

Unity & ARfoundation introduction

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休士頓獨立製片與國際影片影展 互動類金獎
《聲 · 森不息 | 阿爆 A Bao演唱會》 - 沈浸式體驗特效製作
故宮《四季百駿》 - VR 資深程式設計師
南科考古館 / 高雄科工館 / 苗栗客家文化館...等互動展覽 - AR 資深程式設計師



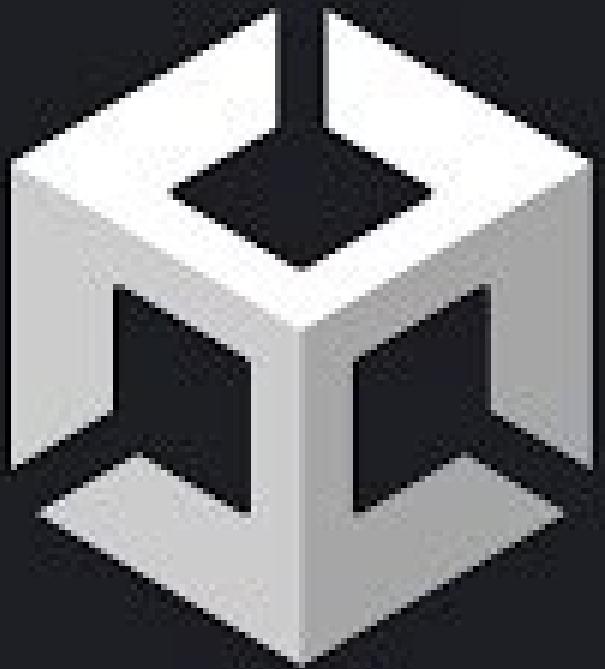


到底甚麼是 Unity 呢？

你所知道的遊戲引擎 ?
名稱? 數量? 差異? 分類?



100 SECONDS OF



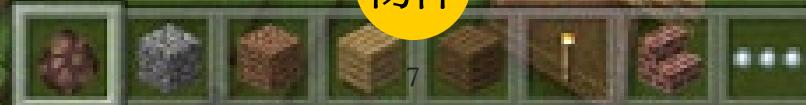
製作一個虛擬內容，需要甚麼呢？

組成遊戲的元素？電影的橋段？

“



物件





場景



角色



攝影機



光

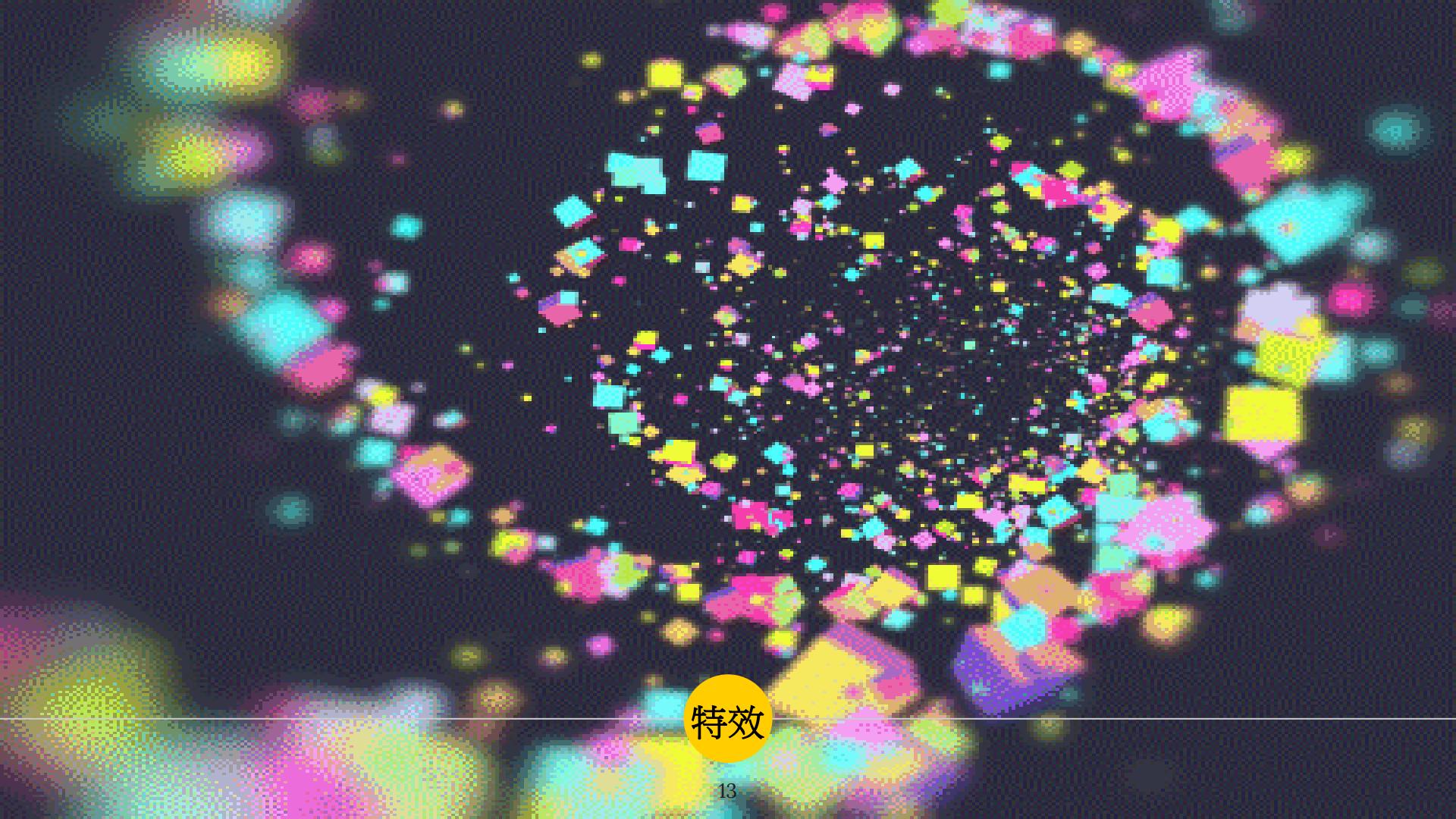
Leyendecker 01

Leyendecker

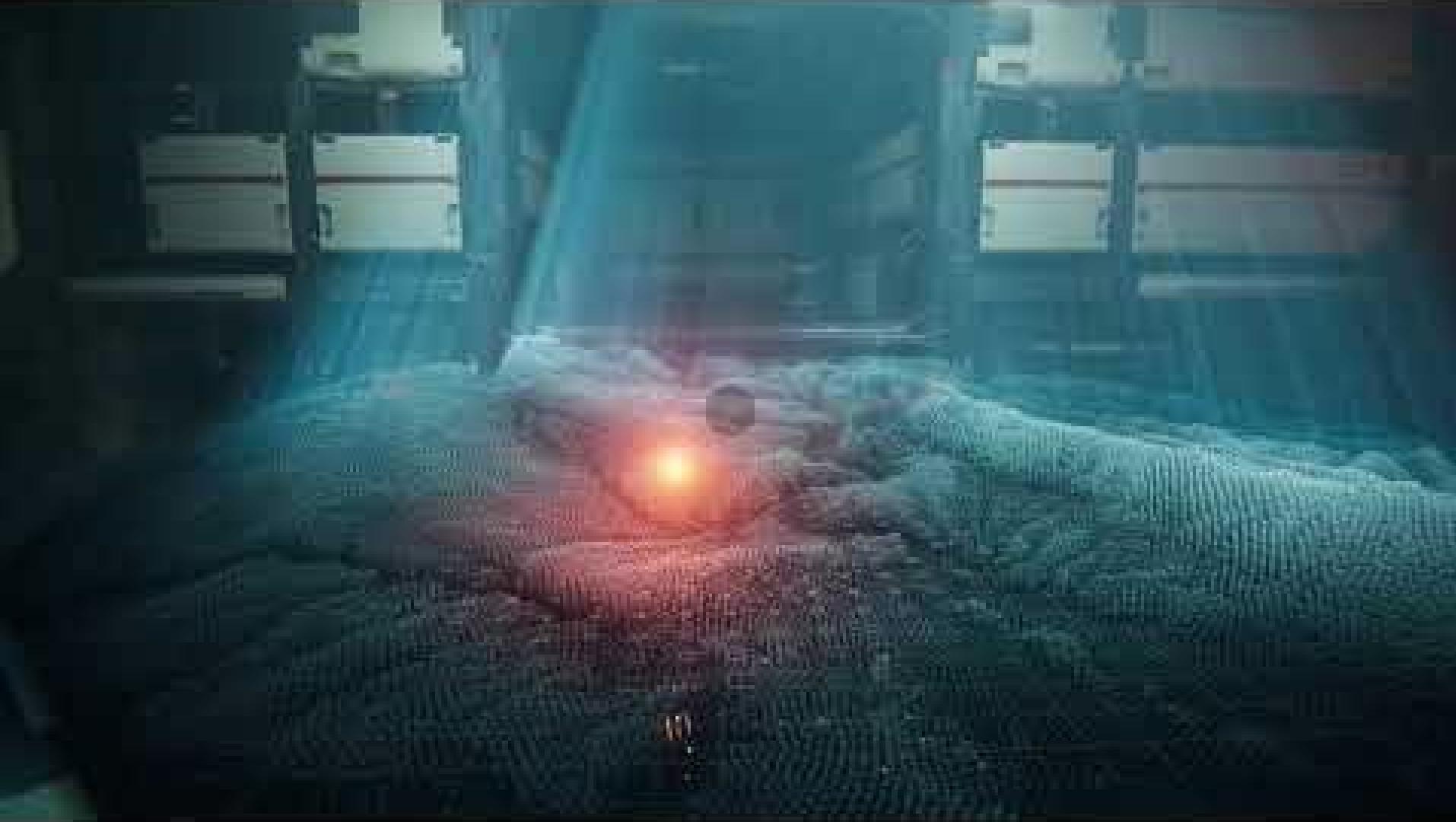
Caravaggio

JaneMere 2018

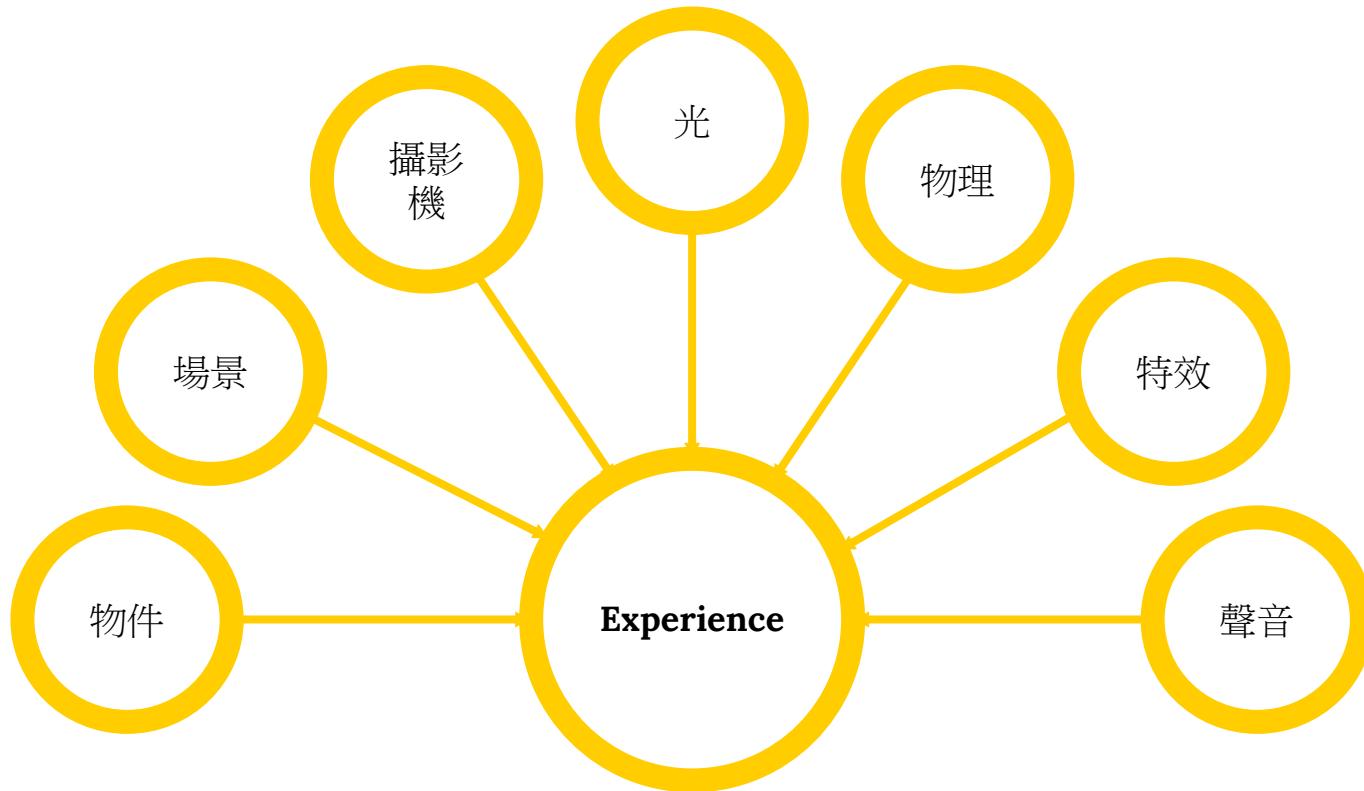




特效







Why unity ?

- 跨平台支援度高（PC, Mac, VR, iOS, Android, Web...）
- 相對易上手，資源、插件豐富
- 靈活度高（使用 C# script ）





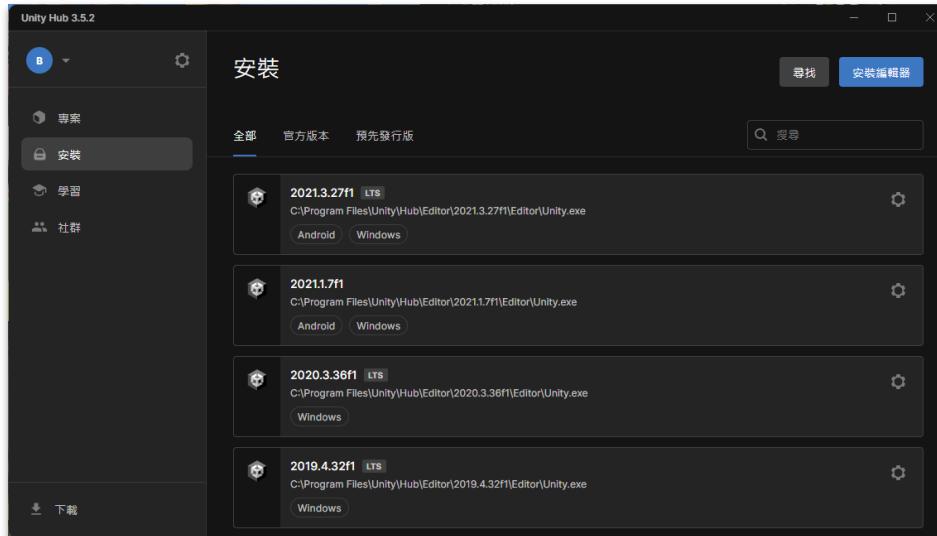
先從安裝開始吧！

記得要註冊帳號 -



Unity 2023.2.0b

使用 unity hub 安裝 <https://unity.com/download>





Create a Project

來試試看 3D 場景的範本吧！

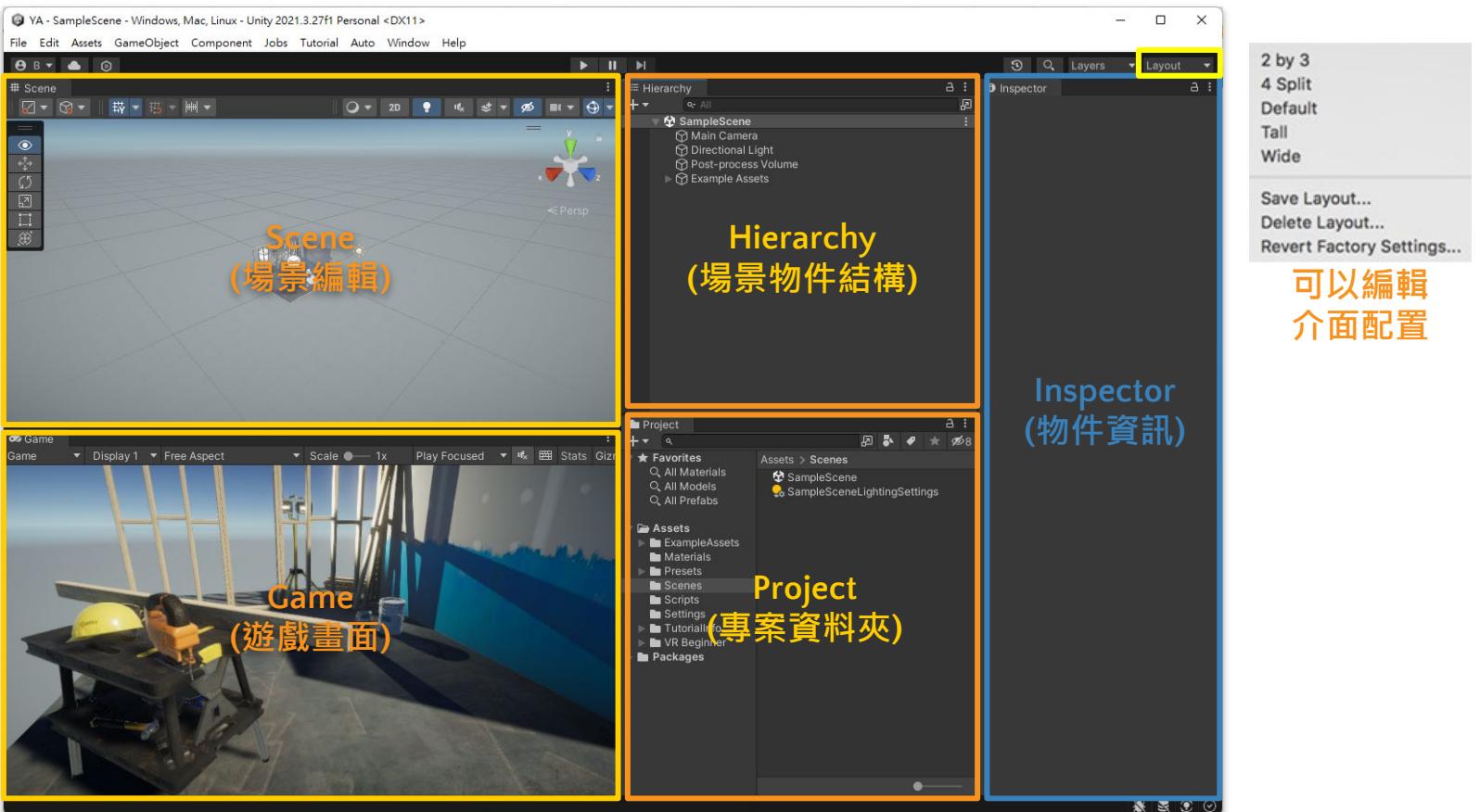




如果遇到授權問題

如果使用 Unity Hub 新增專案，他會要求授權，
因此需要自己更新授權





界面



基礎操作 (手動)

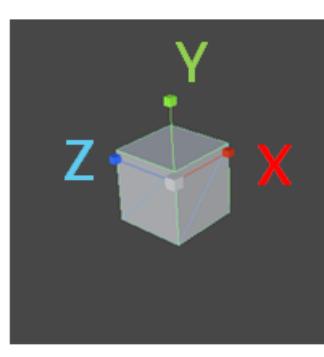
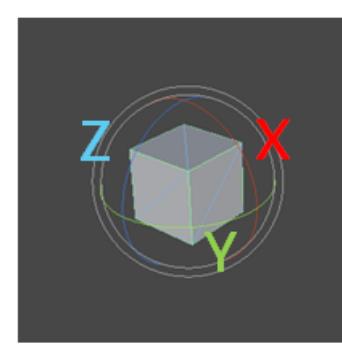
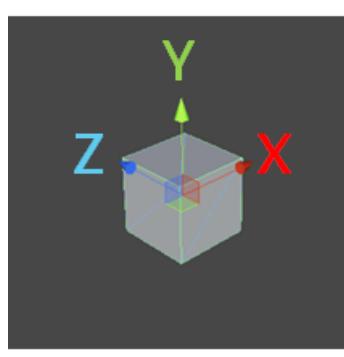
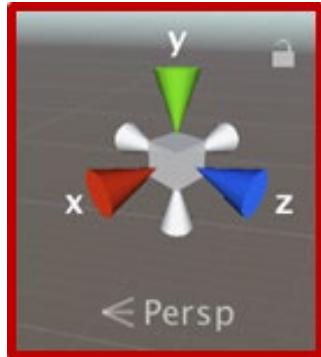
快捷鍵 Q W E R

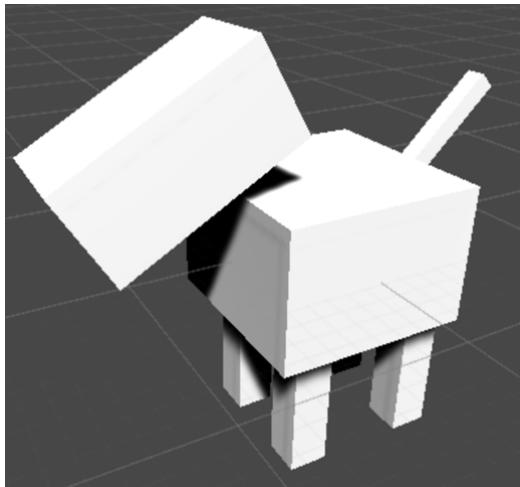
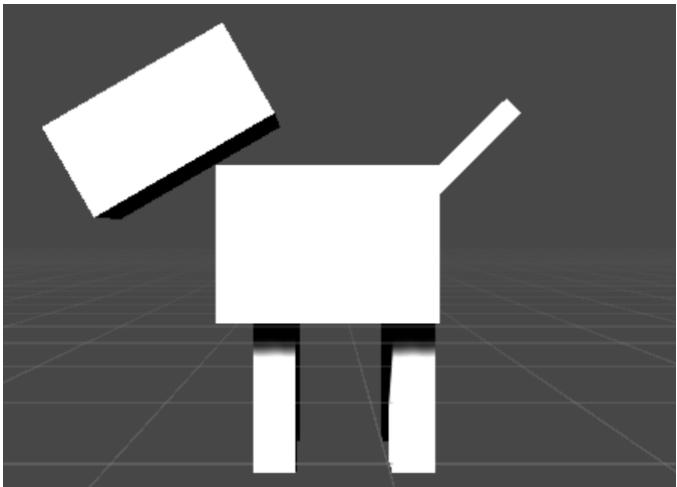
移動場景\移動物件\旋轉物件\縮放物件



點選物件後可以看到三個顏色的軸向，分別對應 XYZ 軸。

Scene 右上角也可以看到





Tips:

- Ctrl + C = 複製
- Ctrl + D = 也是複製
- Ctrl + V = 貼上

- [滑鼠] 中鍵 = 平移視角 = Q
- [滑鼠] 右鍵 = 旋轉視角

練習時間



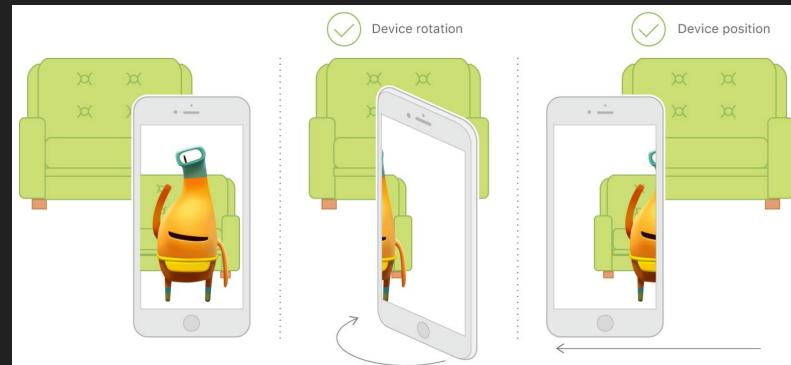
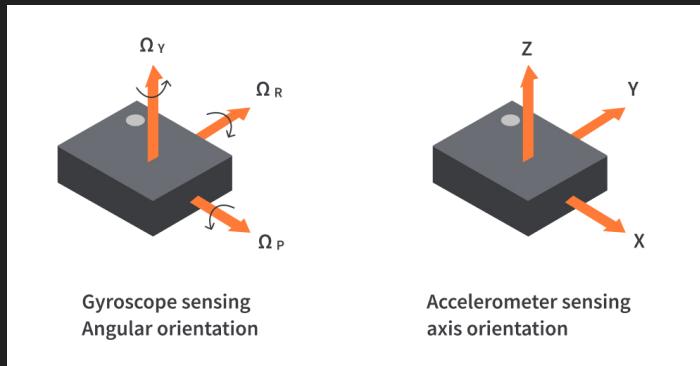
ARfoundation

What's AR?

1. 知道自己手機的位置（定位）

localization - 使用者經自身與辨識物(anchor)的相對位置，透過演算法分析並推導真實世界的空間座標(三角測量法、RGBD相機、lidar sensor)

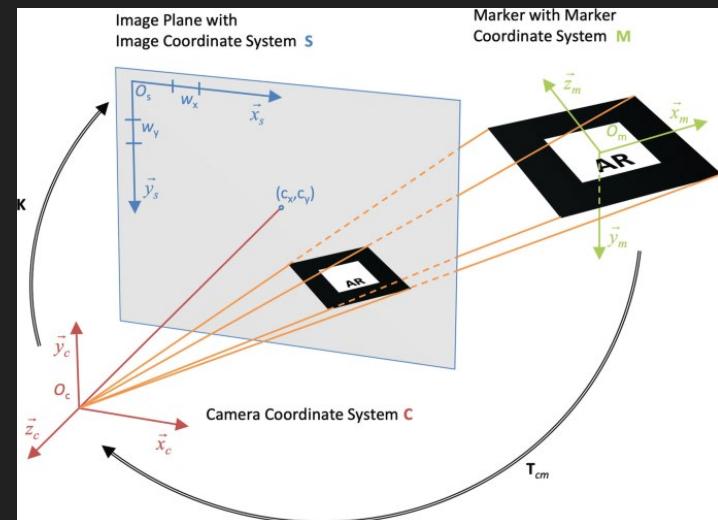
tracking - 動態的追蹤使用者座標上的位移，配合數秒前的資訊估算使用者位移
慣性測量方式: 陀螺儀和加速度計(6DoF) 或 電腦視覺方式



What's AR?

2. 畫上虛擬的物件（渲染）

- 包括繪製模型的外型、材質，將 3D 世界座標映射至 2D 座標（螢幕）
- 其他還有像是遮擋 (occlusion)等問題，基於影像辨識或是深度資料以正確畫出虛擬物件。



Platform

- Laptop or Digital signage

- Mobile



- Native app: Unity, MAKAR, Marq+, Quiver, Spark AR
- Web browser: 8th Wall, AR.js

8



- Head-mounted Display(HMD):
HoloLens and others

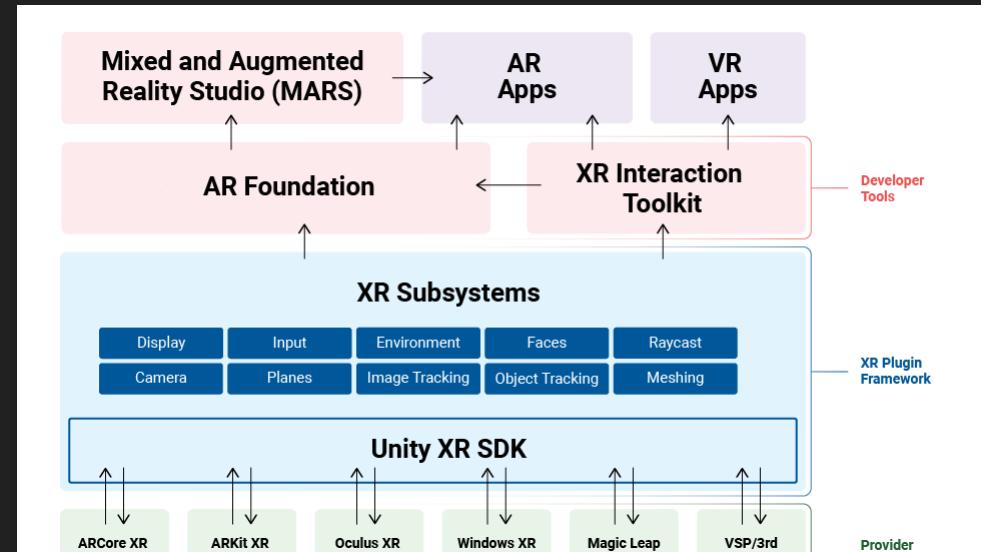


AR frameworks

ARKit	ARcore	Vuforia
		 vuforia™
iOS	iOS/Android	iOS/Android
Free	Free	Premium Plan / Basic Plan (with watermark)

What's ARfoundation?

- Unity package
- 各平台 native AR SDK 整合器
- 其架構大致分為3層：



最上層 - AR Foundation 本身的 API 與 C# 接口，供開發者使用

中間層 - 將取自底層的 SDK 依據功能重新封裝成獨立的Subsystem，統一其數據結構同時避免不同功能(subsystem)間互相干擾

最下層 - 來自不同平台的 AR SDK (如 ARKit, ARCore...)

Platform support

AR Foundation provider plug-ins rely on platform implementations of AR features, such as Google's ARCore on Android and Apple's ARKit on iOS. Not all features are available on all platforms.

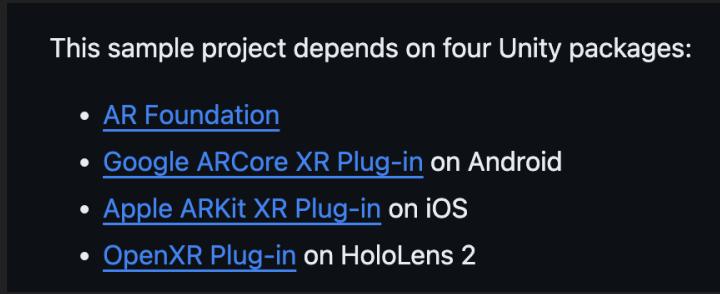
The table below lists the available features in each Unity-supported provider plug-in:

Feature	ARCore	ARKit	HoloLens (OpenXR)	Meta Quest (OpenXR)
Session	Yes	Yes	Yes	Yes
Device tracking	Yes	Yes	Yes	Yes
Camera	Yes	Yes		Yes
Plane detection	Yes	Yes	Yes	Yes
Image tracking	Yes	Yes		
Object tracking		Yes		
Face tracking	Yes	Yes		
Body tracking		Yes		
Point clouds	Yes	Yes		
Raycasts	Yes	Yes	Yes	Yes
Anchors	Yes	Yes	Yes	Yes
Meshing		Yes	Yes	
Environment probes	Yes	Yes		
Occlusion	Yes	Yes		
Participants		Yes		

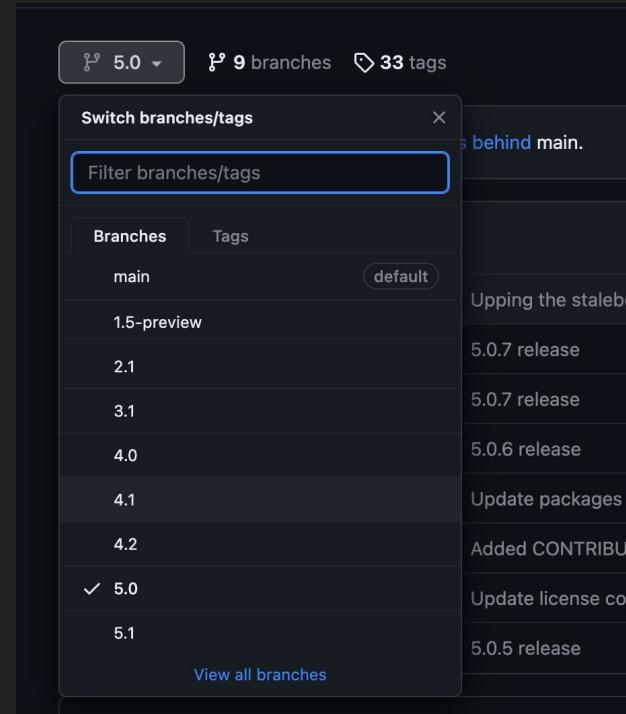
AR foundation setup

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

1. Download the sample project from the github and unzip it.



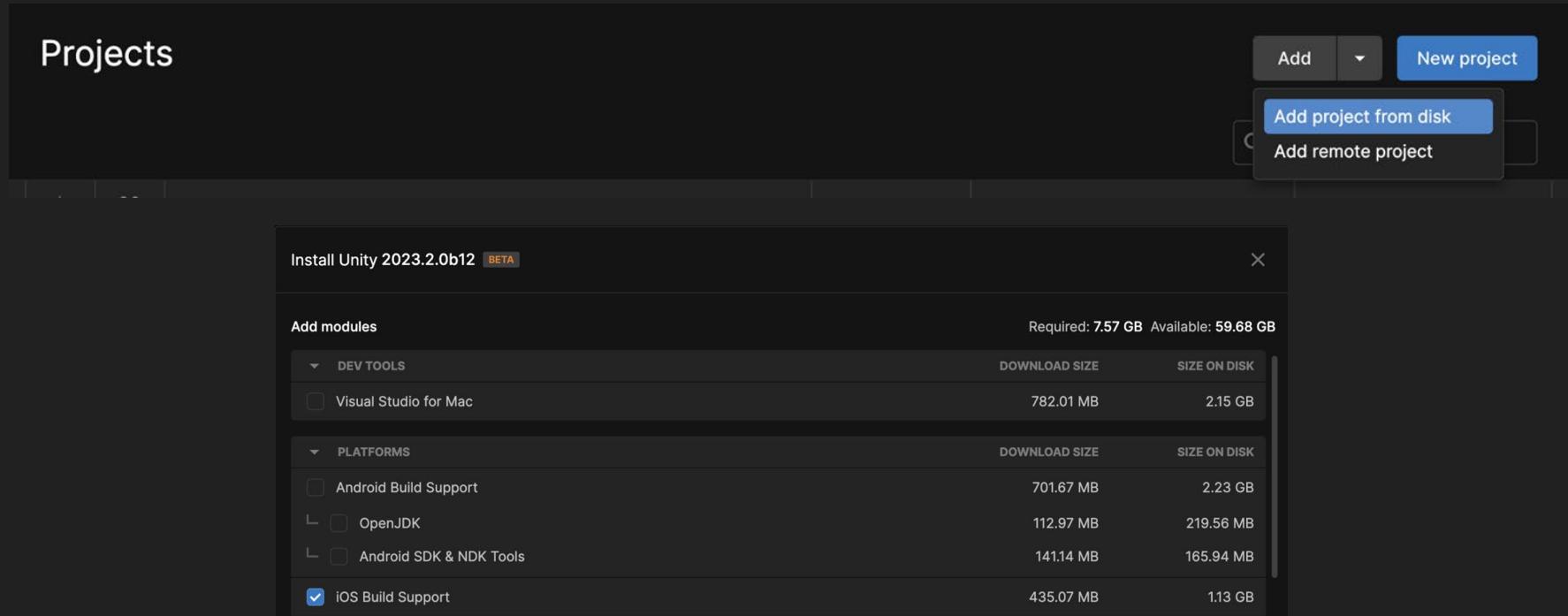
Unity Version	AR Foundation Version
2023.3 (alpha)	6.0
2023.2 (beta)	5.1
2023.1	5.1
2022.3	5.0
2021.3	4.2
2020.3	4.1



AR foundation setup

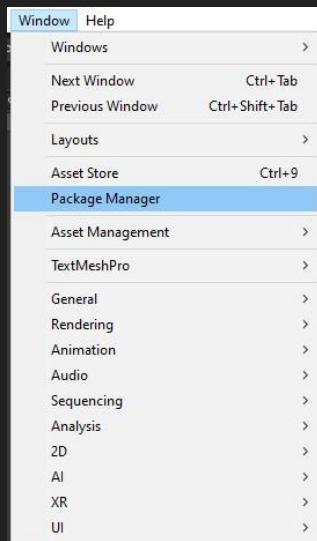
<https://github.com/Unity-Technologies/arfoundation-samples>

2. Open the project in unity hub



AR foundation setup

3. Check the Package Manager



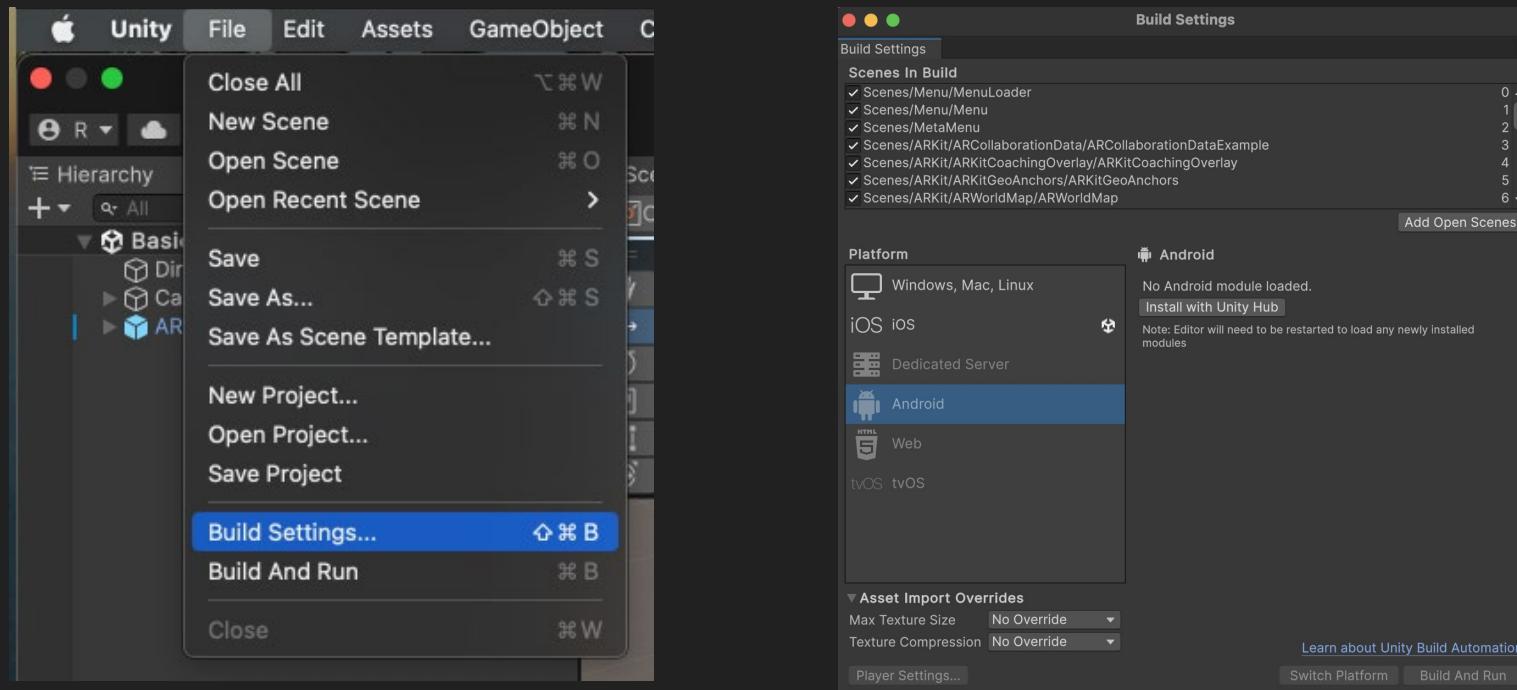
A screenshot of the Unity Package Manager window. The 'In Project' tab is selected. In the list of packages, 'AR Foundation' is listed with a version of 6.0.0-pre.4 and a status of 'Pre'. Other packages listed include Android Logcat, Apple ARKit XR Plugin, AR Core, Custom NUnit, Editor Coroutines, Google ARCore XR Plugin, Input System, JetBrains Rider Editor, Mathematics, OpenXR Plugin, Test Framework, Unity UI, Visual Scripting, Visual Studio Editor, XR Core Utilities, XR Interaction Toolkit, XR Legacy Input Helpers, and XR Plugin Management. A note on the right side states: 'Pre-release packages are in the process of becoming stable and will be available as production-ready by the end of this LTS release. We recommend using these only for testing purposes and to give us direct feedback until then.' Below the note are links for 'Documentation', 'Changelog', and 'Licenses'. At the bottom of the window, it says 'Last update Nov 13, 23:29'.

AR foundation build to mobile



AR foundation build (Android)

4. Build to Device (<https://www.youtube.com/watch?v=r3JXOoPTUHw>)



AR foundation build (iOS)

MacOS: 14.1.1

iOS: 17.1.1

Xcode: 15.0.1

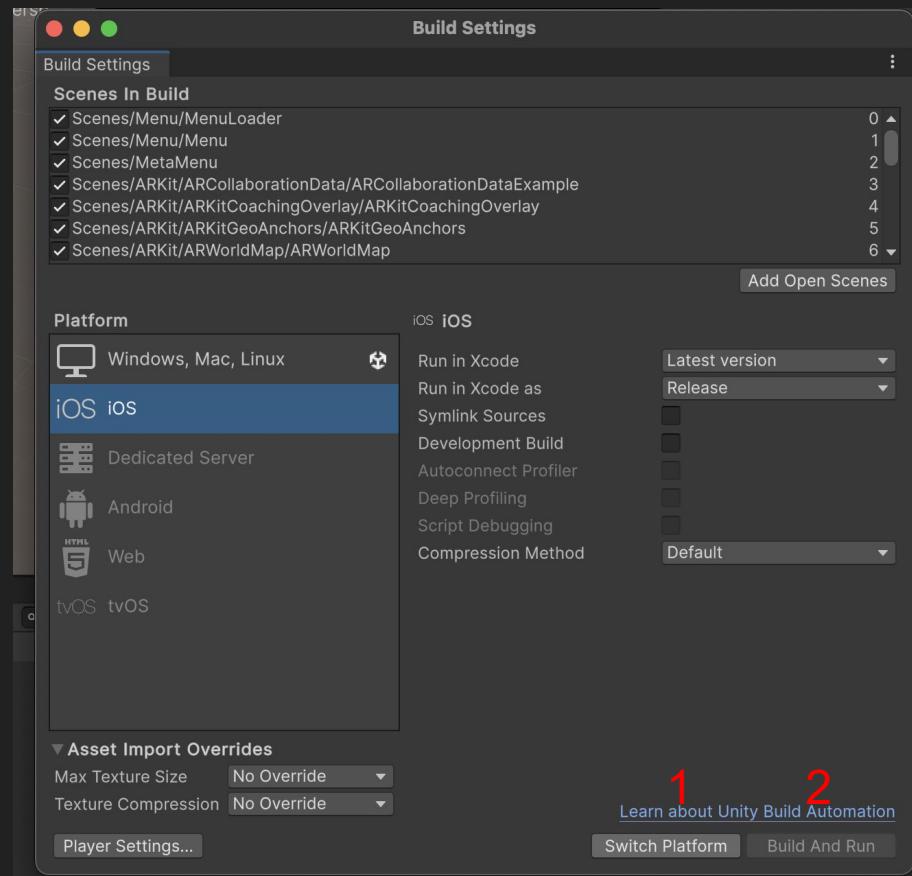
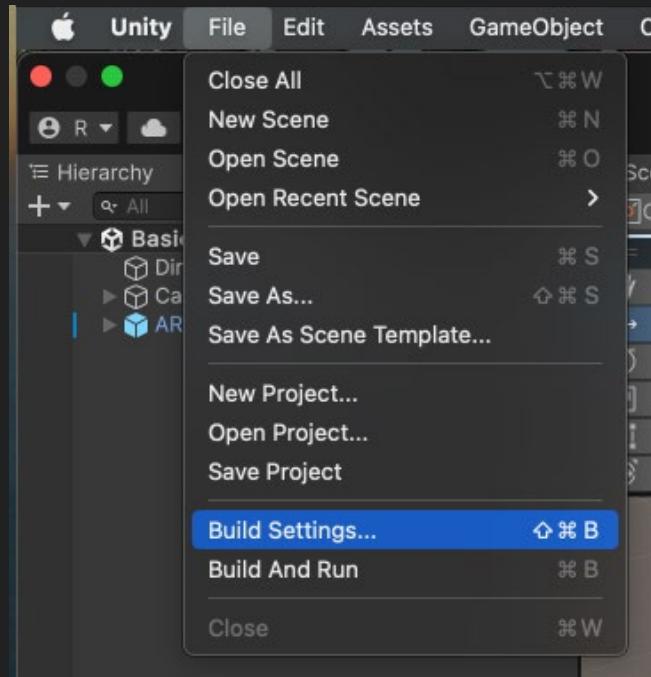
Unity: 2023.2.0b

ARfoundation: 6.0.0-pre

(Strongly recommended)

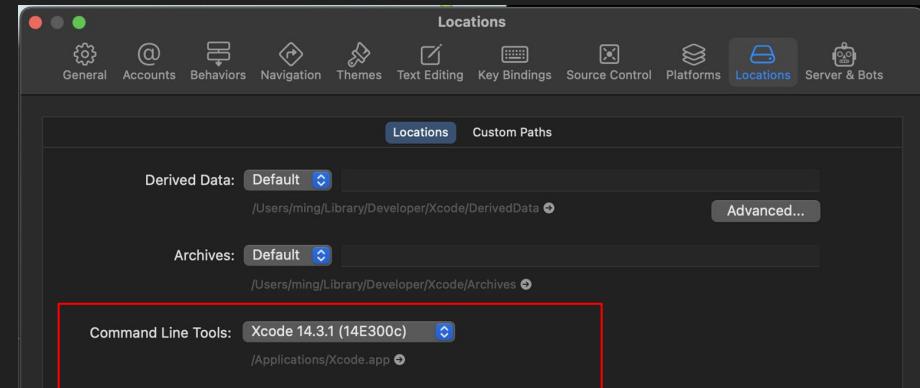
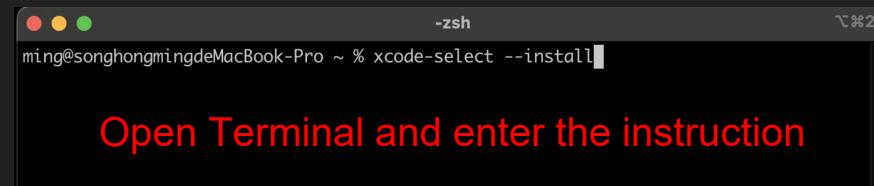
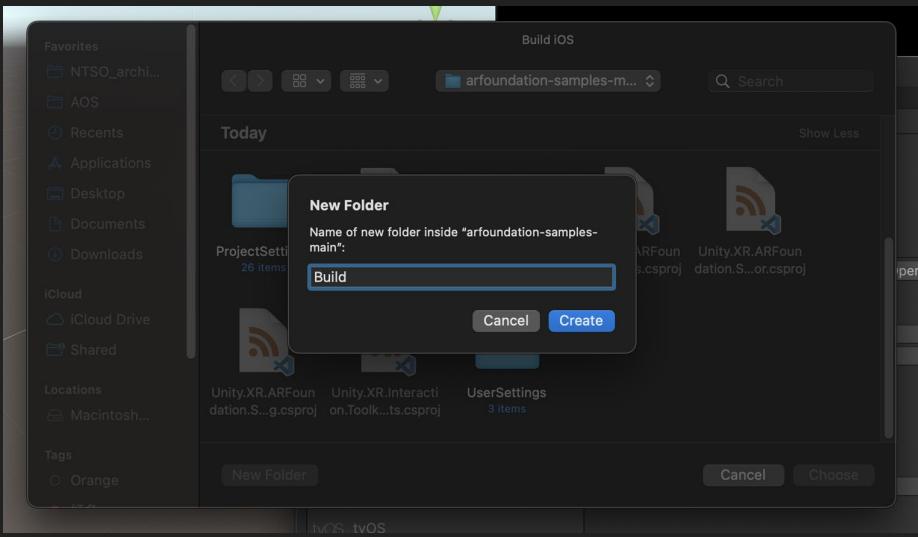
AR foundation build (iOS)

4. Build to Xcode project



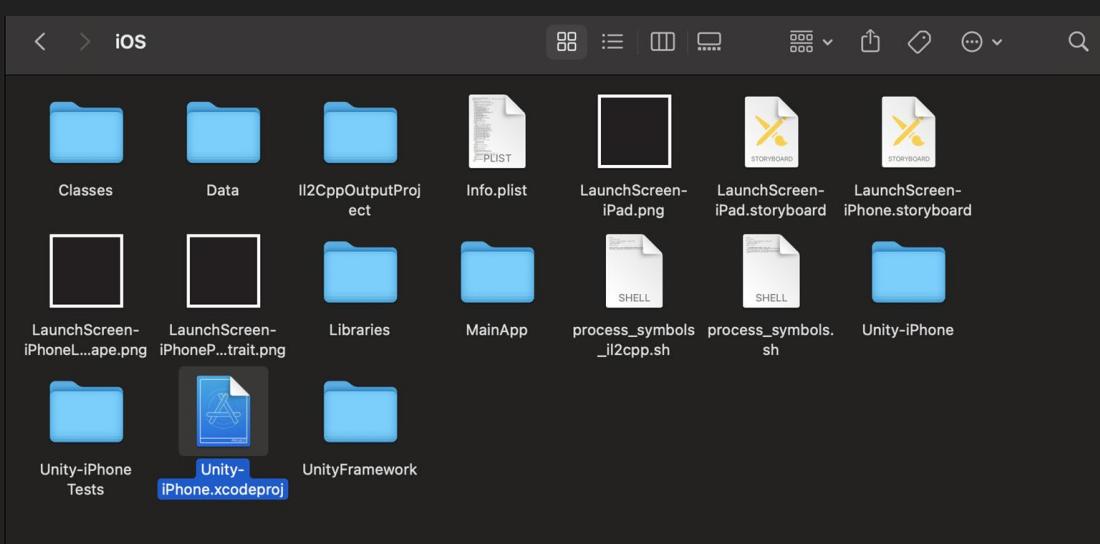
AR foundation build (iOS)

4. Build to Xcode project (install xcrun if you don't have it)



AR foundation build (iOS)

5. Open Xcode project & register an [apple developer account](#)



AR foundation build (iOS)



6. Set the project with user information

The screenshot shows the Xcode interface with the "Unity-iPhone" project selected. The "Signing & Capabilities" tab is active for the "Unity-iPhone" target. In the "TARGETS" list, "Unity-iPhone" is selected. Under the "Signing" section, the "Automatically manage signing" checkbox is checked, and the "Team" dropdown is set to "None". The "Bundle Identifier" is set to "com.unity.arfoundation.samples". The "Status" message at the bottom indicates that signing requires a development team.

Unity-iPhone

Unity-iPhone > Any iOS Device (arm64)

Unity-iPhone: Ready | Today at 12:17 AM

Unity-iPhone

General Signing & Capabilities Resource Tags Info Build Settings Build Phases Build Rules

PROJECT

+ Capability All Release ReleaseForProfiling ReleaseForRunning Debug

Unity-iPhone

SIGNING

Automatically manage signing

Xcode will create and update profiles, app IDs, and certificates.

Team None

Bundle Identifier com.unity.arfoundation.samples

TARGETS

Unity-iPhone Unity-iPhone Tests UnityFramework GameAssembly

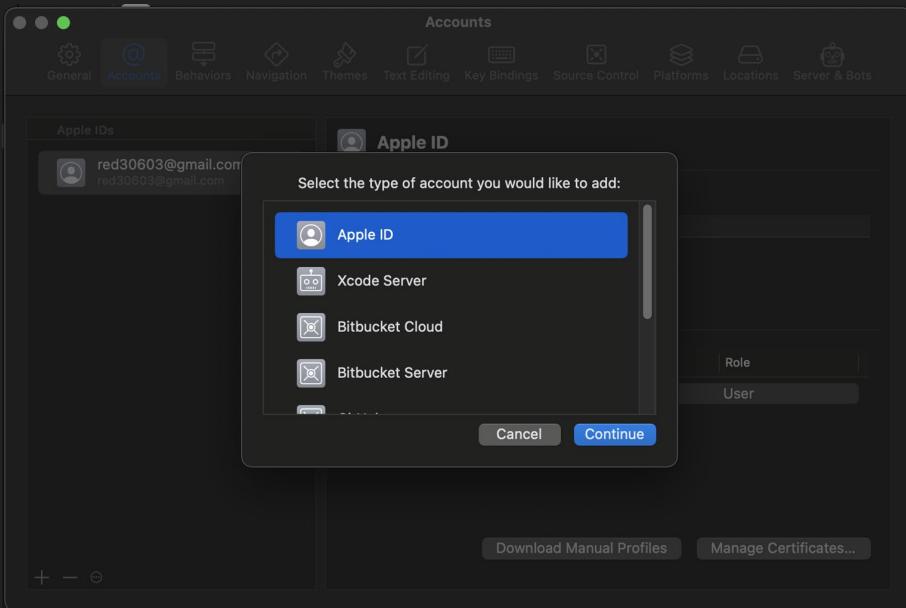
iOS

Provisioning Profile Xcode Managed Profile

Signing Certificate Apple Development

Status ✘ Signing for "Unity-iPhone" requires a development team. Select a development team in the Signing & Capabilities editor.

AR foundation build (iOS)



The screenshot shows the 'Signing' section of the Xcode preferences. Under the 'ios' heading, there are fields for 'Team' (set to 'Sung HungMing (Personal Team)') and 'Bundle Identifier' (set to 'com.unity.arfoundation.my_samples1114'). A checked checkbox says 'Automatically manage signing: Xcode will create and update profiles, app IDs, and certificates.' Below this, the 'Status' section displays two errors:

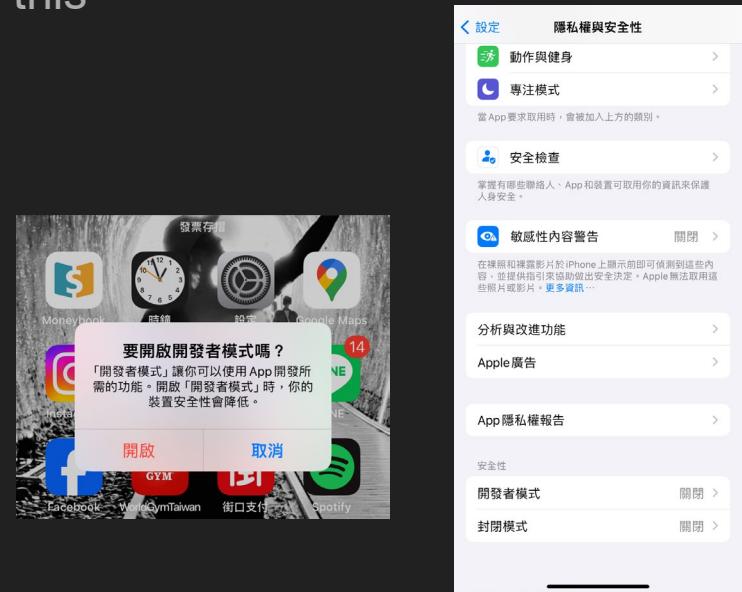
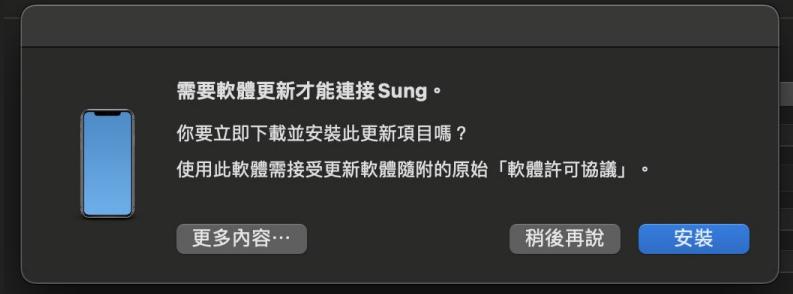
- A red 'X' icon next to the text: 'Failed to register bundle identifier: The app identifier "com.unity.arfoundation.samples" cannot be registered to your development team because it is not available. Change your bundle identifier to a unique string to try again.' A 'Try Again' button is located below this message.
- A red 'X' icon next to the text: 'No profiles for "com.unity.arfoundation.samples" were found: Xcode couldn't find any iOS App Development provisioning profiles matching "com.unity.arfoundation.samples".'

AR foundation build (iOS)

7. Run on a iOS device

7-1 Connect the iPhone (Click “Trust this device”)

7-2 Open the developer mode



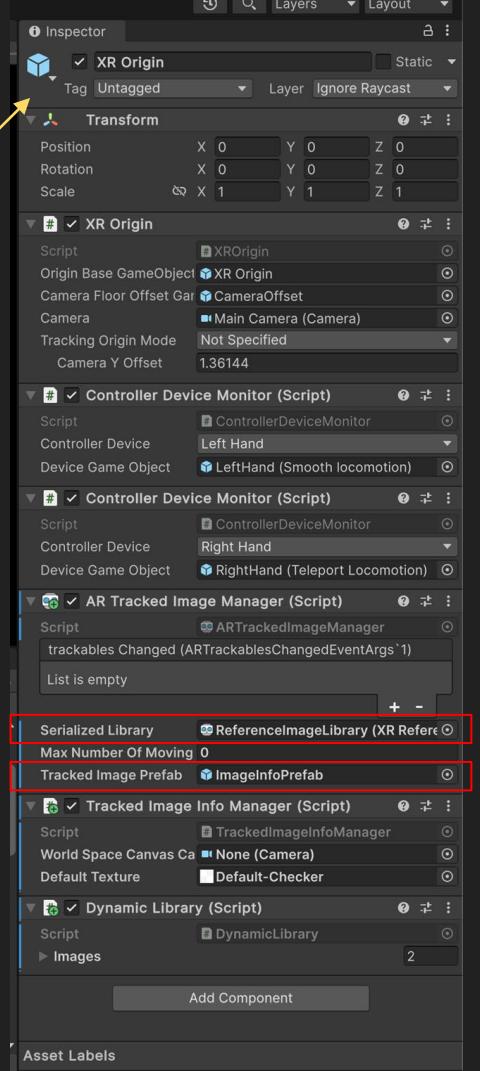
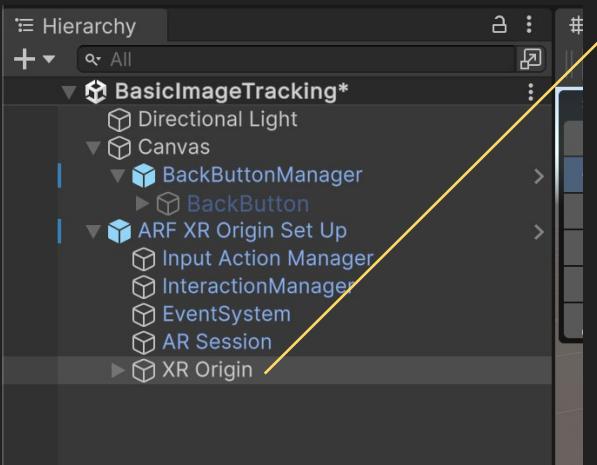
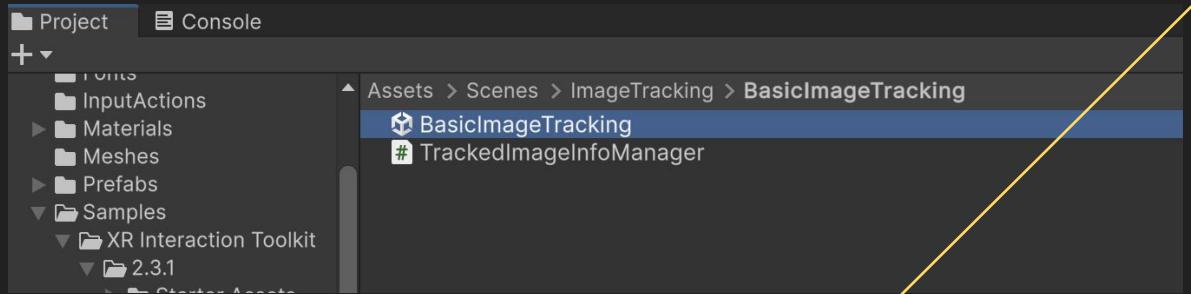
Sample scenes

- Simple AR
- image-tracking
- object-tracking
- face-tracking
- body-tracking
- point-clouds
- ar-worldmap

Table of Contents

Sample scene(s)	Description
Simple AR	Demonstrates basic Plane detection and Raycasting
Camera	Scenes that demonstrate Camera features
Plane detection	Scenes that demonstrate Plane detection
Image tracking	Scenes that demonstrate Image tracking
Object tracking	Demonstrates Object tracking
Face tracking	Scenes that demonstrate Face tracking
Body tracking	Scenes that demonstrate Body tracking
Point clouds	Demonstrates Point clouds
Anchors	Demonstrates Anchors
Meshing	Scenes that demonstrate Meshing
Environment Probes	Demonstrates Environment Probes
Occlusion	Scenes that demonstrate Occlusion
Check support	Demonstrates checking for AR support on device
Configuration Chooser	Demonstrates AR Foundation's Configuration Chooser
Debug Menu	Visualize trackables and configurations on device
ARKit	ARKit-specific sample scenes
ARCore session recording	Demonstrates the session recording and playback functionality available in ARCore

AR foundation image-tracking example



Thanks for listening