System
- JetBrains Rider Editor
- Mathematics
- Mono Cecil
- Multiplayer Center
- Performance testing API
- Searcher
- Shader Graph



ARFoundati...

ARFoundati...

DefaultVolu...

Mobile_Re...

Mobile_RP...

PC_Renderer

PC_RPAsset

SampleSce...

UniversalR...

Inspector

PC_Renderer (Universal Renderer Data)

Filtering

Opaque Layer Mask
Transparent Layer Mask

Everything
Everything

Rendering

Rendering Path
Depth Priming Mode
Depth Texture Mode
Depth Attachment Format
Depth Texture Format

Forward+
Disabled
After Opaques
Default
Default

Shadows

Transparent Receive Shadows



Post-processing

Enabled
Data
PostProcessData (Post Process Data)



Overrides

Stencil



Compatibility

Intermediate Texture

Auto

Renderer Features

Screen Space Ambient Occlusion
 AR Background Renderer Feature (AR Background Renderer Feature)

Add Renderer Feature

Renderer Features

AR Background Renderer Feature

Full Screen Pass Renderer Feature

Render Objects

Screen Space Shadows

Decal

Asset Labels

AssetBundle None

Basic Setup for AR Foundation (+AR Core)

Setup the Simulator Environments

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Settings

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Package

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management

Core

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Graphics

Set Default Render Pipeline Asset

Set the Default Render Pipeline Asset that Unity uses when you don't have assigned Render Pipeline Asset in the active Quality Level.

Default Render Pipeline

PC_RPAsset (Universal Render Pipeline Asset)

Automatic
Automatic
Strip Unused
Strip if no Entities Graphics package

Shader Stripping

Lightmap Modes
Fog Modes
Instancing Variants
BatchRendererGroup Variants

Shader Loading

Log Shader Compilation

Culling Settings

Camera-Relative Culling
Lights
Shadows

Shader Settings

Video
▶ Always Included Shaders
Renderer Light Probe Selection
▶ Preloaded Shaders
Preload shaders after showing first scene

Always include
Find closest Light Probe

Currently tracked: 108 shaders 162 total variants

Pipeline Specific Settings

Set the default values of all the scenes within the project. Customization capability will be dependent on the currently assigned pipeline for the project. Change the assigned pipeline in the Quality Settings or Default Render Pipeline in Graphics Settings if you don't have Render Pipeline Asset in Quality Settings.

Built-In URP

Volume

Default Profile

DefaultVolumeProfile (Volume Profile)

The values in the Default Volume can be overridden by a Volume Profile assigned to URP asset and Volumes inside scenes.

Lighting

Adaptive Probe Volumes Options

Post-processing

Bloom
Channel Mixer
Chromatic Aberration
Color Adjustments

Assets/Settings/ARFoundation_Renderer.asset

Select Render Pipeline Asset

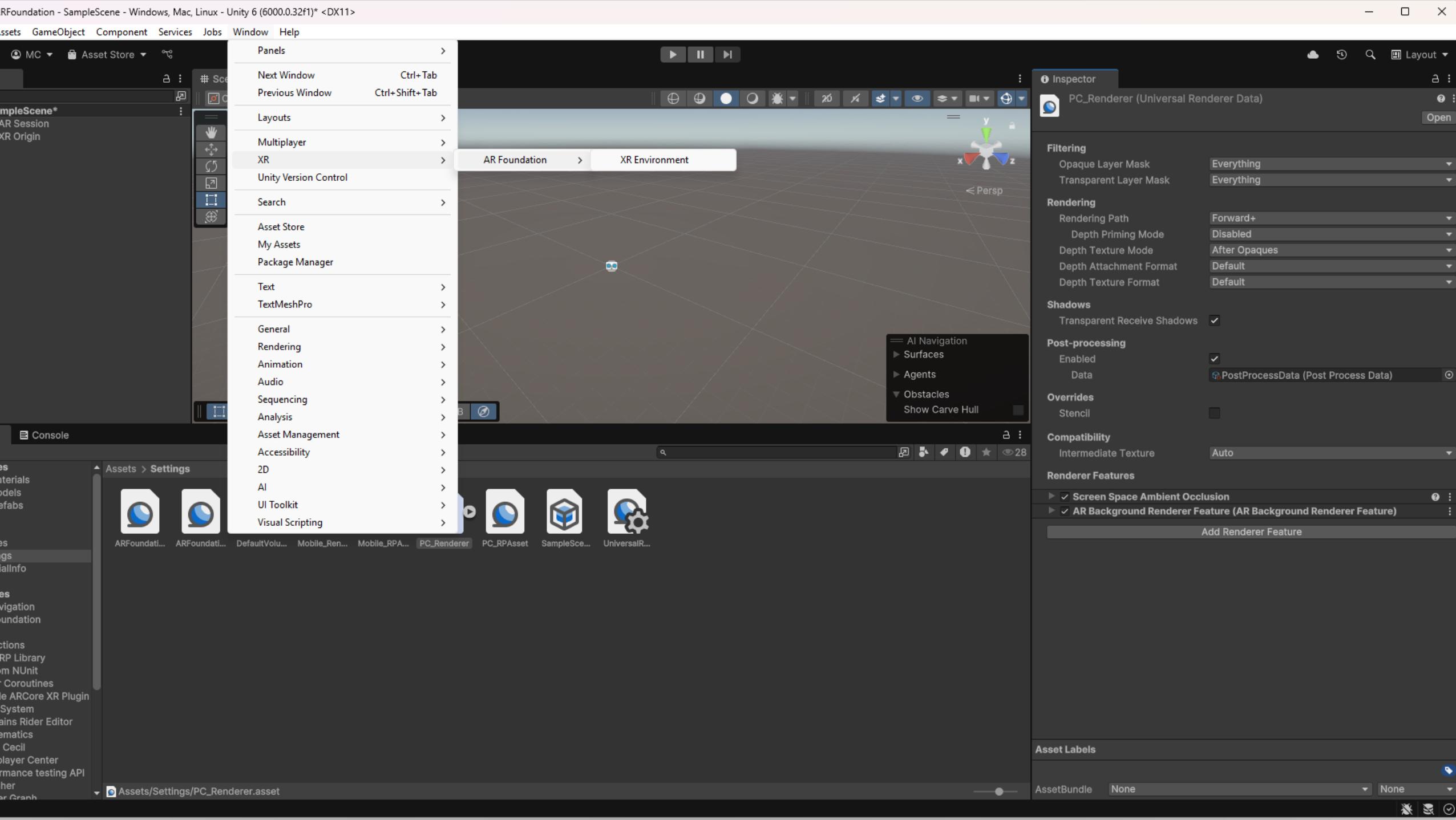
ARFoundation...
Mobile_RPAsset
PC_RPAsset

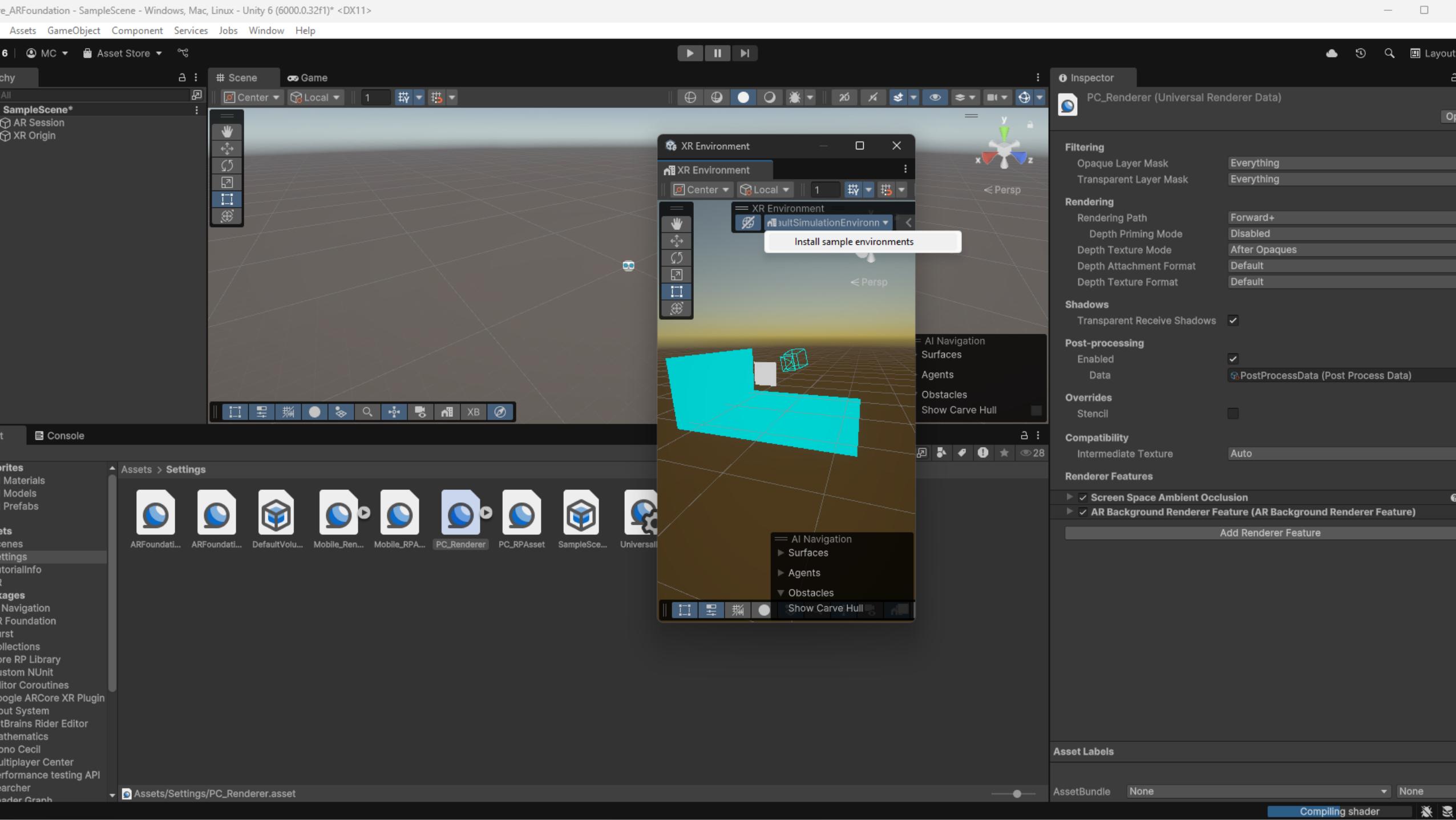
ARFoundation
Universal Render Pipeline Asset
sets/Settings/ARFoundation.as

Always

ature (AR Background Renderer Feature)

Add Renderer Feature





File Edit Assets GameObject Component Services Jobs Window Help

Unity 6 | MC Asset Store

Hierarchy

Scene

Game

Display 1 Free Aspect

Scale 1.5x

Play Focused

Stats

Gizmos

+ All
SampleScene*
AR Session
XR Origin
SimulationCamera
Simulated Environment Scene cac511a1-
DontDestroyOnLoad



Inspector



PC_Renderer (Universal Renderer Data)

Filtering

Opaque Layer Mask
Transparent Layer Mask

Everything
Everything

Rendering

Rendering Path
Depth Priming Mode
Depth Texture Mode
Depth Attachment Format
Depth Texture Format

Forward+
Disabled
After Opaques
Default
Default

Shadows

Transparent Receive Shadows

Post-processing

Enabled
Data
PostProcessData (Post Process Data)

Overrides

Stencil

Compatibility

Intermediate Texture

Auto

Renderer Features

- Screen Space Ambient Occlusion
- AR Background Renderer Feature (AR Background Renderer Feature)

Add Renderer Feature

Project Console

+ +

Favorites

All Materials
All Models
All Prefabs

Assets

Scenes
Settings

TutorialInfo
UnityXRContent
XR

Packages

AI Navigation
AR Foundation
Burst
Collections
Core RP Library
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Google ARCore XR Plugin
Input System
JetBrains Rider Editor
Mathematics
Mono Cecil
Multiplayer Center
Performance testing API
Searcher



ARFoundation ARFoundation Settings DefaultVolume Mobile_Renderer Mobile_Renderer PC_Renderer PC_RPAsset SampleScene UniversalR...

Assets/Settings/PC_Renderer.asset

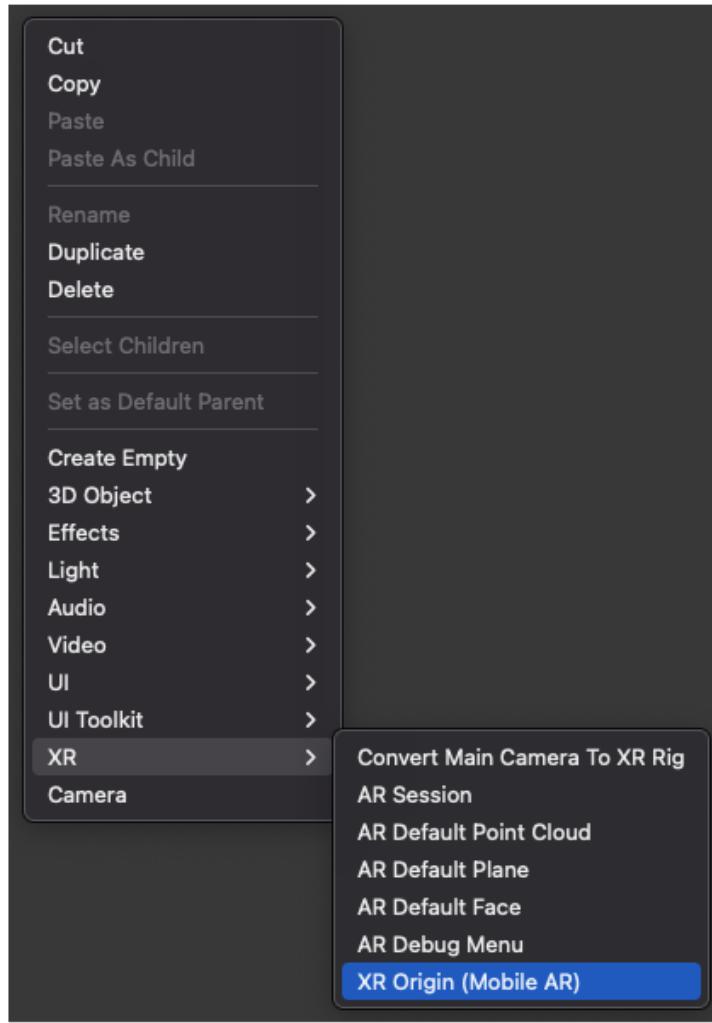
Asset Labels

AssetBundle None

Basic Setup for AR Foundation (+AR Core)

Scene Setup

- XR > AR Session
- XR > XR Origin (Mobile AR)



Create AR Session and XR Origin

After adding both an AR Session and XR Origin to the scene, the Hierarchy window will look like the one below, with GameObjects named "AR Session" and "XR Origin". XR Origin has a child GameObject named "Camera Offset", and Camera Offset has a child GameObject named "Main Camera".



Basic Setup for AR Foundation (+AR Core)

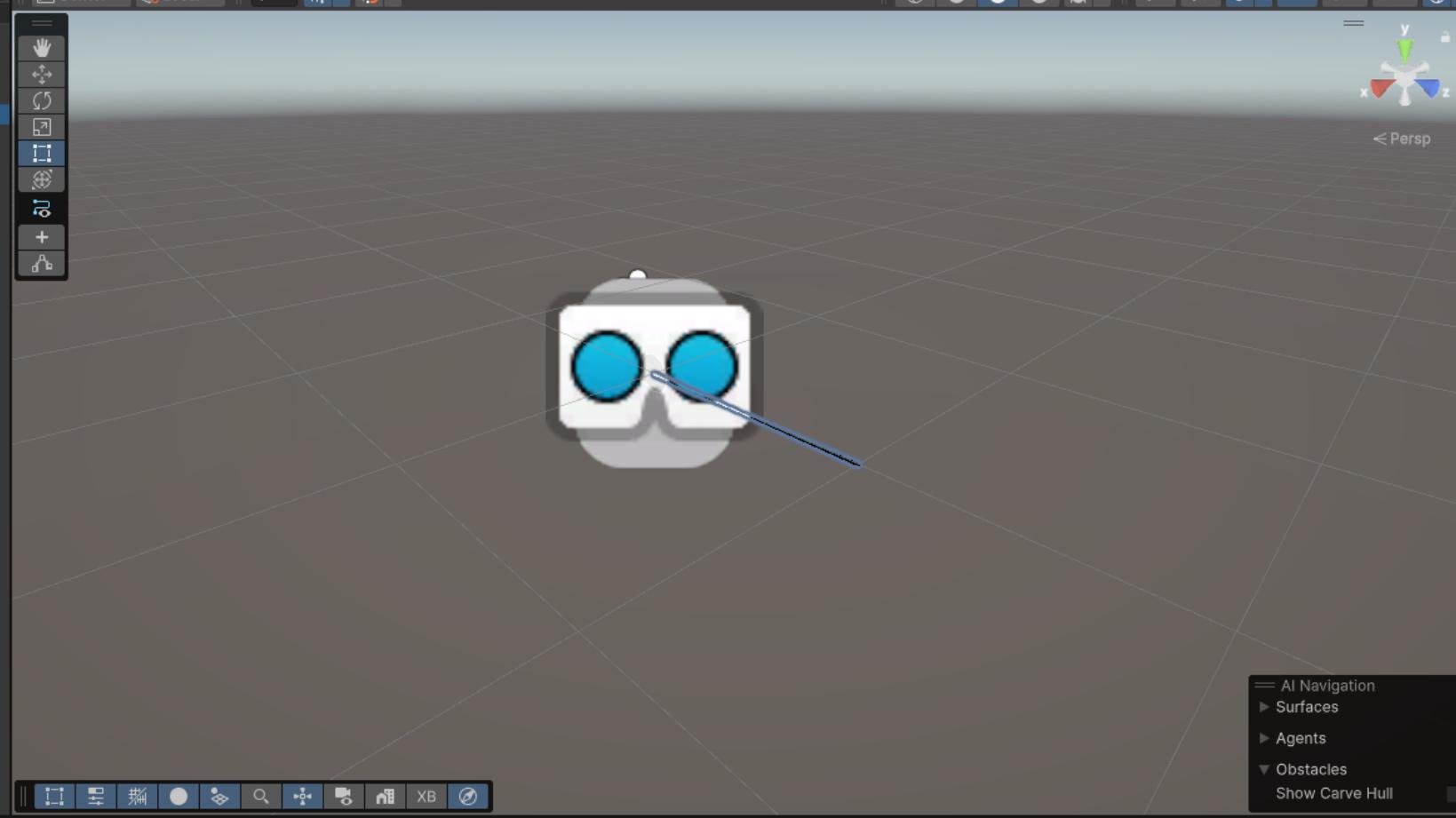
Detect Horizontal Planes

Hierarchy

SampleScene*
AR Session
XR Origin
Camera Offset
Main Camera
AR Default Plane

Scene

Game



Project

Console

+

★ Favorites

- All Materials
- All Models
- All Prefabs

Assets

- Scenes
- Settings
- TutorialInfo
- UnityXRC...
- XR



Readme

No Camera Floor Offset GameObject specified for XR Origin, using attached GameObject.

Inspector

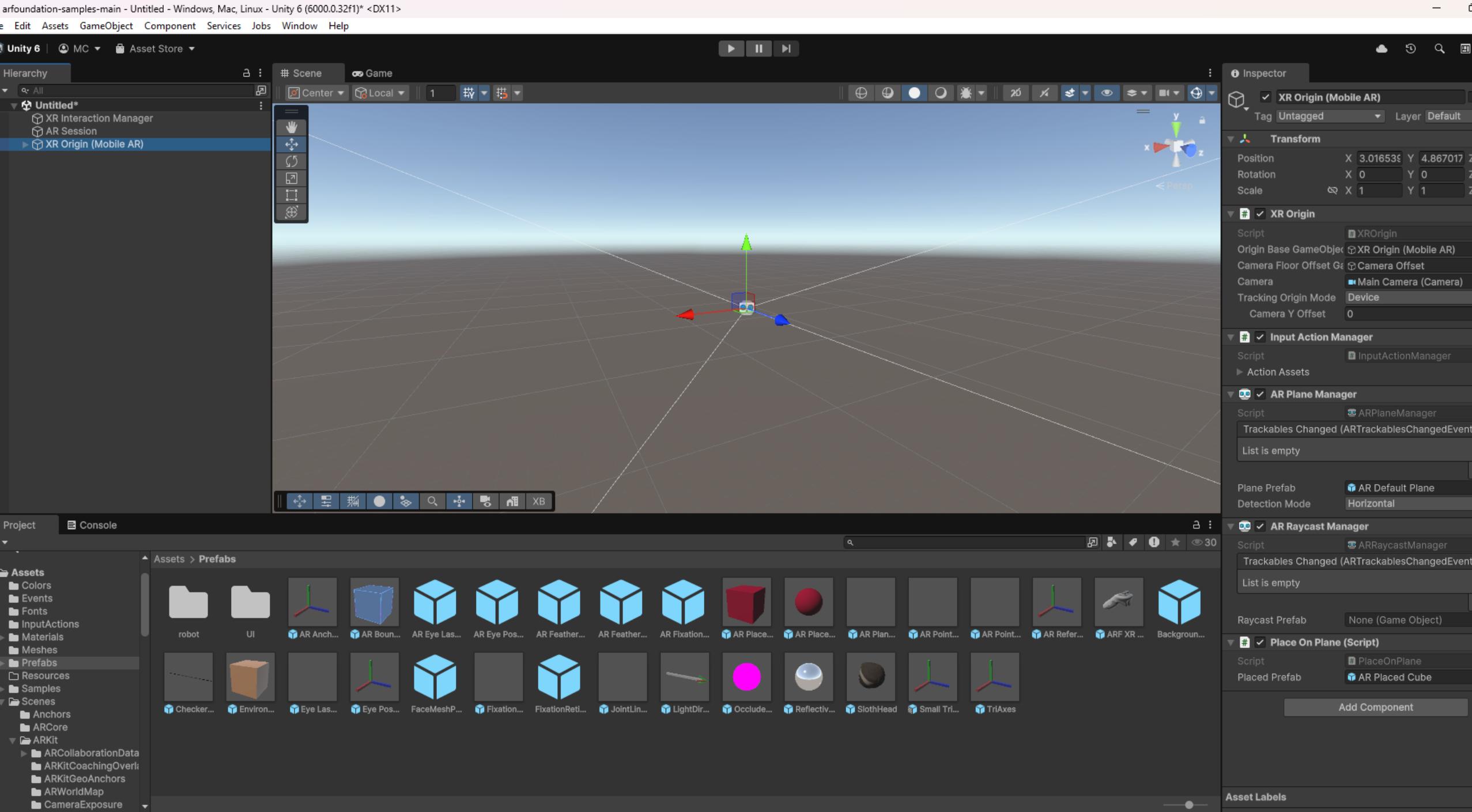
1.0	
0.5	
0.0	
Color	4
Corner Vertices	4
End Cap Vertices	View
Alignment	Stretch
Texture Mode	X 1 Y 1
Texture Scale	0.5
Shadow Bias	Generate Lighting Data
Use World Space	None
Mask Interaction	None
Materials	
Lighting	Cast Shadows Off
Probes	Light Probes Off
Additional Settings	
XR Origin	
Script	XROrigin
Origin Base GameObject	AR Default Plane
Camera Floor Offset G	None (Game Object)
Camera	Main Camera (Camera)
Tracking Origin Mode	Not Specified
Camera Y Offset	1.1176
AR Plane Manager (Script)	
Script	ARPlaneManager
Trackables Changed (ARTrackablesChangedEvent)	List is empty
Plane Prefab	AR Default Plane
Detection Mode	Horizontal
Add Component	
Asset Labels	

More advanced features for AR Foundation (+AR Core)

Create a game with AR Core

<https://github.com/Unity-Technologies/arfoundation-samples>

You will have several examples and script



Create a game with AR Core

<https://codelabs.developers.google.com/arcore-unity-ar-foundation#4>

Create a game with AR Core

1. New 3D URP project
2. AR Foundation
3. AR Core (Google ARCore XR Plugin)
4. Import codelab-starter-package
5. Build settings -> Android
6. Debug USB enabled on the Android device

SampleScene
Main Camera
Directional Light
Global Volume

Build Profiles

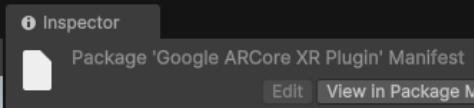
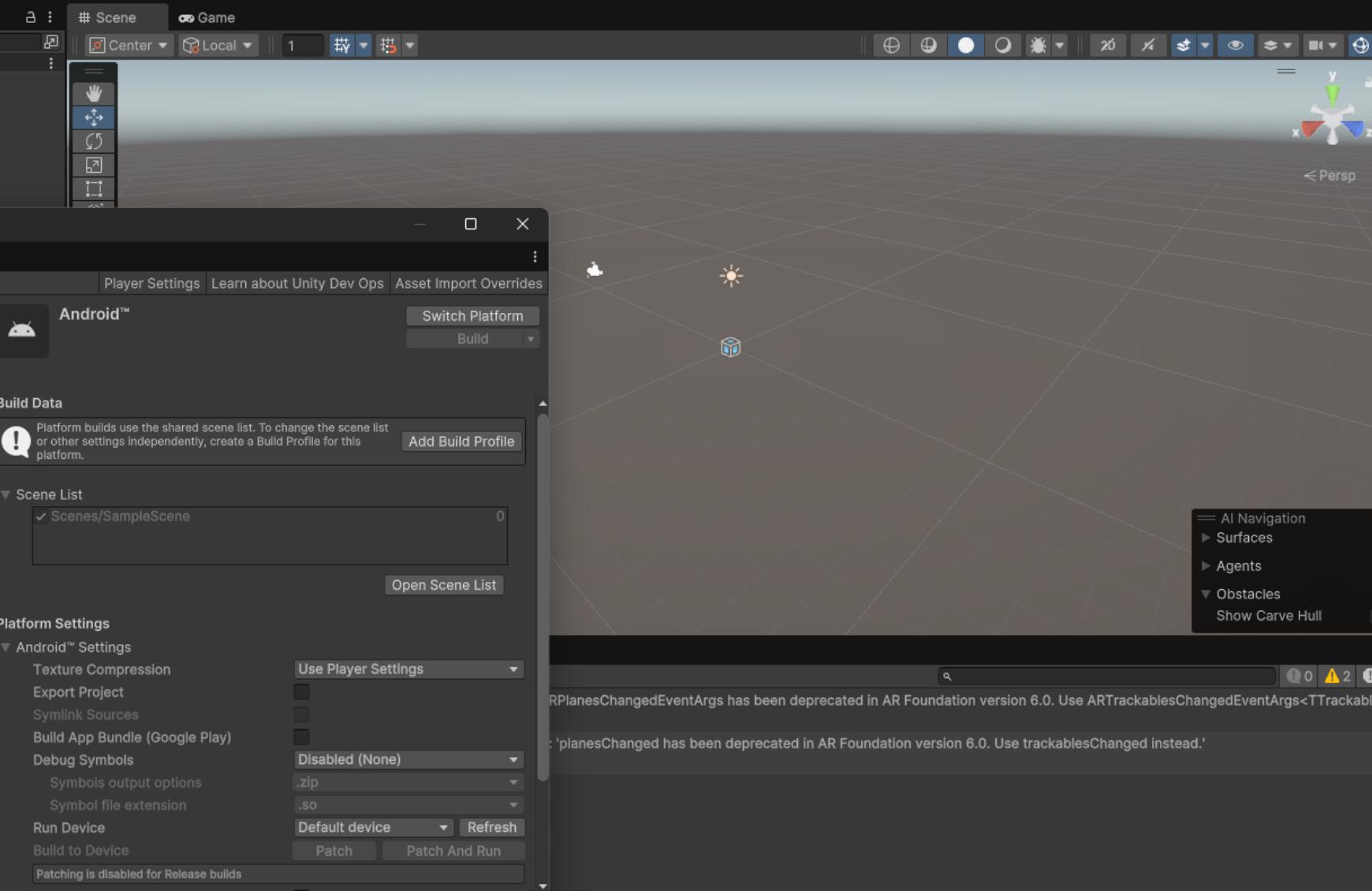
Build Profiles
Add Build Profile

Platforms
Scene List
Windows
Android™
macOS
Linux
Windows Server
macOS Server
Linux Server
iOS
PlayStation®4
PlayStation®5
Web
Universal Windows Platform
tvOS
visionOS
Build Profiles

Welcome to Build Profiles.

Add a Build Profile to configure as many builds as you need for any supported platform. Build profiles are stored as assets you can share with your team

Add Build Profile



Asset Labels

Adaptive Performance
Audio
Burst AOT Settings
Editor
Graphics
Input Manager
Input System Package
 Settings
 Memory Settings
 Package Manager
Physics
 Settings
 Physics 2D
Player
Preset Manager
Quality
Scene Template
Script Execution Order
Services
ShaderGraph
Tags and Layers
TextMesh Pro
Time
Timeline
UI Toolkit
Version Control
Visual Scripting
XR Plug-in Management
 Google ARCore
 Project Validation
 XR Simulation

XR Plug-in Management

Initialize XR on Startup

 Editor Play mode uses Desktop Platform Settings regardless of Active Build Target.

Plug-in Providers

Google ARCore

Oculus

Open XR

Unity Mock HMD

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

[View Documentation](#)

Dependency	Package name	Version
ARCore Utilities	com.unity.xr.arcore	2.2.2
ARCore Login Management	com.unity.xr.arcore.loginmanagement	4.4.0
ARCore Foundation	com.unity.xr.arcore.foundation	6.0.5
ARCore JNI	com.unity.xr.arcore.jni	
ARCore Web Request	com.unity.xr.arcore.webrequest	

Project Settings

Project Settings

Adaptive Performance
Audio
Burst AOT Settings
Editor
Graphics
Input Manager
Input System Package
 Settings
Memory Settings
Package Manager
Physics
 Settings
Physics 2D
Player
Preset Manager
Quality
Scene Template
Script Execution Order
Services
ShaderGraph
Tags and Layers
TextMeshPro
Time
Timeline
UI Toolkit
Version Control
Visual Scripting
XR Plug-in Management
 Google ARCore
 Project Validation
 XR Simulation

Player

Company Name
Product Name
Version

DefaultCompany
ARFoundation CodeLab
0.1.0

Default Icon

None
(Texture 2D)

Select

Default Cursor

None
(Texture 2D)

Select

Cursor Hotspot

X: 0 Y: 0

Settings for Android

▶ Icon

▶ Resolution and Presentation

▶ Splash Image

▼ Other Settings

Rendering

Color Space*

Linear

MSAA Fallback

Downgrade

Auto Graphics API

Graphics API

– Vulkan

= OpenGL ES3

+ -

Remove selection from the list

Require ES3.1



Require ES3.1+AEP



Require ES3.2



Multithreaded Rendering*



Static Batching



Sprite Batching Threshold



300

Sprite Batching Max Vertex Count

65535

GPU Skinning*

GPU (Batched)

Graphics Jobs (Experimental)



Texture Compression Formats

= ASTC

+ -



Texture Compression Targeting is disabled. To use texture compression targeting, add more than one texture compression format to Texture Compression Formats.

Normal Map Encoding

DXT5nm-style

Asset Labels

actor
ackage 'Google ARCore XR Plugin' Manifest
Edit View In Package Manager
ation
com.unity.xr.arcore
ay name Google ARCore XR Plugin
on 6.0.5
gory
ption
des native Google ARCore integration for use with
's multi-platform XR API.
orts the following features:
client Background Rendering
horizontal Planes
th Data
dencies
age name Version
ore Utilities 2.2.2
ugin Management 4.4.0
oundation 6.0.5
void JNI
y Web Request

Project Settings

Project Settings

Adaptive Performance

Audio

Burst AOT Settings

Editor

Graphics

Input Manager

Input System Package

 Settings

Memory Settings

Package Manager

Physics

 Settings

Physics 2D

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Script Execution Order

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ShaderGraph

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TextMeshPro

Time

Timeline

UI Toolkit

Version Control

Visual Scripting

XR Plug-in Management

 Google ARCore

 Project Validation

 XR Simulation

Player

360 Stereo Capture*

Load/Store Action Debug Mode

Vulkan Settings

SRGB Write Mode*

Number of swapchain buffers*

3

Acquire swapchain image late as possible

Recycle command buffers*

Apply display rotation during rendering

► Android Vulkan Deny Filter List

► Android Vulkan Allow Filter List

Identification

Override Default Package Name

 Package Name

com.UnityTechnologies.com.unity.template.urpblank

 Version*

0.1.0

 Bundle Version Code

1

 Minimum API Level

Android 6.0 'Marshmallow' (API level 23)

 Target API Level

Android 6.0 'Marshmallow' (API level 23)

Android 7.0 'Nougat' (API level 24)

Android 7.1 'Nougat' (API level 25)

Android 8.0 'Oreo' (API level 26)

Android 8.1 'Oreo' (API level 27)

Android 9.0 'Pie' (API level 28)

Android 10.0 (API level 29)

Android 11.0 (API level 30)

Android 12.0 (API level 31)

Android 12L (API level 32)

Android 13.0 (API level 33)

Android 14.0 (API level 34)

Android 15.0 (API level 35)

API level 36

Configuration

Scripting Backend

API Compatibility Level*

Editor Assemblies Compatibility Level*

IL2CPP Code Generation

C++ Compiler Configuration

IL2CPP Stacktrace Information

Use Incremental GC

Allow downloads over HTTP*

Mute Other Audio Sources*

Target Architectures

 ARMv7

 ARM64

 x86-64 (Magic Leap 2)

Enable Armv9 Security Features for Arm64

Split APKs by target architecture

Install Location

Prefer External

Internet Access

Auto

Write Permission

Internal

Filter Touches When Obscured

Sustained Performance Mode

Low Accuracy Location

Predictive Back Support

Android TV Compatibility

Warn about App Bundle size

App Bundle size threshold

150

Manifest Editor

package 'Google ARCore XR Plugin' Manifest

Edit View In Package Manager

Dependencies

 Name Version

core Utilities 2.2.2

plugin Management 4.4.0

foundation 6.0.5

old JNI

Web Request

Asset Labels

Hierarchy

SampleScene*

- Directional Light
- AR Session
- XR Origin
- Camera Offset
- Main Camera

Scene | Game



Inspector

Project | Console

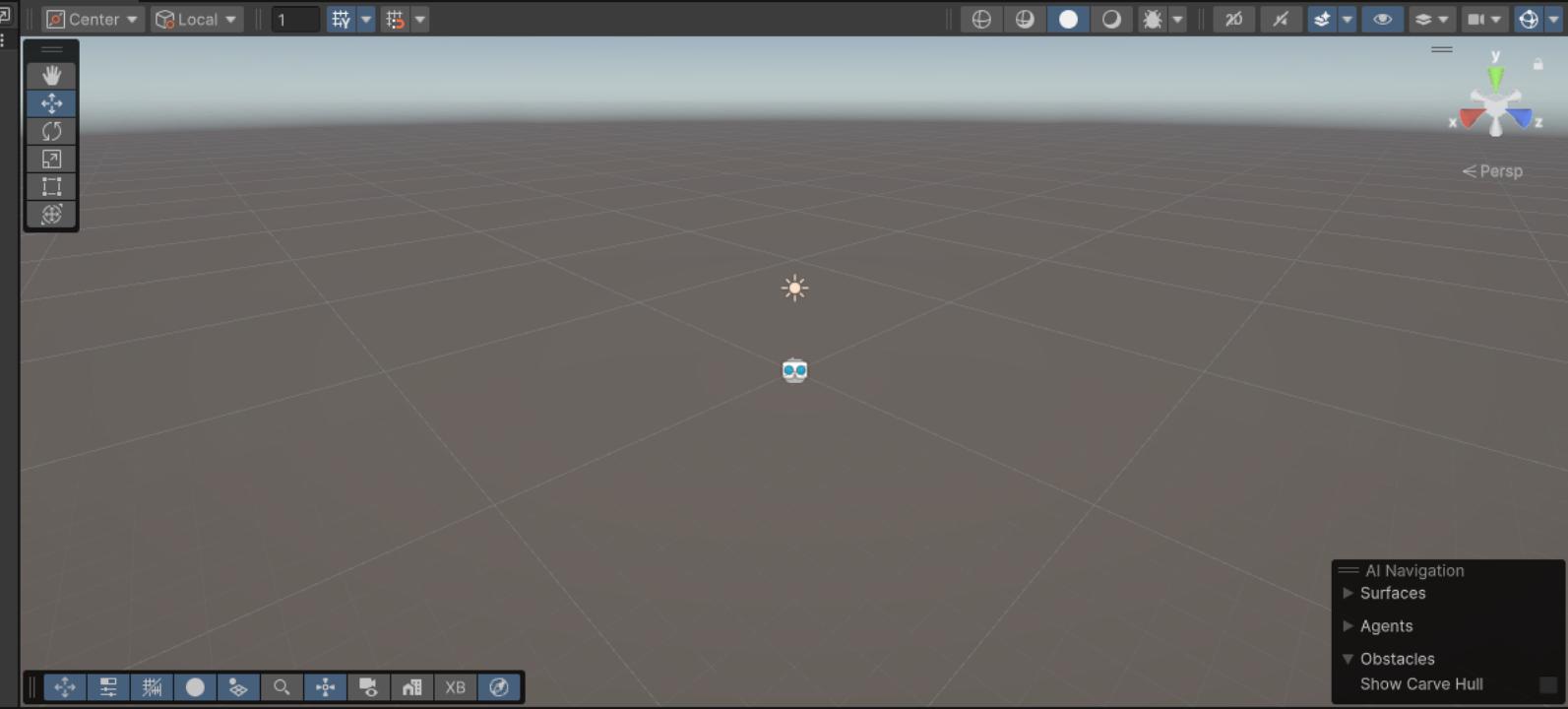
Clear | Collapse | Error Pause | Editor

[15:08:19] Assets\Starter Package\DrivingSurfaceManager.cs(57,35): warning CS0618: 'ARPlanesChangedEventArgs' is obsolete: 'ARPlanesChangedEventArgs has been deprecated in AR Foundation version 6.0. Use ARTrackablesChangedEventArgs<TTrackable>'

[15:08:19] Assets\Starter Package\DrivingSurfaceManager.cs(41,9): warning CS0618: 'ARPlaneManager.planesChanged' is obsolete: 'planesChanged has been deprecated in AR Foundation version 6.0. Use trackablesChanged instead.'

SampleScene*

- Directional Light
- AR Session
- XR Origin
- Camera Offset
- Main Camera



Mobile_Renderer (Universal Render Data)

Open

Filtering

Opaque Layer Mask Everything
Transparent Layer M Everything

Rendering

Rendering Path Forward+
Depth Priming Mode Disabled
Depth Texture Mode After Opaques
Depth Attachment Format Default
Depth Texture Format Default

Shadows

Transparent Receive

Post-processing

Enabled
Data PostProcessData (Post Process D)

Overrides

Stencil

Compatibility

Intermediate Texture Auto

Renderer Features

AR Background Renderer Feature (AR Background)
Add Renderer Feature

- All Materials
- All Models
- All Prefabs

- Scenes
- Settings
- Starter Package
- TutorialInfo
- XR
- Packages
 - AI Navigation
 - AR Foundation
 - Burst
 - Collections
 - Core RP Library
 - Custom NUnit
 - Editor Coroutines
 - Google ARCore XR Plugin



DefaultVol...



Mobile_Ren...



Mobile_RPAsset



PC_Renderer



PC_RPAsset



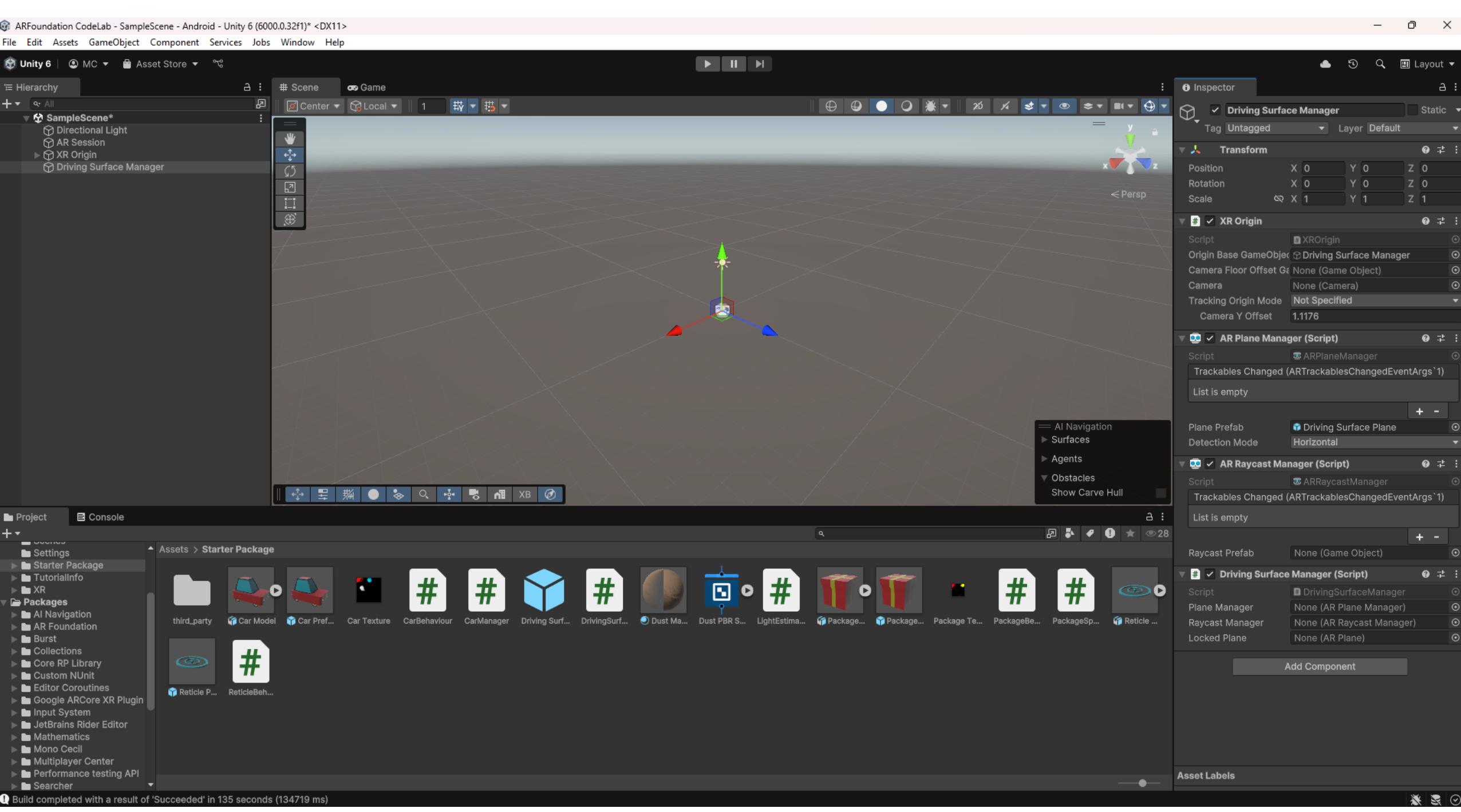
SampleSce...



UniversalR...

Create a game with AR Core

Detect and visualize the plane



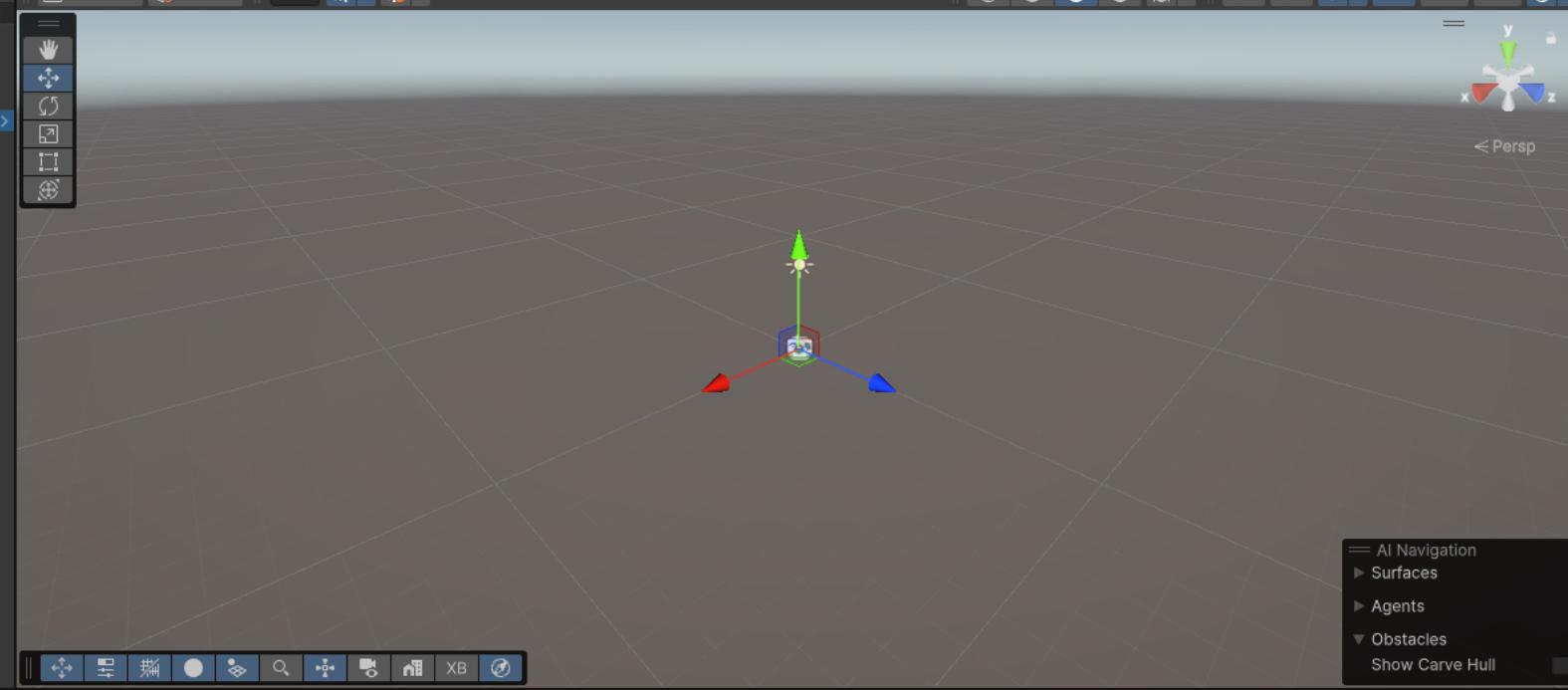
Create a game with AR Core

Add a Reticle that follows the camera

Hierarchy

SampleScene
Directional Light
AR Session
XR Origin
Driving Surface Manager
Reticle Prefab

Scene Game



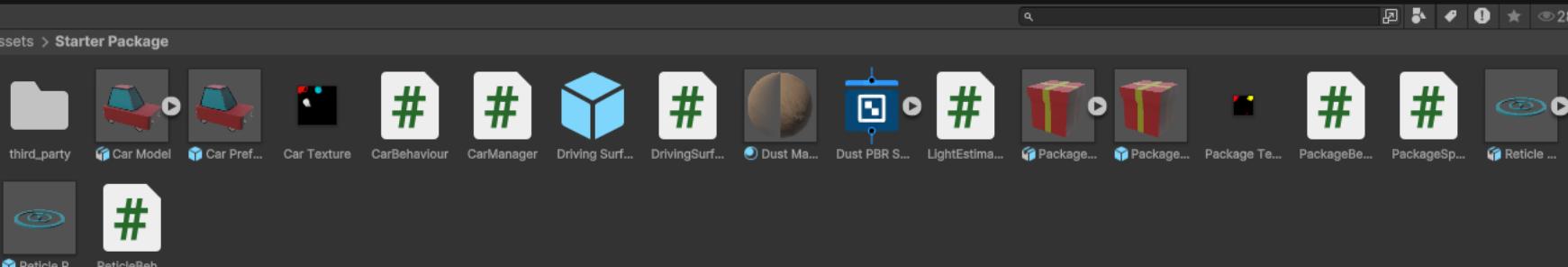
Inspector

<input checked="" type="checkbox"/> Reticle Prefab	Tag Untagged	Layer Default	
Prefab	Reticle Prefab	<input type="button" value="Select"/>	
Overrides	<input type="button" value="Open"/>		
Transform			
Position	X 0	Y 0	Z 0
Rotation	X 0	Y 0	Z 0
Scale	X 0.3	Y 0.3	Z 0.3
Reticle Behaviour (Script)			
Script	<input type="checkbox"/> ReticleBehaviour	<input type="button" value="Edit"/>	
Child	None (Game Object)	<input type="button" value="Select"/>	
Driving Surface Man...	<input type="checkbox"/> Driving Surface Manager (Driving...	<input type="button" value="Edit"/>	
Current Plane	None (AR Plane)	<input type="button" value="Select"/>	

Project Console

Settings
Starter Package
third_party
Car Model
Car Pref...
Car Texture
CarBehaviour
Driving Surf...
DrivingSurf...
Dust Ma...
Dust PBR S...
LightEstima...
Package...
Package Te...
PackageBe...
PackageSp...
Reticle ...
Reticle P...
ReticleBeh...

Packages
AI Navigation
AR Foundation
Burst
Collections
Core RP Library
Custom NUnit
Editor Coroutines
Google ARCore XR Plugin
Input System
JetBrains Rider Editor
Mathematics
Mono.Cecil



Asset Labels

Assets > Starter Package > C# ReticleBehaviour.cs > ReticleBehaviour > Update

```
26 public class ReticleBehaviour : MonoBehaviour
27 {
28     // 0 references
29
30     private void Update()
31     {
32         // TODO: Conduct a ray cast to position this object.
33         var screenCenter = Camera.main.ViewportToScreenPoint(new Vector3(0.5f, 0.5f));
34         var hits = new List<ARRaycastHit>();
35         DrivingSurfaceManager.RaycastManager.Raycast(screenCenter, hits, TrackableType.PlaneWithinBounds);
36
37         CurrentPlane = null;
38         ARRaycastHit? hit = null;
39         if (hits.Count > 0)
40         {
41             // If you don't have a locked plane already...
42             var lockedPlane = DrivingSurfaceManager.LockedPlane;
43             hit = lockedPlane == null
44                 // ... use the first hit in `hits` .
45                 ? hits[0]
46                 // Otherwise use the locked plane, if it's there.
47                 : hits.SingleOrDefault(x => x.trackableId == lockedPlane.trackableId);
48
49         }
50
51         if (hit.HasValue)
52         {
53             CurrentPlane = DrivingSurfaceManager.PlaneManager.GetPlane(hit.Value.trackableId);
54             // Move this reticle to the location of the hit.
55             transform.position = hit.Value.pose.position;
56         }
57         Child.SetActive(CurrentPlane != null);
58     }
59 }
60 }
```

Create a game with AR Core

Add a car

Hierarchy

- SampleScene*
- Directional Light
- AR Session
- XR Origin
- Driving Surface Manager
- Reticile Prefab
- Car Spawner

Scene Game



Center Local 1



Inspector

Car Spawner

Tag Untagged Layer Default

Transform

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

Car Manager (Script)

Script	CarManager
Car Prefab	Car Prefab
Reticile	Reticile Prefab (Reticile Behaviour)
Driving Surface Man...	Driving Surface Manager (Driving
Car	None (Car Behaviour)

Add Component

Project

Console

- Sources
- Settings
- Starter Package
- third_party
- Ground026_1K-JPG
- Unity Feathered Plan

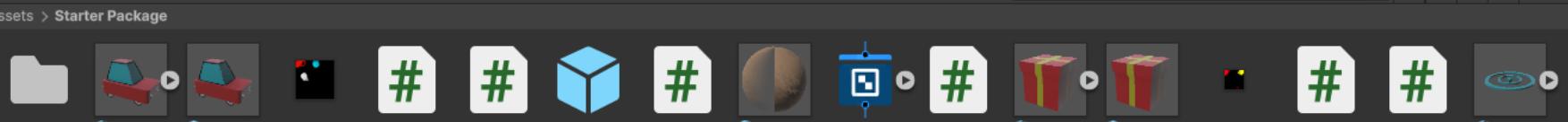
TutorialInfo

XR

Packages

- AI Navigation
- AR Foundation
- Burst
- Collections
- Core RP Library
- Custom NUnit
- Editor Coroutines
- Google ARCore XR Plugin
- Input System
- JetBrains Rider Editor
- Mathematics
- Mono Cecil

Assets > Starter Package

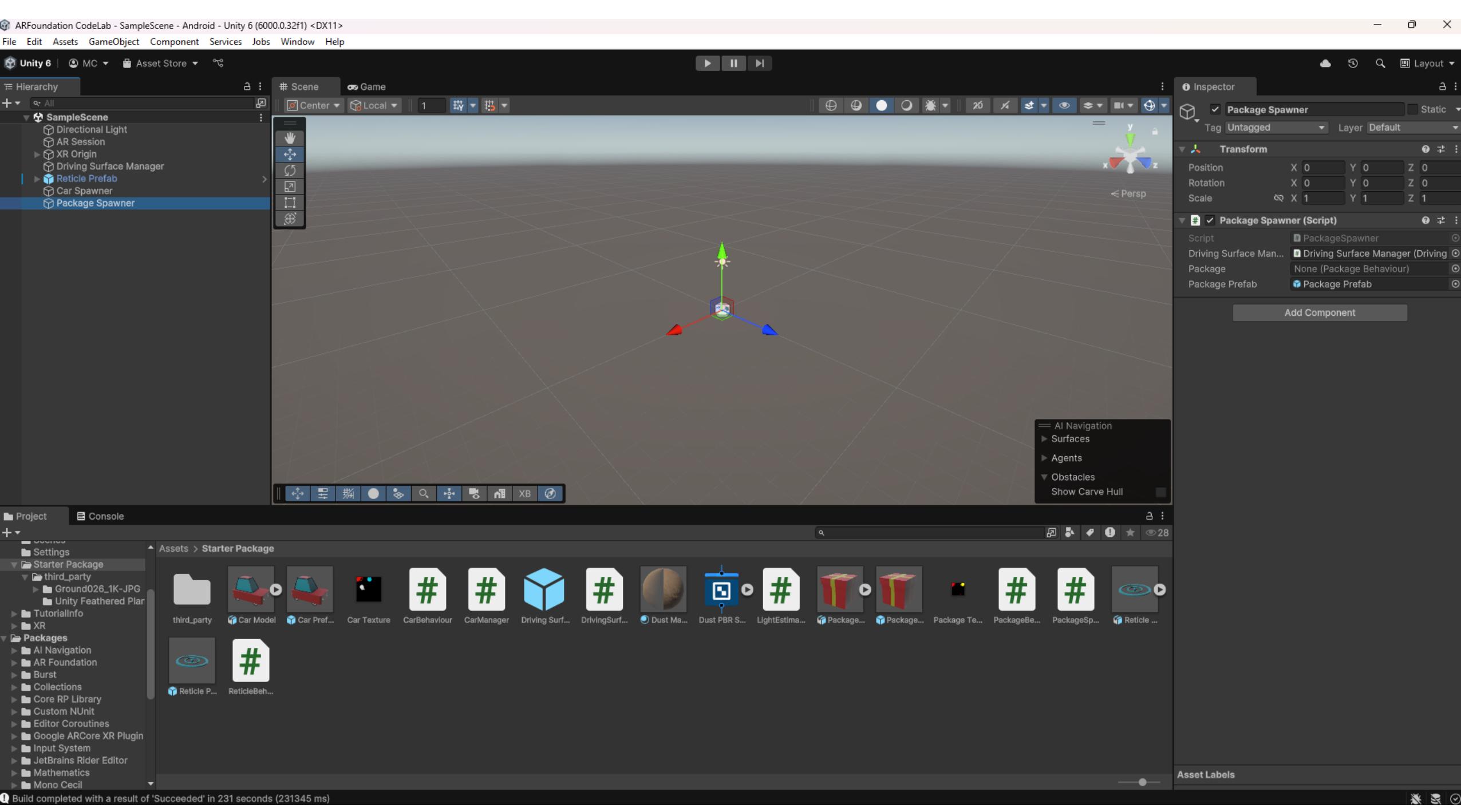


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Asset Labels

Create a game with AR Core

Spawn targets (package)



Create a game with AR Core

Visual coherence: light estimation

Unity 6 | MC Asset Store

Scene Game

Field of View
Clipping Planes Near 0.1 Far 20
Physical Camera

Rendering
Default Renderer (PC_Renderer)
Post Processing
Anti-aliasing No Anti-aliasing
Stop NaNs
Dithering
Render Shadows
Priority 0
Opaque Texture Use settings from Render Pipeline
Depth Texture Use settings from Render Pipeline
Culling Mask Everything
Occlusion Culling

Stack
Environment
Background Type Solid Color
Background
Volumes
Update Mode Use Pipeline Settings
Volume Mask Default
Volume Trigger None (Transform)

Output
Audio Listener
AR Camera Manager (Script)
Script ARCameraManager
Auto Focus
Image Stabilization
Light Estimation Everything
Facing Direction World
Render Mode Any
AR Camera Background (Script)
Use Custom Material
Tracked Pose Driver (Input System)
Script TrackedPoseDriver
Tracking Type Rotation And Position
Update Type Update And Before Render
Ignore Tracking State
Position Input Action
Asset Labels

Build completed with a result of 'Succeeded' in 231 seconds (231345 ms)

Modify the directional light

1. In Hierarchy, select the **Directional Light** object.
2. Add the **LightEstimation** component to it. This component from the Starter Package provides some boilerplate for subscribing to lighting changes.
3. In the `FrameReceived()` function, add:

```
ARLightEstimationData lightEstimation = args.lightEstimation;

if (lightEstimation.averageBrightness.HasValue)
    Light.intensity = lightEstimation.averageBrightness.Value;

if (lightEstimation.averageColorTemperature.HasValue)
    Light.colorTemperature = lightEstimation.averageColorTemperature.Value;

if (lightEstimation.colorCorrection.HasValue)
    Light.color = lightEstimation.colorCorrection.Value;

if (lightEstimation.mainLightDirection.HasValue)
    Light.transform.rotation = Quaternion.LookRotation(lightEstimation.mainLightDirection);

if (lightEstimation.mainLightColor.HasValue)
    Light.color = lightEstimation.mainLightColor.Value;

if (lightEstimation.mainLightIntensityLumens.HasValue)
    Light.intensity = lightEstimation.averageMainLightBrightness.Value;

if (lightEstimation.ambientSphericalHarmonics.HasValue)
{
    RenderSettings.ambientMode = AmbientMode.Skybox;
    RenderSettings.ambientProbe = lightEstimation.ambientSphericalHarmonics.Value;
}
```

Check out [the AR Foundation documentation on `ARLightEstimationData`](#) for more details on each parameter.

Create a game with AR Core

Some notes

In the ReticleBehavior.cs script, in Update() modify if (hits.Length > 0) to if (hits.Count > 0)

In the DrivingSurfaceManager.cs script, in StartUp() add RaycastManager = GetComponent();