MARKER BASE EXERCISE: HANDS ON TOGETHER

Corso Realtà Virtuale 2025/2026

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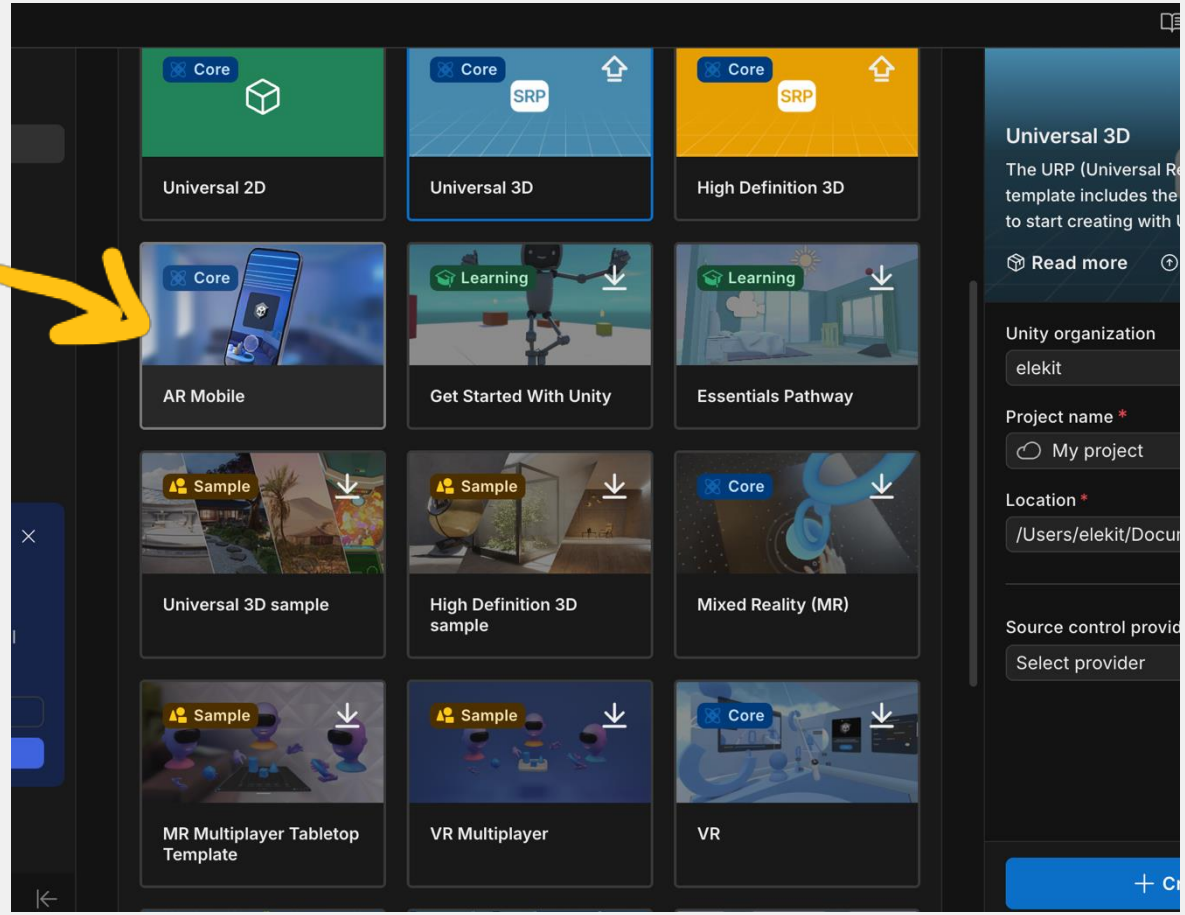
Code on the laboratory repository Github in the folder Material-Unity-AR

https://github.com/aislabunimi/courses.vr2026

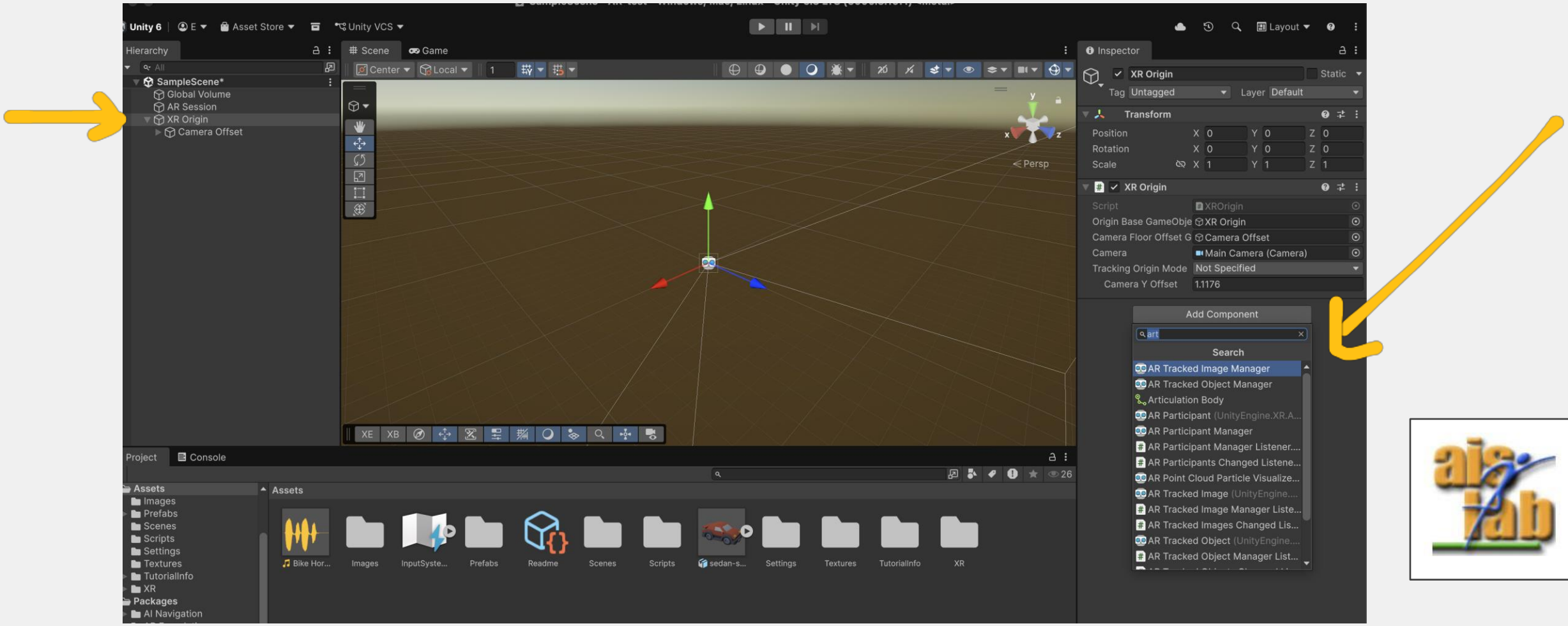
SETUP THE SCENE

- Create empty Project chosing AR
- Download the unitypackage from Github of the laboratory “ar-marker-project-material-new.unitypackage”
- To import the unitypackage go to the Assets > Import > Custom Package and select the ar-marker-project-material.unitypackage
- If materials are pink (error material for URP) select all the pink materials clink on: Edit > Rendering > Materials > Convert selected built in materials into URP



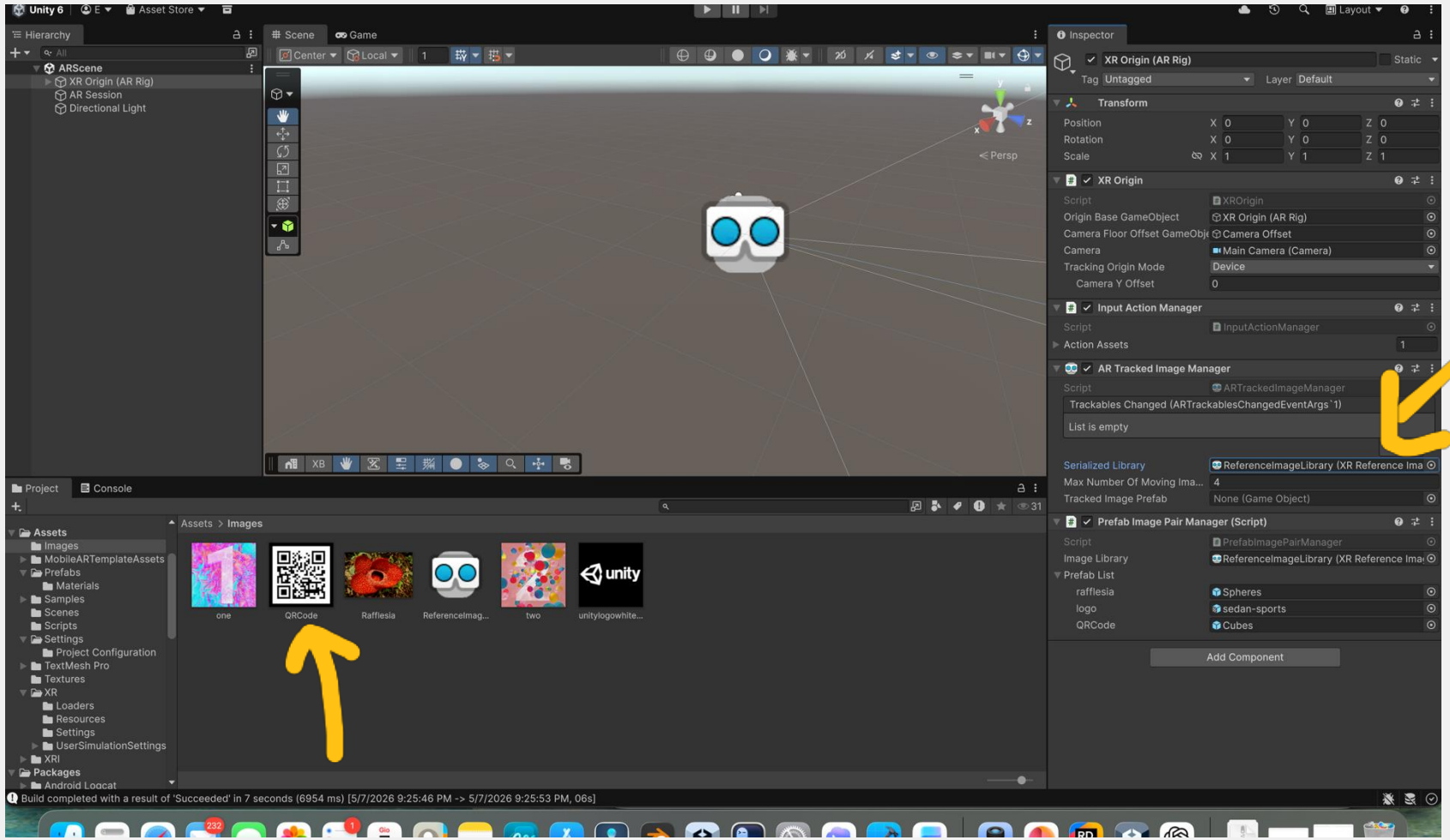
ADD MARKER MANAGER SCRIPT

Click on the **XR Session Origin** and in the inspector click on Add Component and search for the **AR Tracked Image Manager**



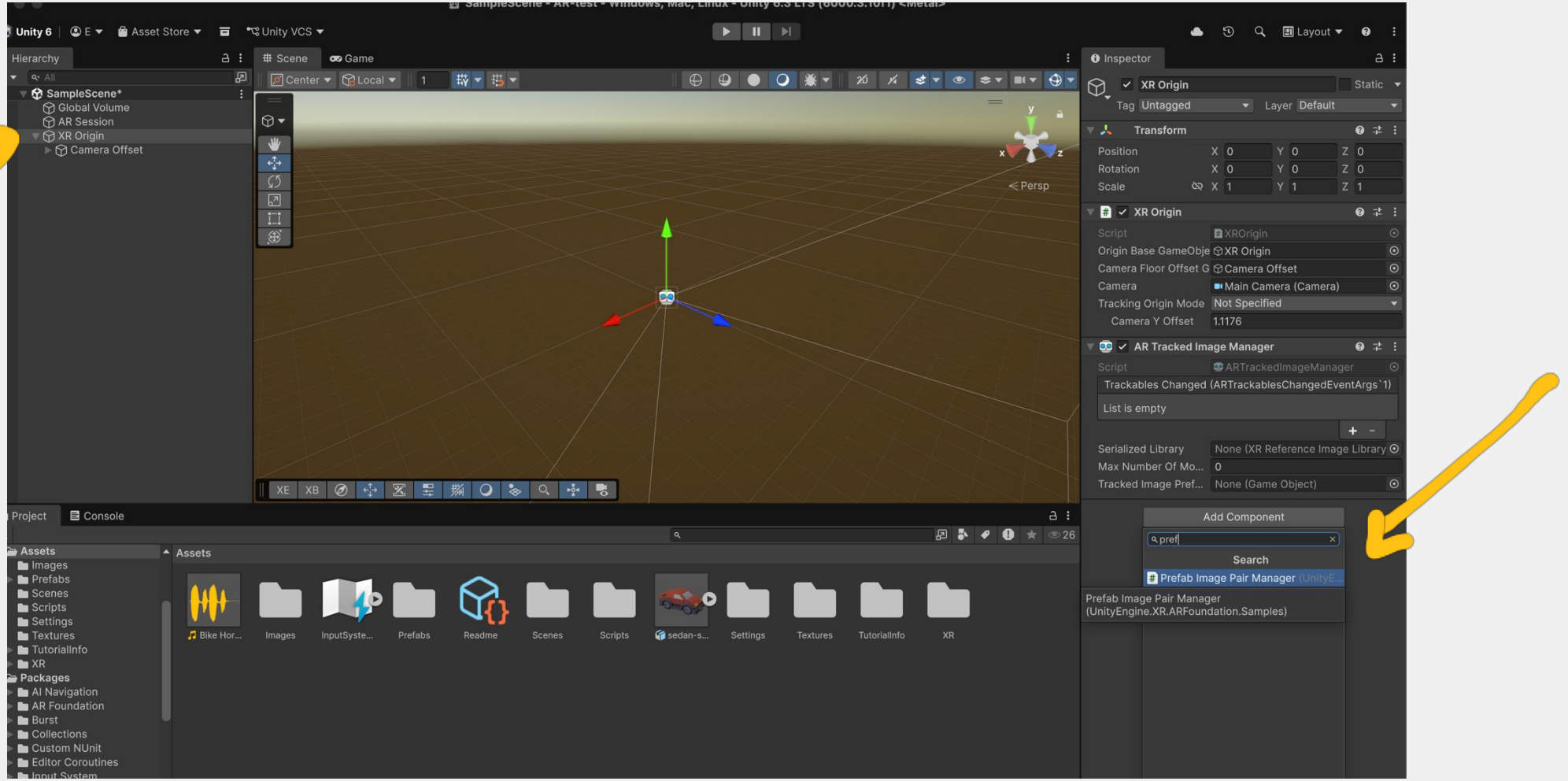
ADD MARKER MANAGER SCRIPT

Add **Reference Image Library** into the **AR Tracked Image Manager**



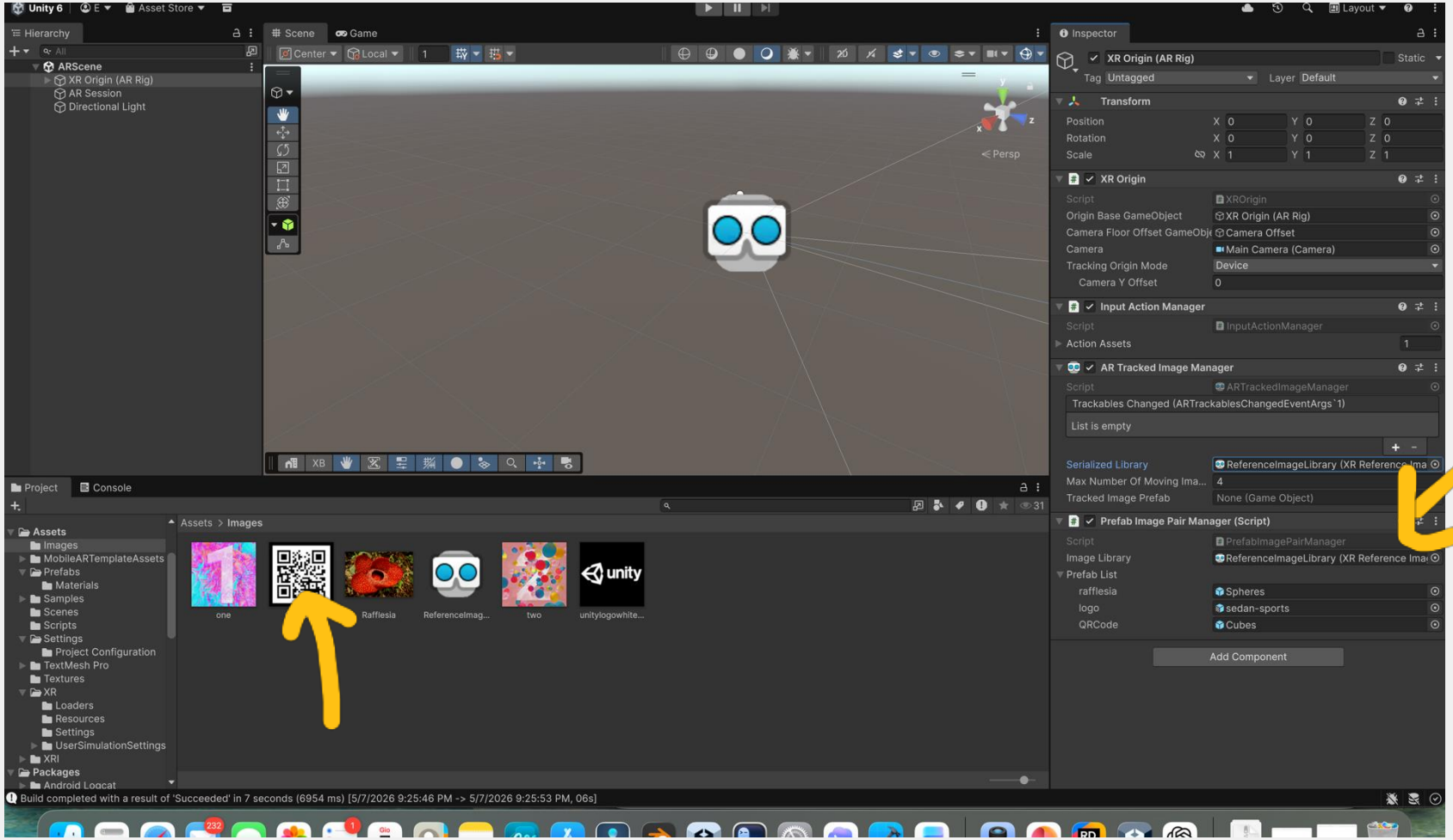
ADD SCRIPT: PAIR PREFAB-IMAGE MARKER

Always on the XR Session Origin Add Component **Prefab Image Pair Manager**



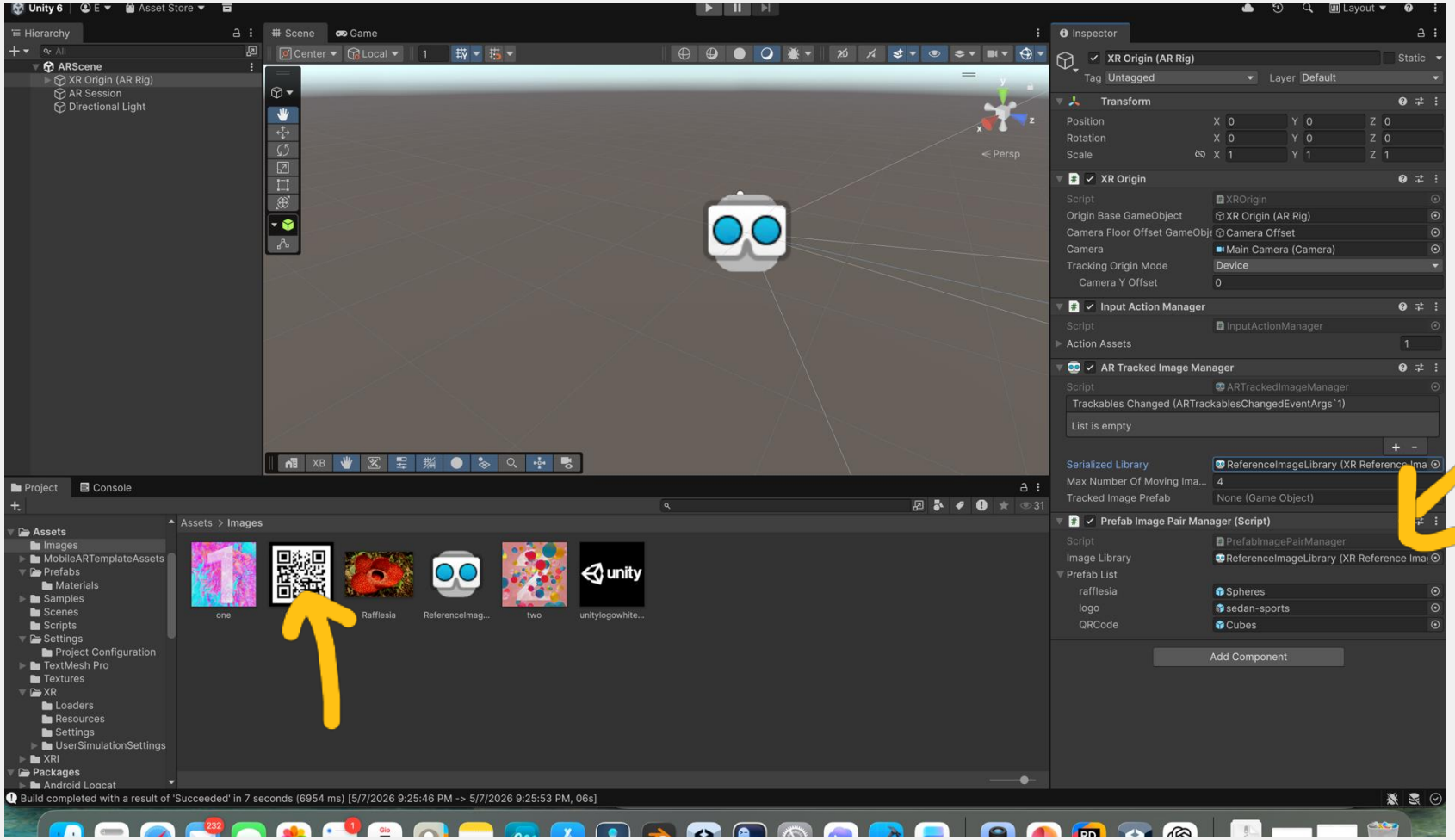
ADD MARKER MANAGER SCRIPT

Add **Reference Image Library** into the **Prefab Image Pair Manager,** wait a bit and automatically a list of 3 empty elements appear



ADD MARKER MANAGER SCRIPT

Add **a Prefab betwee** into the**,** wait a bit and automatically a list of 3 empty elements appear

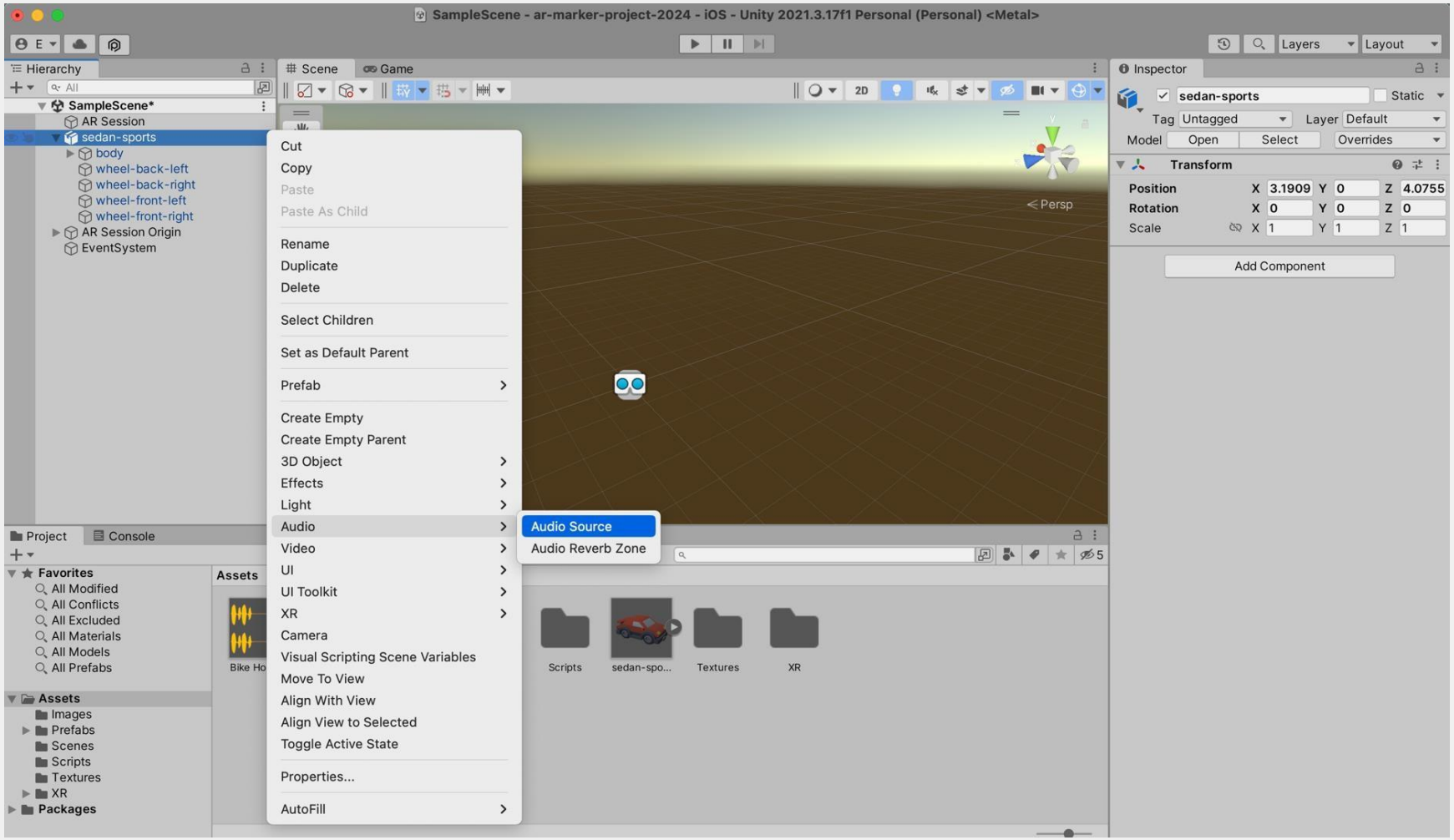


(I) CAR PREFAB

- Add **sedan-sports** object in the SampleScene (just drag the object in the open scene)

(2) CAR PREFAB

- Add to the **sedan-sports** object an Audio Source as children: right click on **sedan-sports to add it**

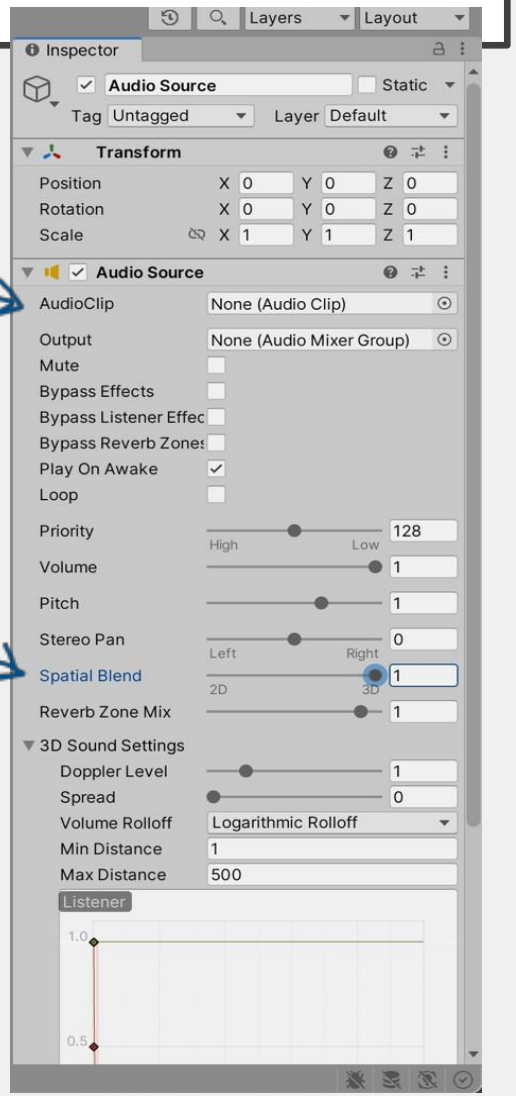


(3) CAR PREFAB

In the Audio Source

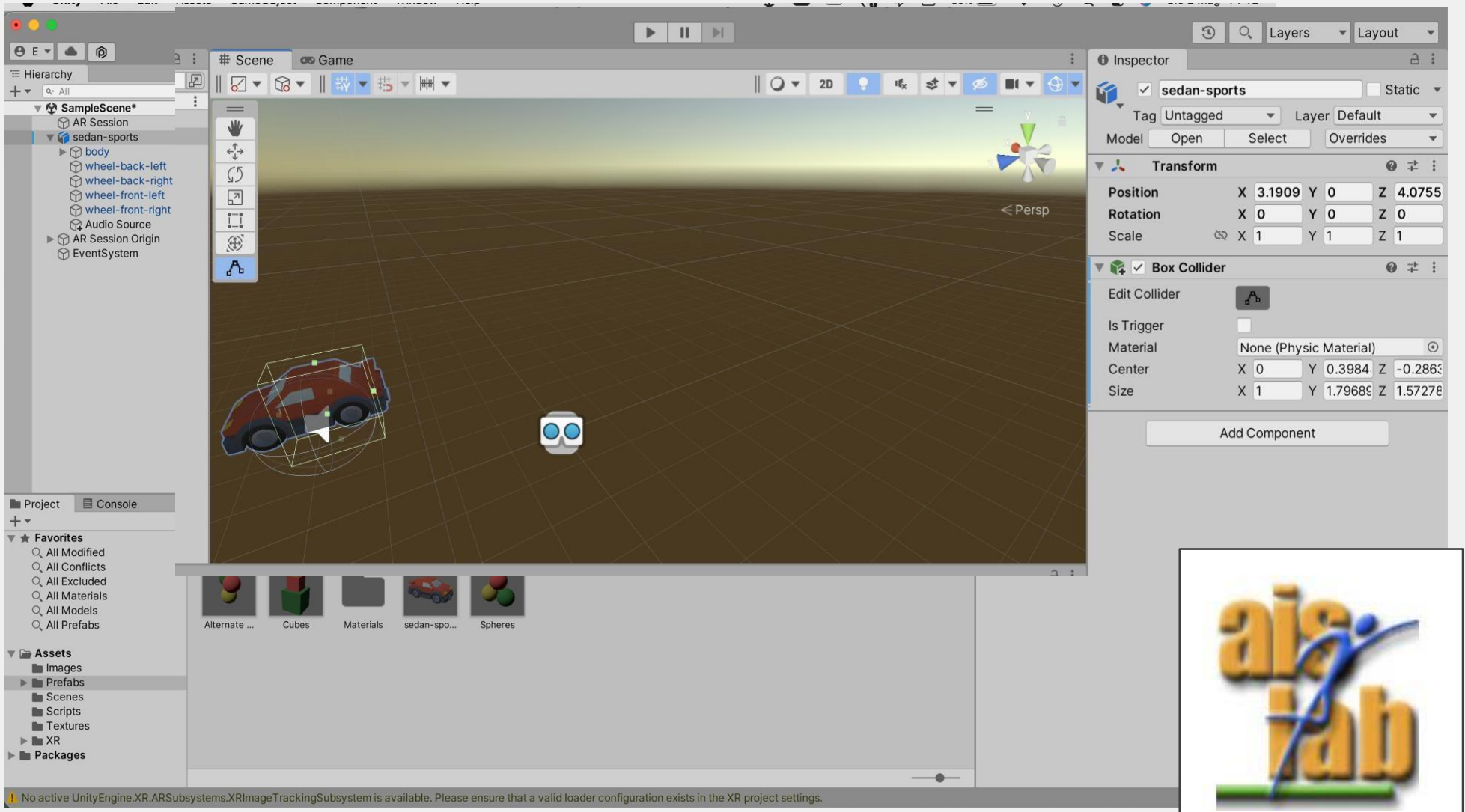
- select Bike Horn audio in AudioClip

- Set Spatial Blend to 3D



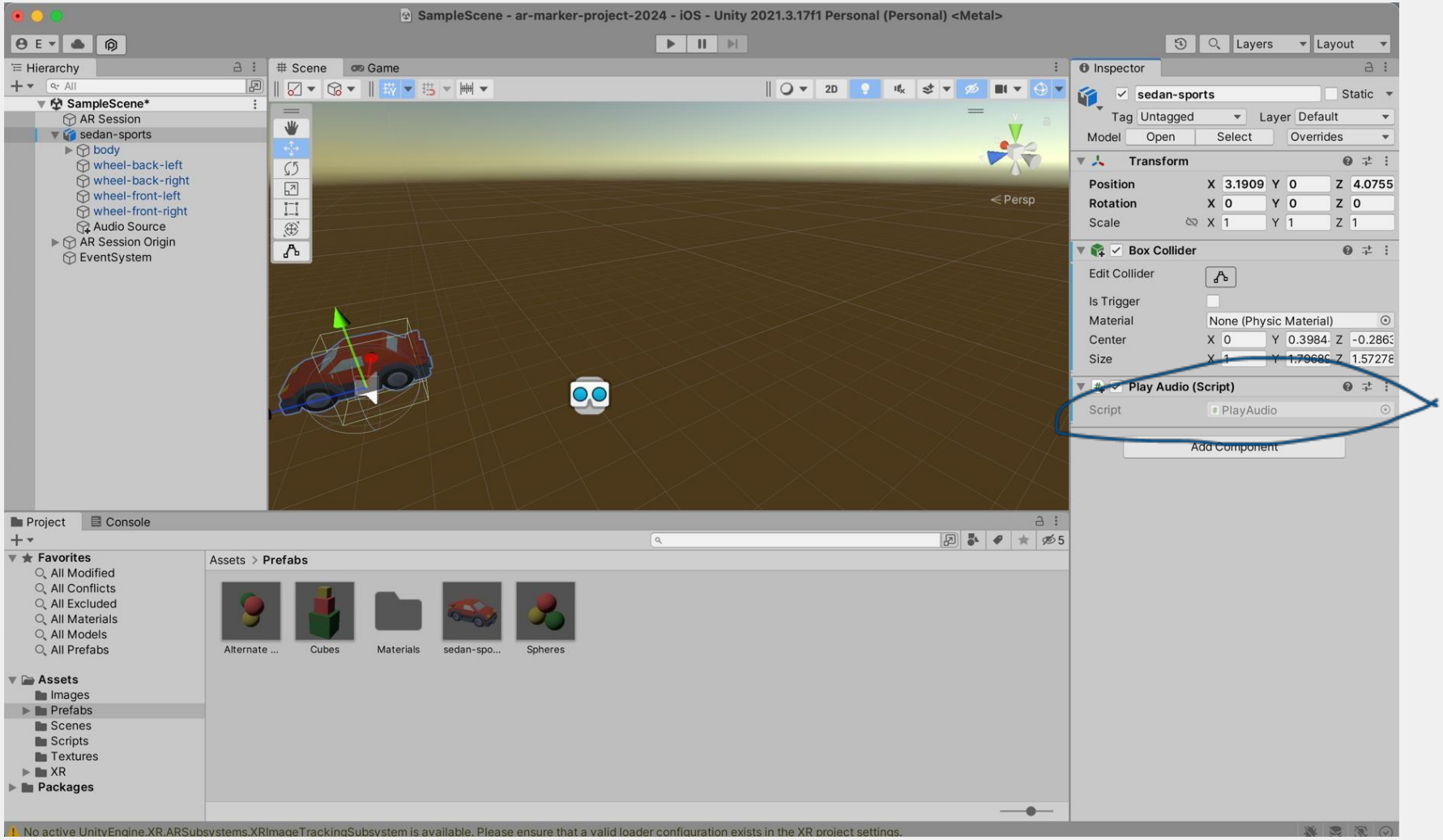
(4) CAR PREFAB

- To the sedan-sports add a Box Collider and adjust it to the right size



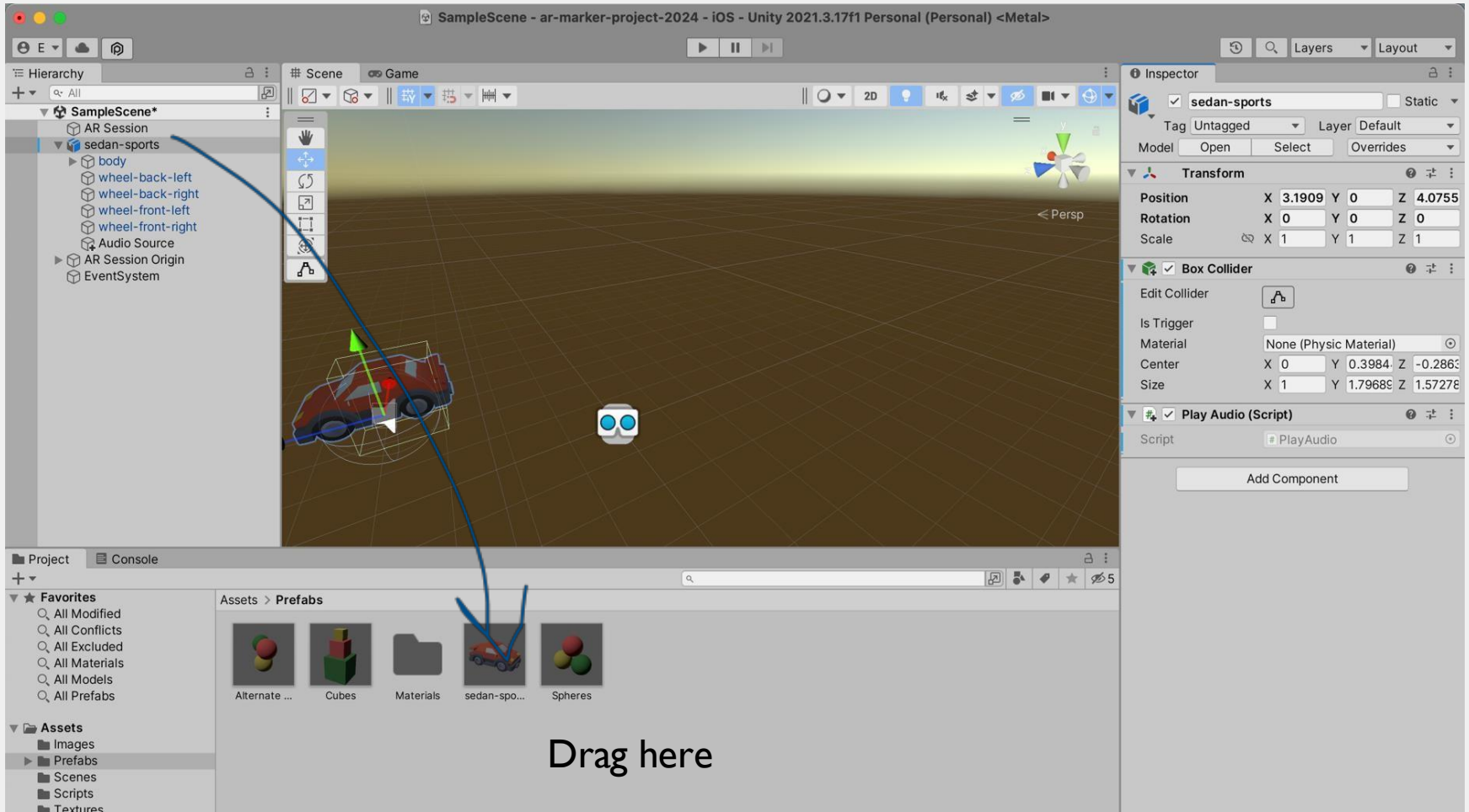
(5) CAR PREFAB

- Add to the **sedan-sports** object the PlayAudio script



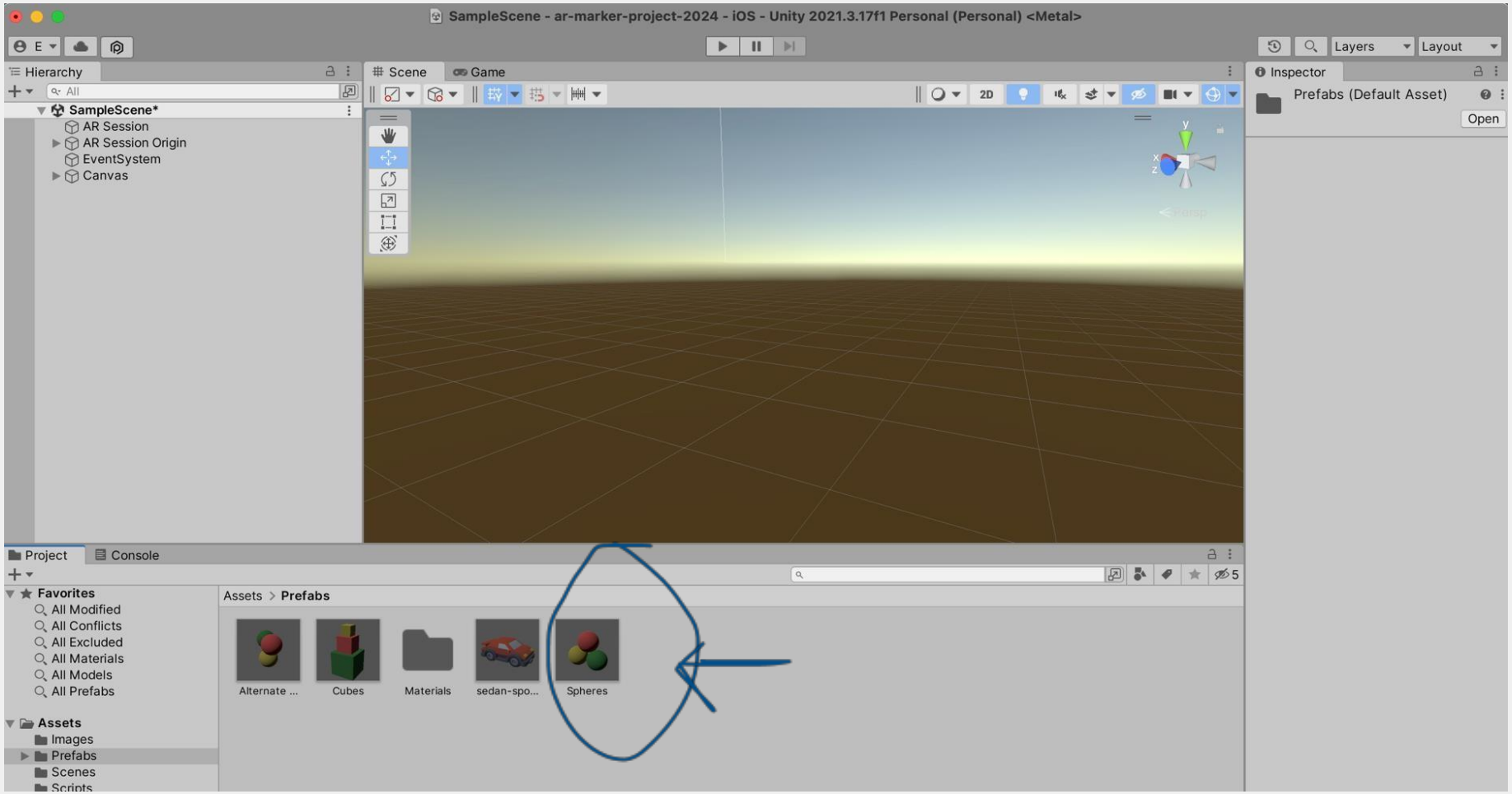
GENERATE CAR PREFAB

- To generate the prefab Drag&drop the **sedan-sports** object in the Prefabs folder
- Once you have done, delete the **sedan-sports** from the Sample Scene



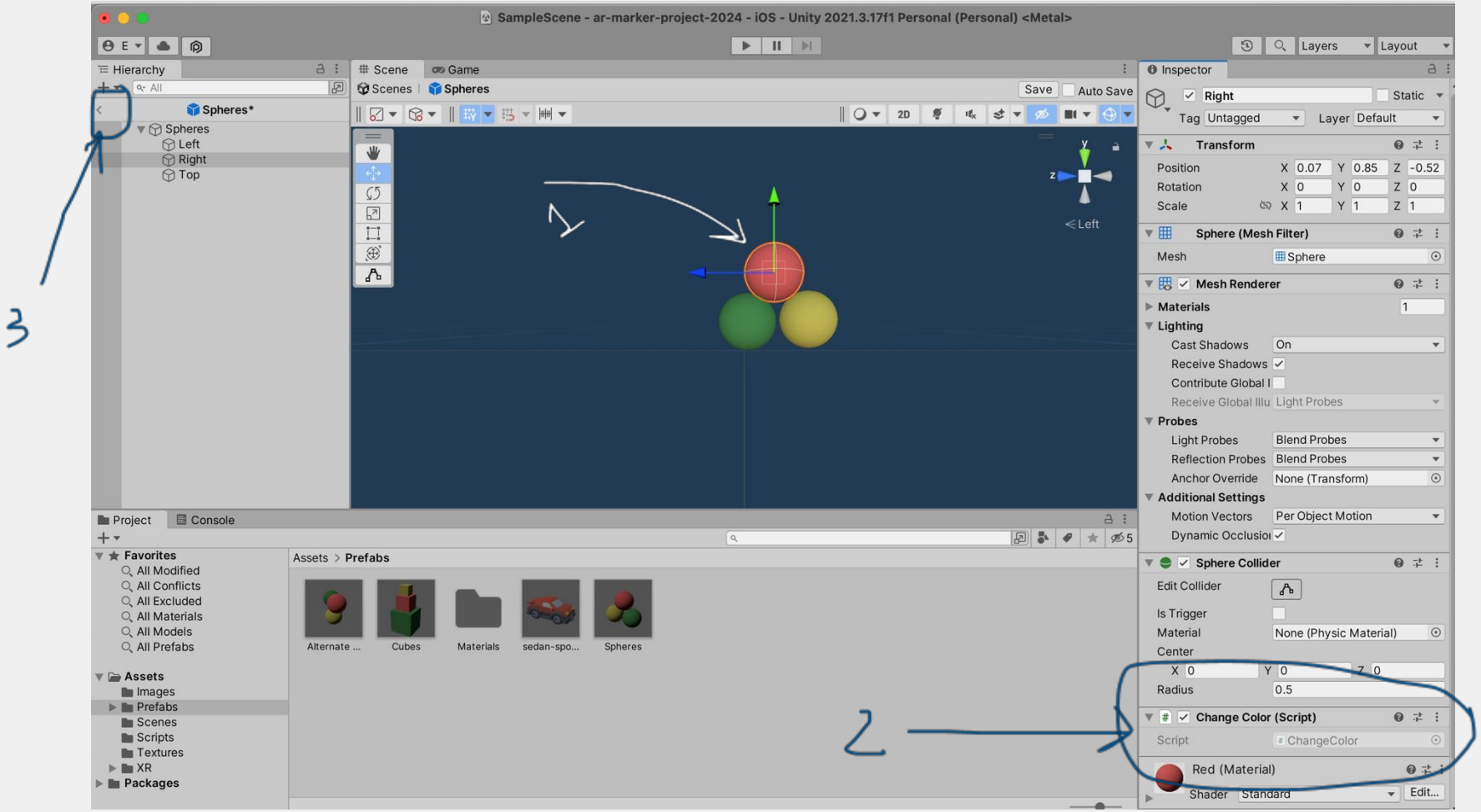
ADD COLOR SCRIPT TO SPHERE PREFAB

- Double click on Spheres Prefab to open it



GENERATE CAR PREFAB

1. Click on the Red Sphere
2. add the ChangeColor script
3. then Save with cntrl + S and then exit from Prefab view



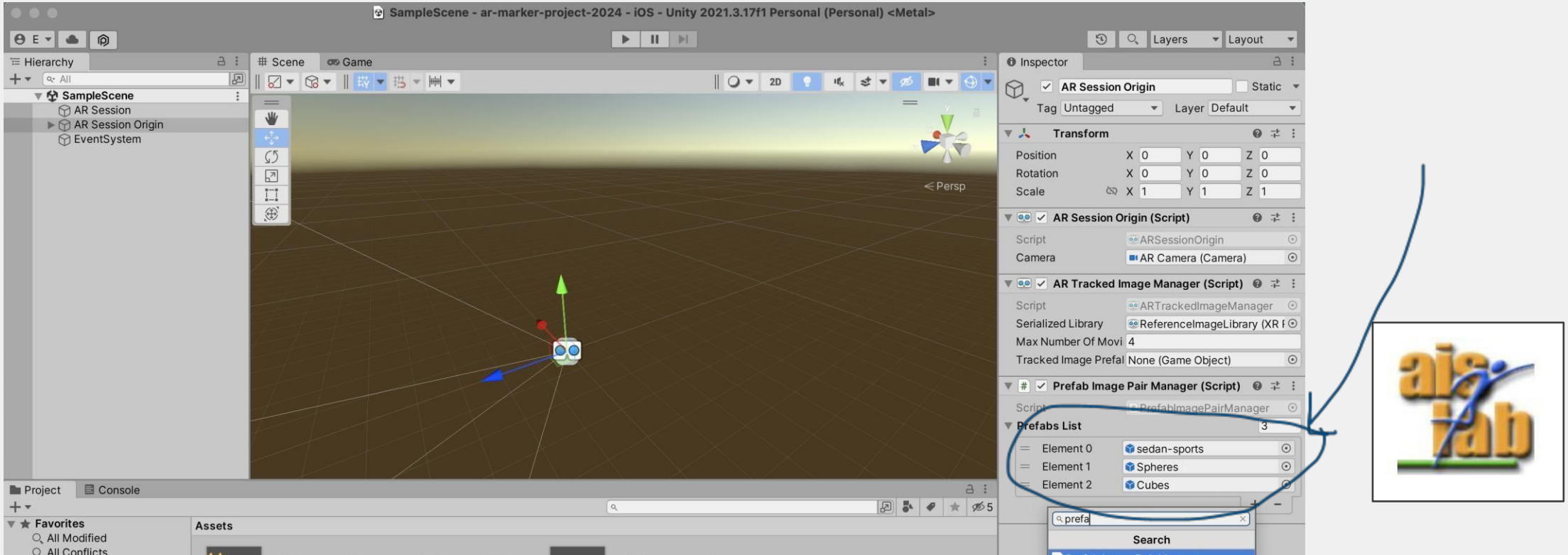
ADD PREFABS FOR IMAGE TRACKING

- Go to the AR Session Origin in Sample Scene and in the **Prefab Image Pair Manager** add in the **Prefabs List** in order:

  0: Spheres

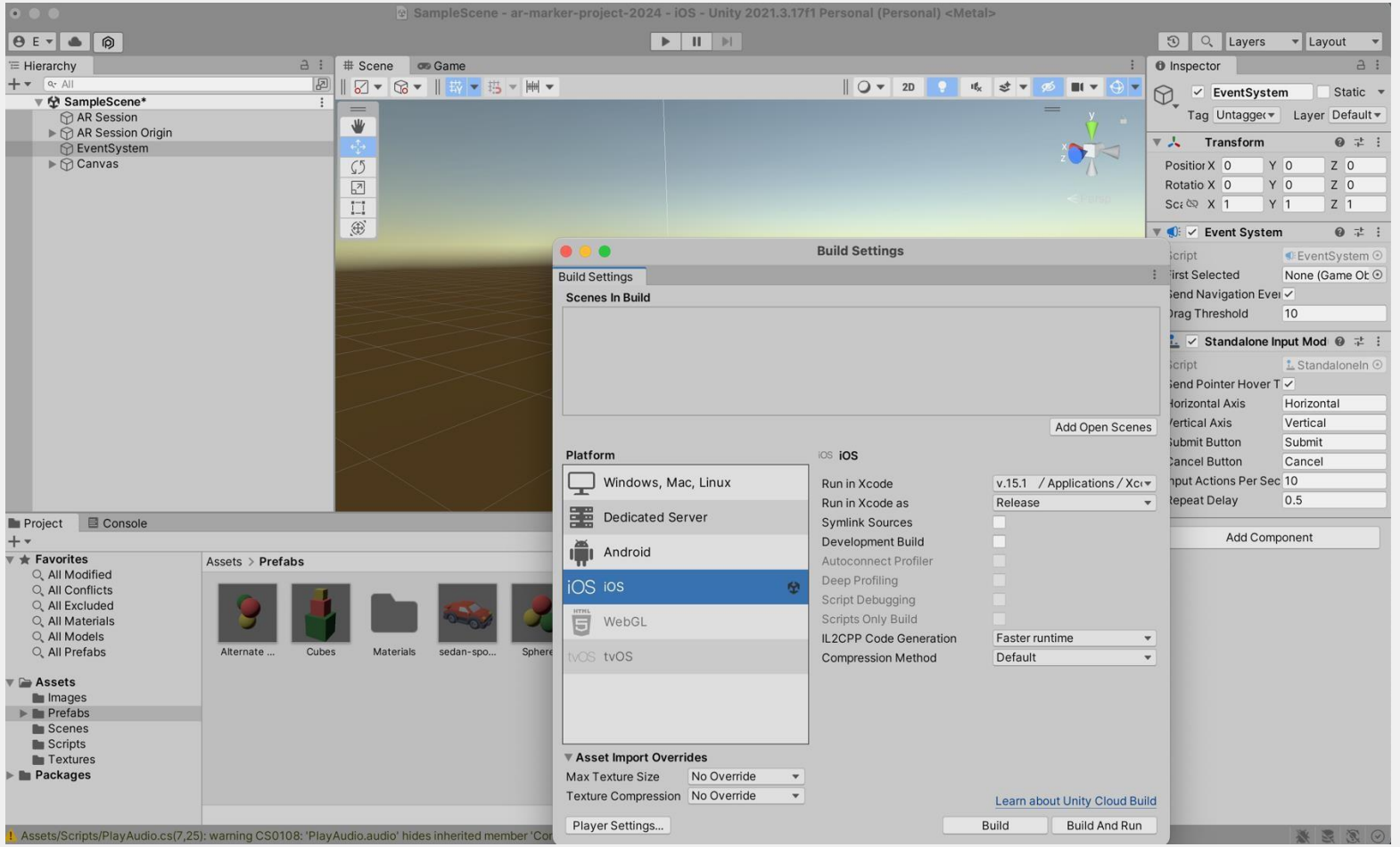
  1: sedan-sports

  2: Cubes



NOW BUILD

- Build for Android or iOS as you have seen in the previous exercise of Solar System



TROUBLESHOOTING

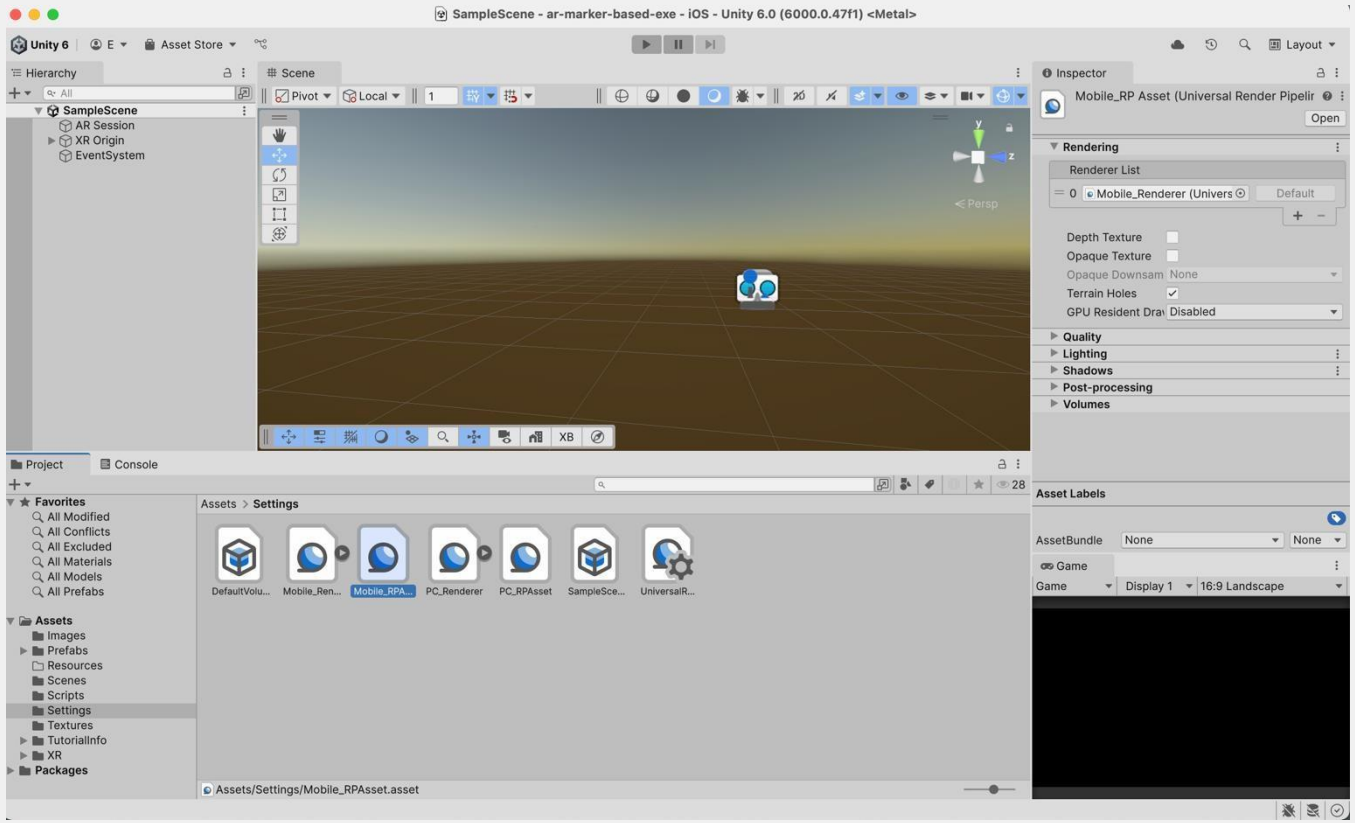
- [iOS] If after the build your project is black, you should enable the Provider Plugin setup, in the "Project Settings" click on "XR Plug-in Management" then click on iOS or on Android and respectively check the box ARKit or ARCore (step 11)
- [Android] If after the build you get an error on ARCore as "BuildFailedException: ARCore Required apps require a minimum SDK version of 24." or "Failed getting available Android API levels. Could not find Android SDK Tools."

  You can solve it: Project Settings > Player Settings > Android, under the voice "Other Settings" → "Identification" change the "Minimum API Level" to Nougat level 24
- [Android] "BuildFailedException: You have enabled the Vulkan graphics API, which is not supported by ARCore."

  Under the voice "Other Settings" → "Rendering" change the Graphics API and remove Vulkan

TROUBLESHOOTING

- ARFoundation may cause issues in Unity 6 and URP: if you see a yellow screen you can fix going to Assets > Settings > Click on Mobile_RP Assets and if in the Inspector the voice Rendering is empty add the AR Background Renderer



- Whole explanation is available at: https://discussions.unity.com/t/yellow-screen-when-doing-ar/1542033

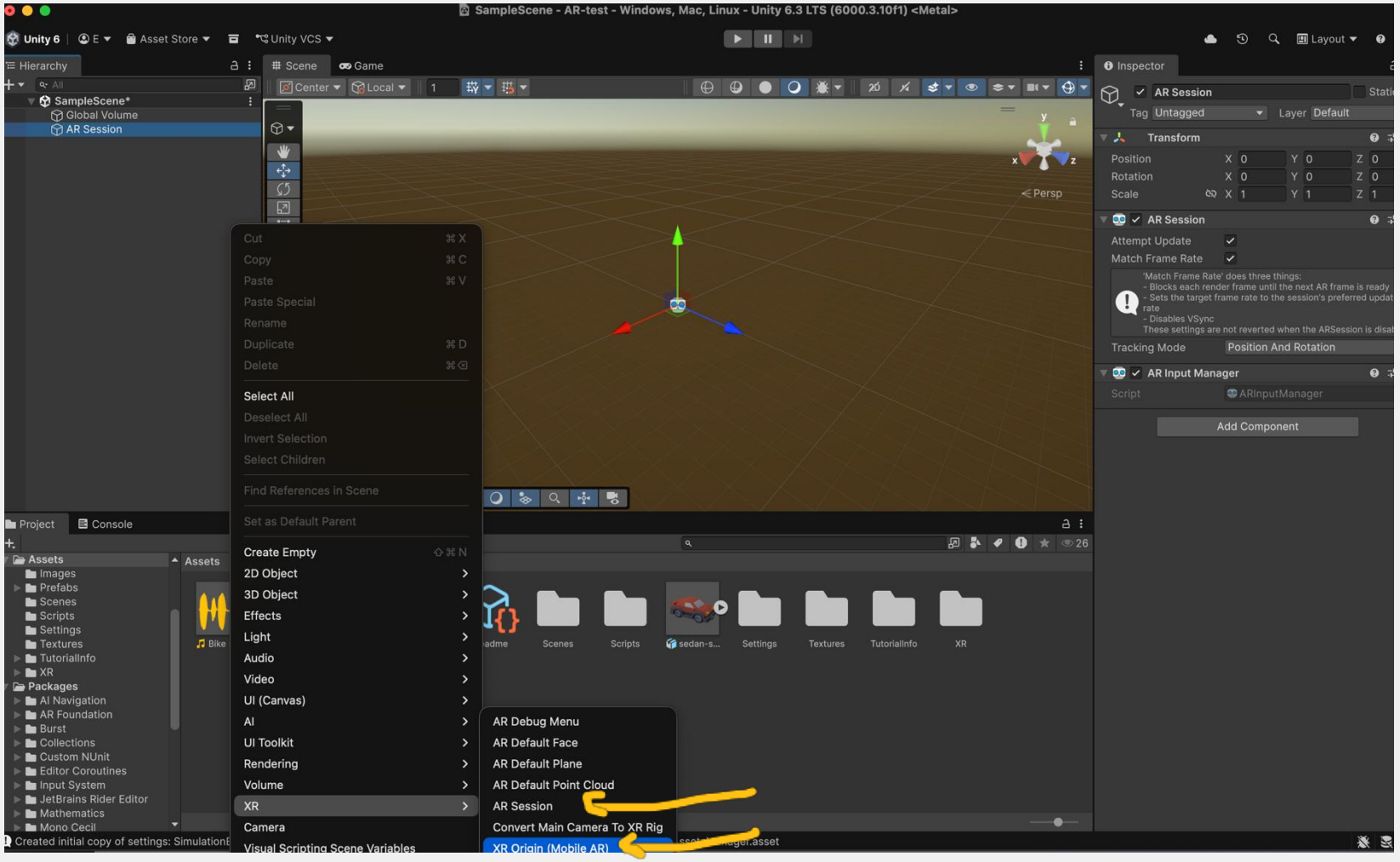
Other Info

Manually SETUP THE *SampleSceneAR*

In the *SampleScene:*

- Add a GameObject > XR > AR Session
  AR Session supports enabling and disabling XR on the target device

- Add a GameObject > XR > XR Origin (AR Mobile)
  Because AR devices provide their data in "session space", which is an unscaled space relative to the beginning of the AR session, the ARSessionOrigin performs the appropriate transformation into Unity space



BUILD UNITY3D APP WITH XR ARFOUNDATION

ARFOUNDATION

AR foundation allows to work with different AR platforms inside Unity3D

You can install ARFoundation in Unity's Package Manager

In addition to that Package, you should install also the Plugin you need, as ARKit for IOS apps or ARCore for Android apps development.

Supported Platform Packages

The following platform packages and later implement the AR Foundation features indicated above:

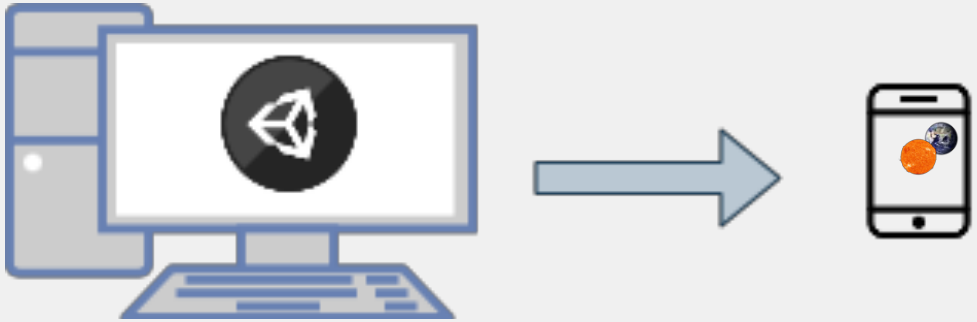
Package Name	Version
ARCore XR Plugin	4.1
ARKit XR Plugin	4.1
ARKit Face Tracking	4.1
Magic Leap XR Plugin	6.0
Windows XR Plugin	5.0

https://docs.unity3d.com/Packages/com.unity.xr.arfoundation@4.1/manual/index.html#using-ar-foundation

WHAT TO DO NOW

At this point we have modeled a Solar System in a Unity 3D Scene named *SampleScene*.

Now we will use the same assets to create the XR version, then we will build it for IOS with ARKit + ARFoundation



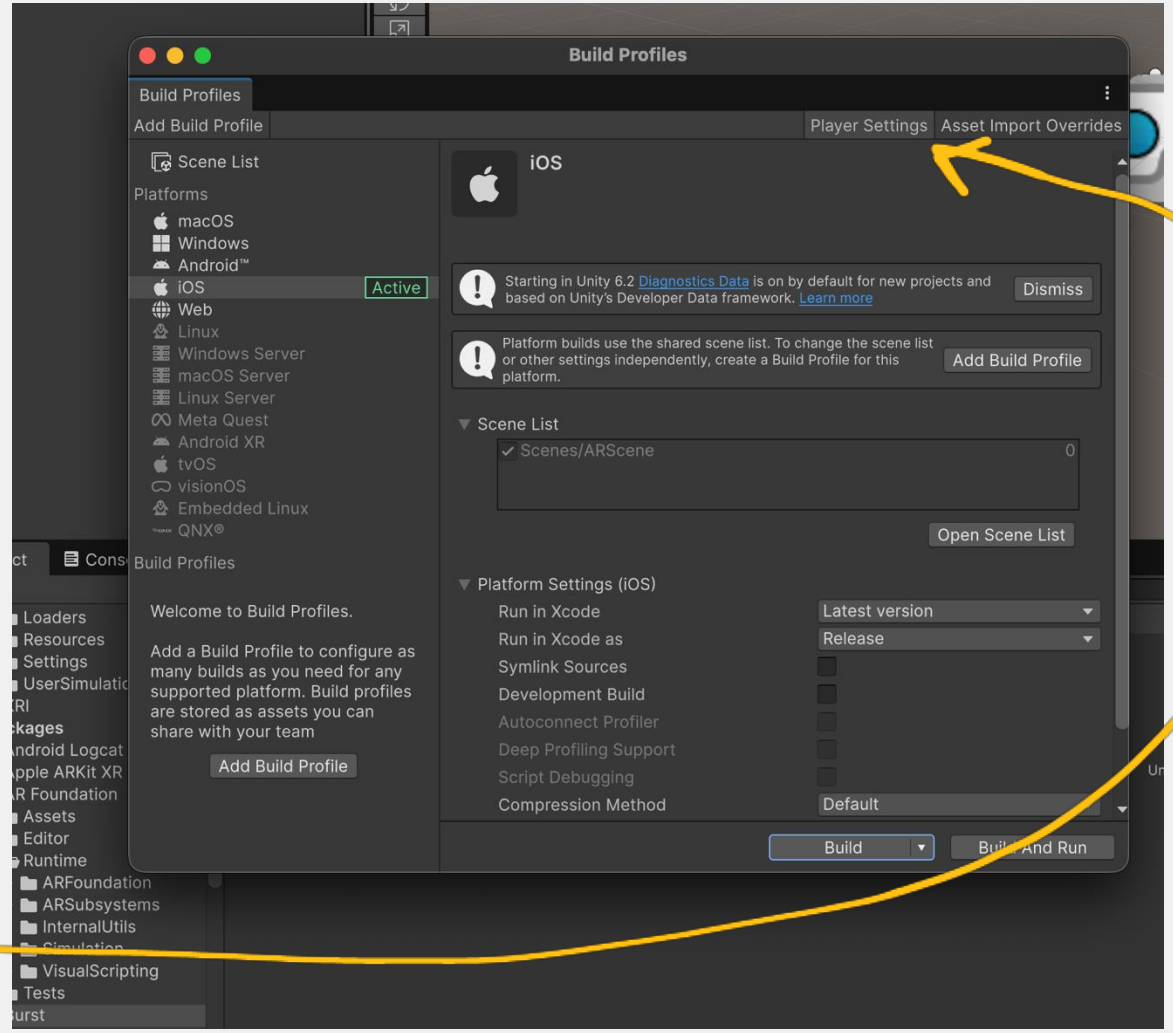
BUILD SETUP

15. Go to File > Build Settings

16. Click on the button “Open Scenes List” and then click on “Add Open Scenes”

17. Click on the target device iOS or Andoid and then click on the button “Switch Platform,” wait for Unity to switch
(it may take some minutes)

18. Now in the Build Settings click on the button “Player Settings” to open the corresponding panel



https://docs.unity3d.com/Packages/com.unity.xr.arfoundation@4.1/manual/index.html#using-ar-foundation

PLAYER SETTINGS SETUP IOS

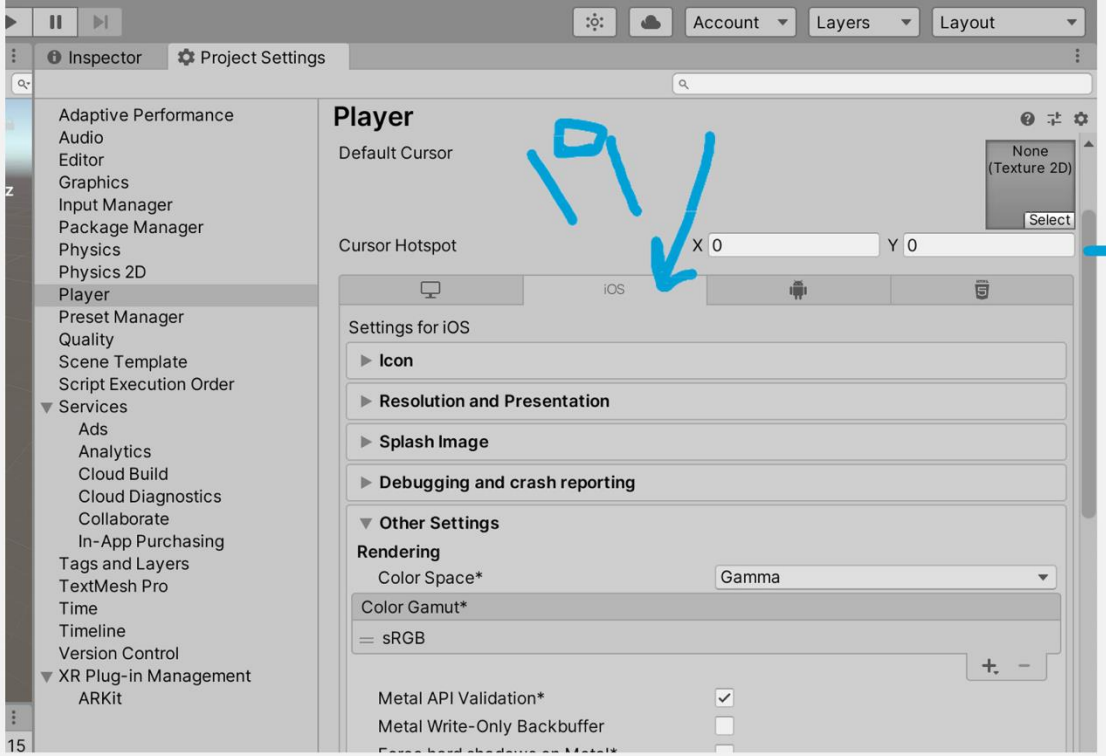
19. In the Player Settings click on iOS

20. under the voice "Other Settings" → "Configuration" check the box corresponding to "Requires ARKit support"

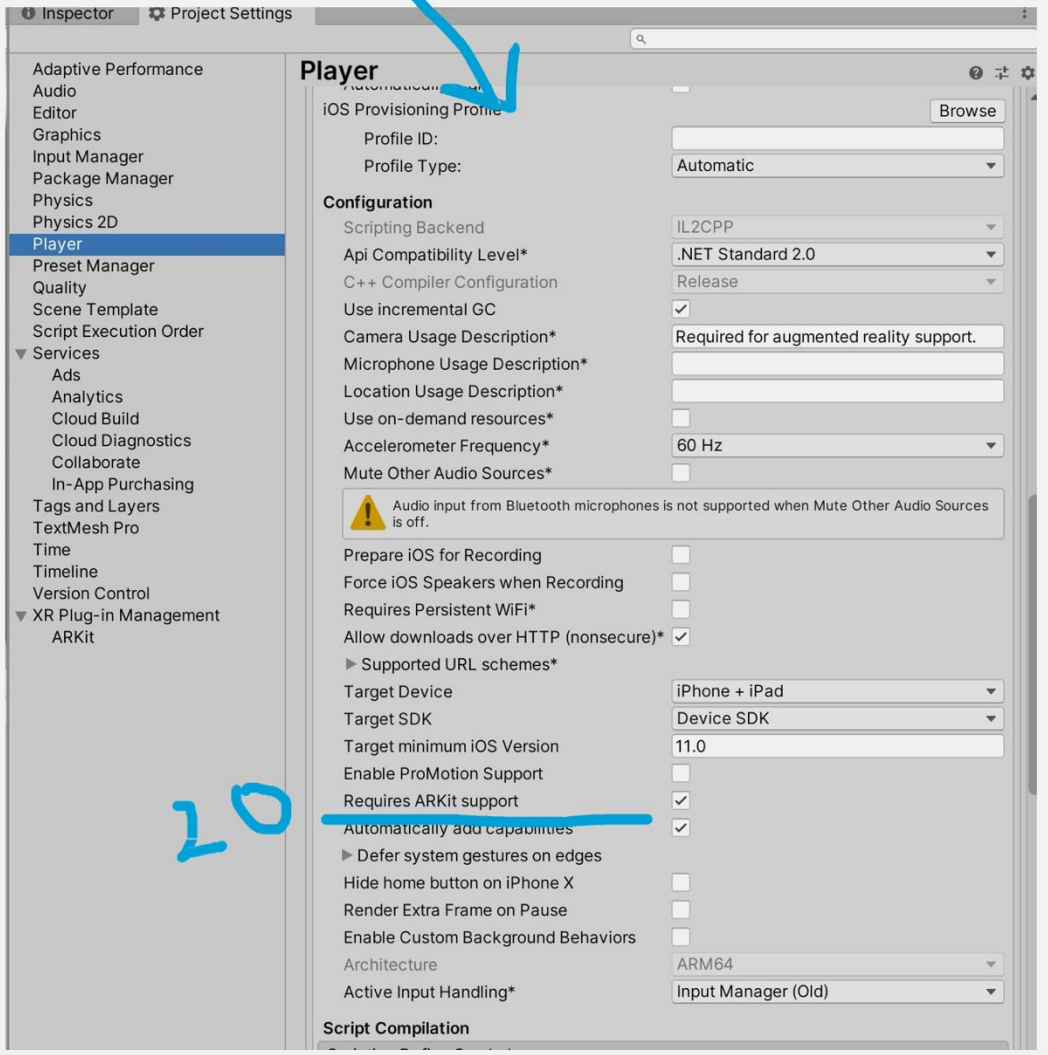
21. under the voice "Other Settings" → "Camera Usage Description" write "AR Camera"

(Player Settings are inside the Project Settings window, you can also go to Player Settings by click on Edit > Project Settings then click on "Player")

https://docs.unity3d.com/Packages/com.unity.xr.arfoundation@4.1/manual/index.html#using-ar-foundation

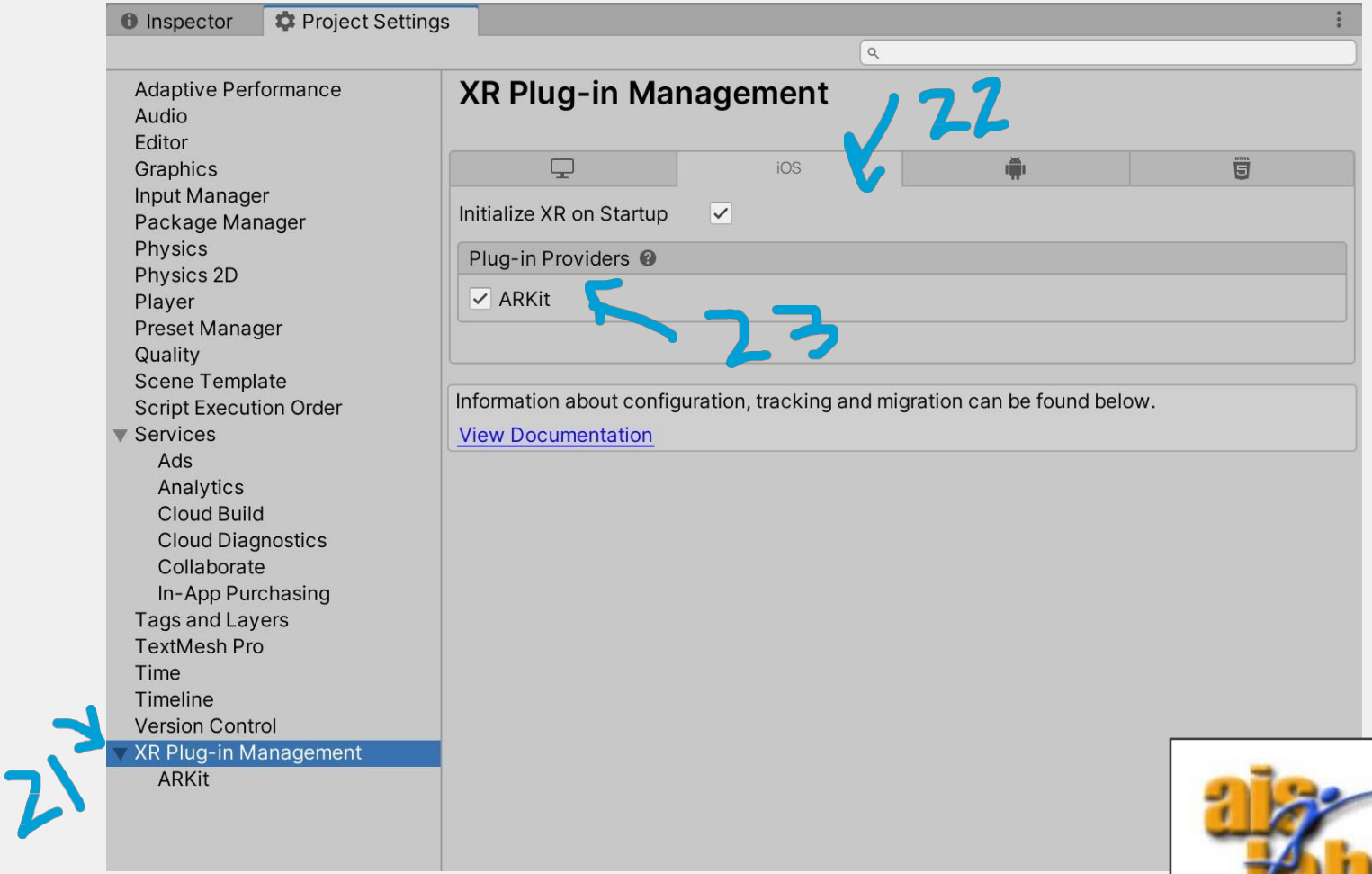


Scrolling down with the mouse



XR PLUGIN MANAGEMENT SETUP

21. Now in the Project Settings click on "XR Plug-in Management"
22. Click on iOS (or Android depending on target device)
23. Enable the Provider Plugin setup, checking the box ARKit for iOS (ARCore for Android)



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BUILD THE PROJECT

24. (Optional) Before building the project in the Player Settings under the voice "Other Settings" → "Identification" you can change the Bundle Identifier, that should be a unique identifier of your project.

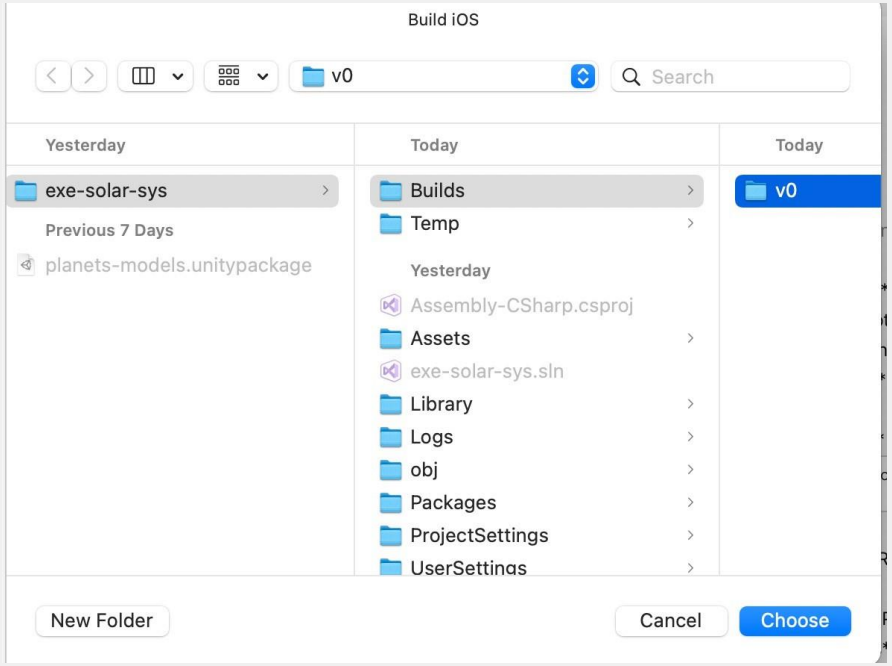
25. Now you can go to Build Settings and click on Build

https://docs.unity3d.com/Packages/com.unity.xr.arfoundation@4.1/manual/index.html#using-ar-foundation

BUILD THE PROJECT

26. Now a Save Panel appears, create a folder called Builds inside the root folder called “exe-solar-sys” and inside it create another folder, we will call it “version0” :

this folder will be the one to be opened with Xcode.



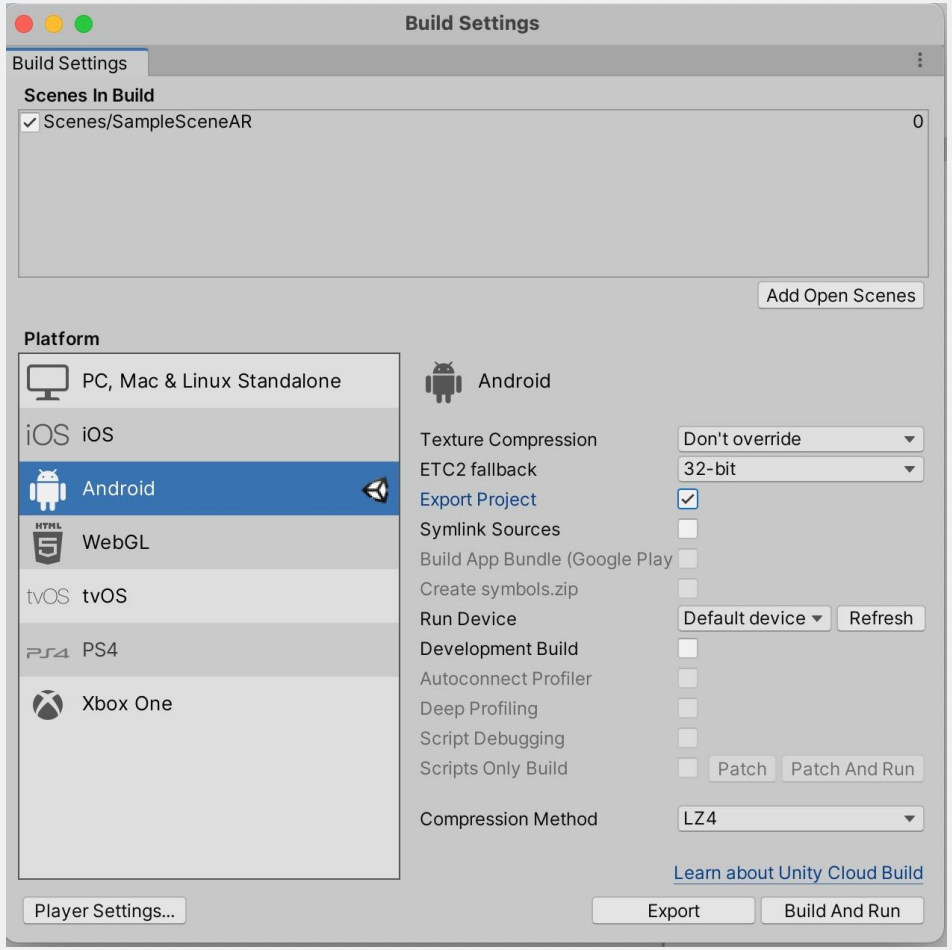
https://docs.unity3d.com/Packages/com.unity.xr.arfoundation@4.1/manual/index.html#using-ar-foundation

IF YOU WANT TO BUILD WITH ANDROID

With Unity targeting an Android, you can press the button Build to directly create the .apk to be installed into your mobile device.

Otherwise, you can decide to export it as Gradle Project.

This second option is very similar to the step 26 : you need to create a Builds folder and then another folder as version0 inside it, and the version0 folder will be the one you will need to open with Android Studio.



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TROUBLESHOOTING

- [iOS / Android] If after the build, you run it on your device and the screen is black:
  you should enable the Provider Plugin setup, in the "Project Settings" click on "XR Plug-in Management" then click on iOS or on Android and respectively check the box ARKit or ARCore (step 11)
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  Under the voice "Other Settings" → "Rendering" change the Graphics API and remove Vulkan

XCODE FOR IOS

To build an Xcode project for development you need a simple Apple ID (it is the free personal ID you use to login in the smartphone or on iCloud)
https://support.apple.com/it-it/apple-id

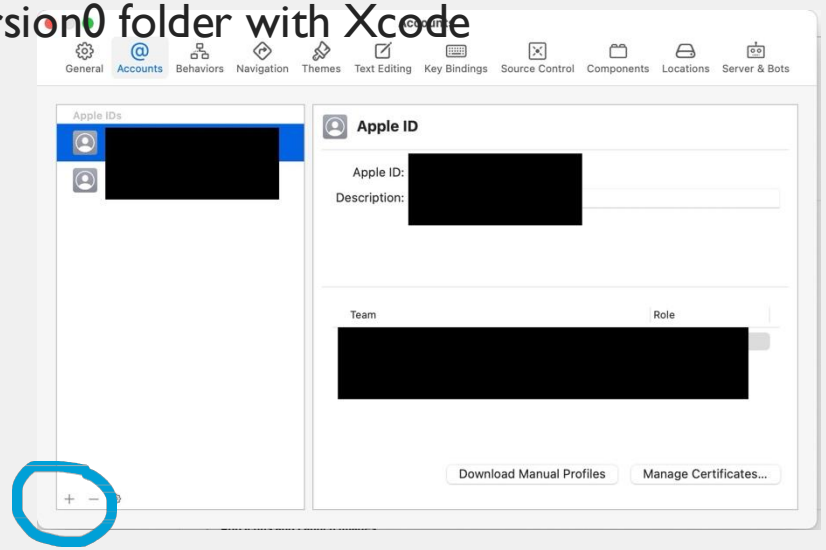
The free Apple ID can be used only to build TEST APP on your iOS device, it cannot be used to load on Apple Store (it needs a billing account)

To build the TEST app on the iOS target device remember that:

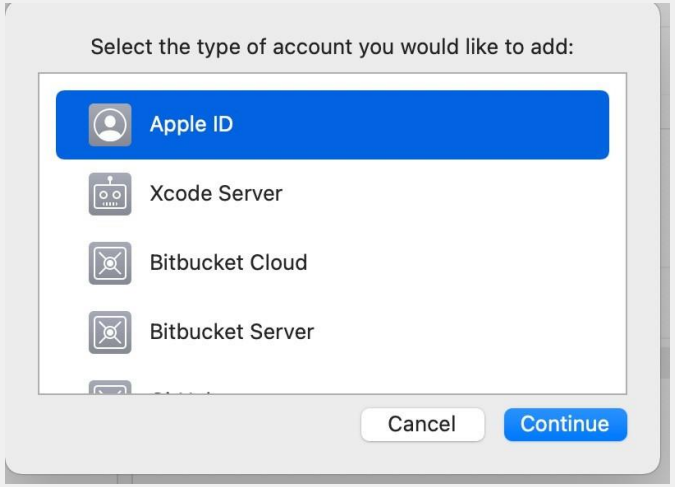
- the Apple ID on Xcode should be the same ID on the iOS device
- on the iOS device you can install no more than 3 different TEST apps

XCODE FOR IOS

1. Once the build has done you can open the version0 folder with Xcode
2. In the menu click on Xcode > Preferences
3. Click on Accounts area and click on +



4. From the popup choose Apple ID, then click on Confirm and perform the login with your Apple ID credentials



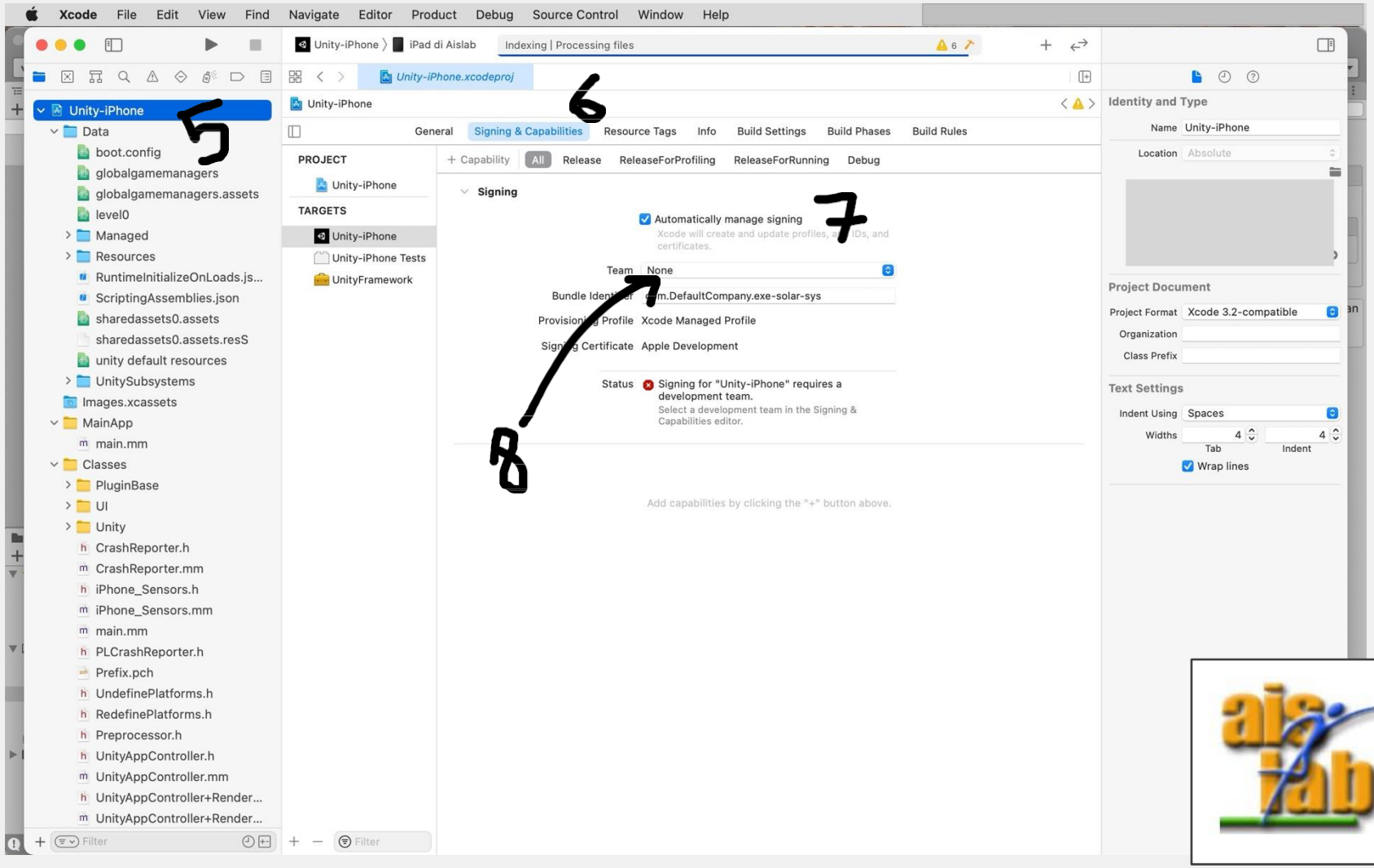
XCODE FOR IOS

5. Now click on the Root of the Project (the one usually called Unity-iPhone)

6. Click on "Signing & Capabilities"

7. check the box "Automatically manage signing" a popup will appear, click on the button "Enable Automatic"

8. Now at the voice Team, click on "none", and from the menu select your ID



XCODE FOR IOS

5. Now connect your device, it should automatically appear. (If it does not appear automatically you can click on “Any Device” to open the menu and see the available devices, sometimes if the device is not appearing you can just unplug it, unlock the device and then plug it again)
6. Now you can Run it