

# Building Immersive Mobile AR Experiences with Unity

**PALO**IT

Crafting tech as  
a force for good.



## WHO ARE WE?



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# PALO IT

A **global tech innovation consultancy** dedicated to achieving your business goals through next-level product-centric software delivery.

We provide expertise across the full product journey from ideation to launch and scale, using Sustainable IT practices as a commitment to crafting tech as a force for good.

**50**  
Nationalities

**18**  
Offices

**10**  
Countries



**GitHub** Verified Partner



**PALO IT SERVICES**

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 **Microsoft**  
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# What We Do ?

## PRODUCT CONSULTING

### 1 New Digital Product Innovation

- Validate Product-Market Fit
- Formulate Implementation Plan
- Minimize Development Cost

### 2 Existing Product Optimization

- Increase Product Adoption
- Identify Product Improvements
- Improve Viability and Profitability

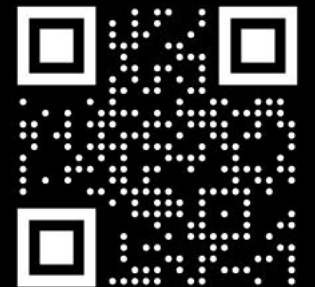
## ORGANIZATION CONSULTING

### 3 Delivery Acceleration

- Reduce Time to Market
- Enable Value-Based Delivery
- Modernize Tech Infrastructure
- Align Business and Product Delivery
- Staff Empowerment

### 4 Sustainability For Positive Impact

- Sustainability Fundamentals
- ESG Data Management
- Enabling An Impact Mindset
- Tech For Good



Contact Us

# Agenda

- 01 Introduction to AR Foundation
- 02 AR Face Tracking
- 03 AR Image Tracking
- 04 AR Plane Detection
- 05 Summary
- 06 Q & A



# Introduction to AR Foundation



## INTRODUCTION TO AR FOUNDATION

# What is Augmented Reality(AR)?

- AR overlays digital elements onto the real world
- Combines physical and virtual worlds
- Creates interactive experiences, including:
  - **Face Tracking:** Adds virtual objects to a user's face, allowing for face-based interactions in AR.
  - **Image Tracking:** Triggers AR content when a specific image is detected in the real world.
  - **Plane Detection:** Scans horizontal and vertical surfaces, enabling interaction with virtual 3D objects on these surfaces.





## INTRODUCTION TO AR FOUNDATION

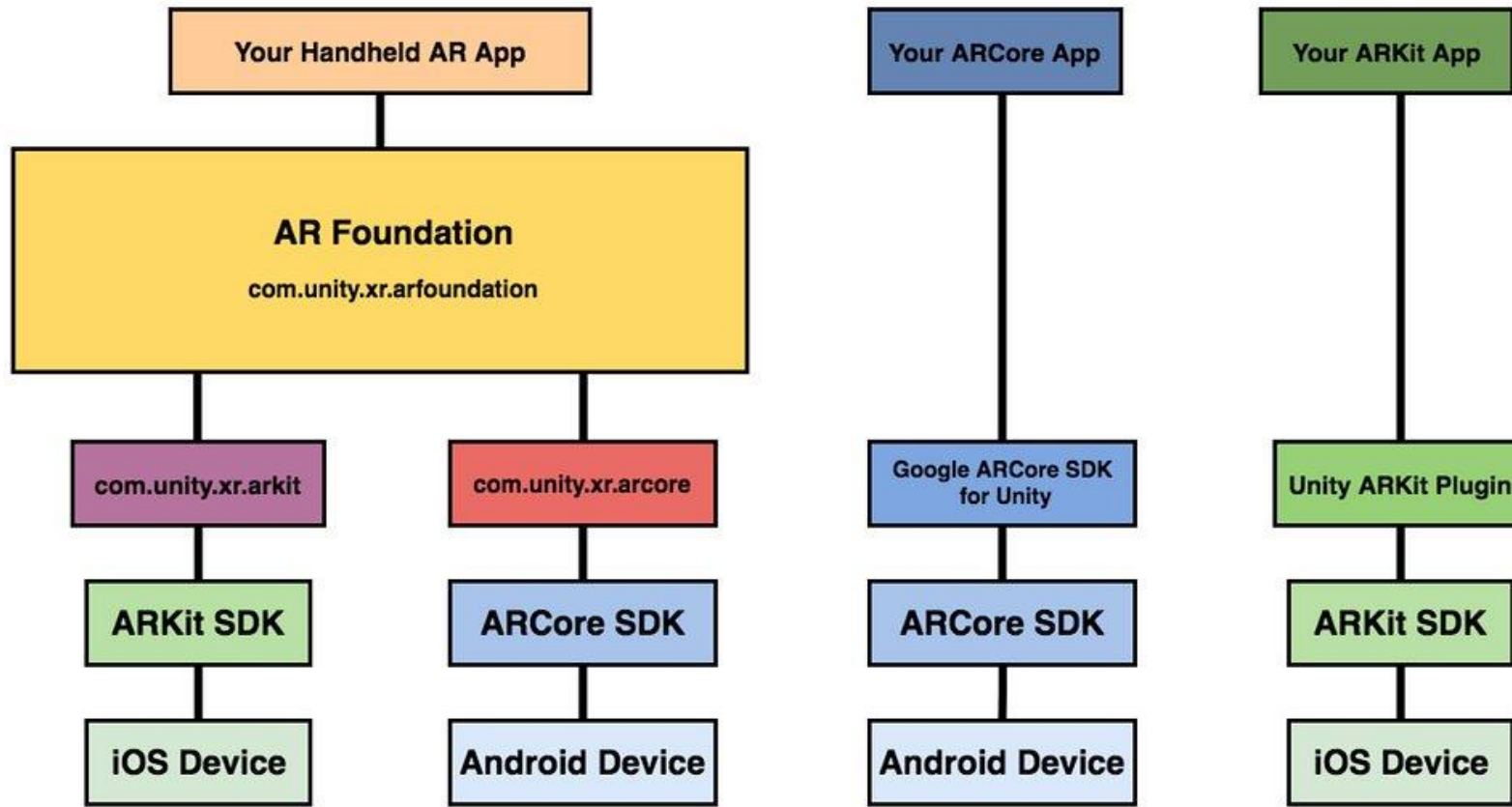
# What is AR Foundation?

- Cross-platform development framework: Build once, deploy to multiple platforms such as iOS, Android, Meta Quest, HoloLens and so.
- Simplified AR development: Focus on core AR features like face tracking and image tracking
- Access to native AR capabilities: Leverage device-specific functionalities



## INTRODUCTION TO AR FOUNDATION

# AR Foundation Architecture



## INTRODUCTION TO AR FOUNDATION

# Required Unity Packages

### AR Foundation

6.0.3 · August 19, 2024

From **Unity Registry** by Unity Technologies Inc.  
*com.unity.xr.arfoundation*

### XR Plugin Management

4.5.0 · July 08, 2024

 Installed as dependency

From **Unity Registry** by Unity Technologies Inc.  
*com.unity.xr.management*

### Apple ARKit XR Plugin

6.0.3 · August 19, 2024

From **Unity Registry** by Unity Technologies Inc.  
*com.unity.xr.arkit*

### Google ARCore XR Plugin

6.0.3 · August 19, 2024

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

### XR Simulation Environments

2.0.1 Local

Author unknown

*com.unity.xr-content.xr-sim-environments*



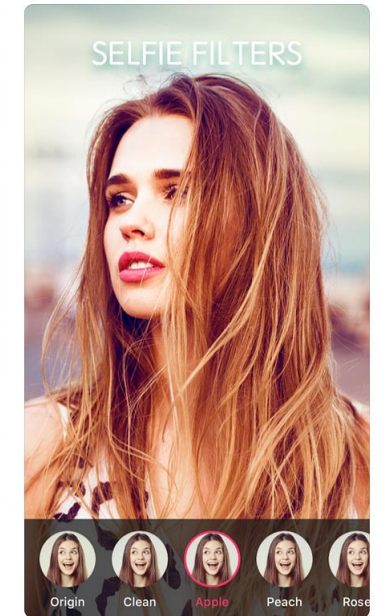
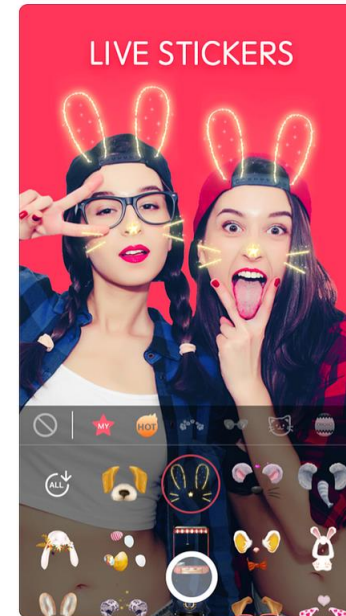
# AR Face Tracking



## AR FACE DETECTION

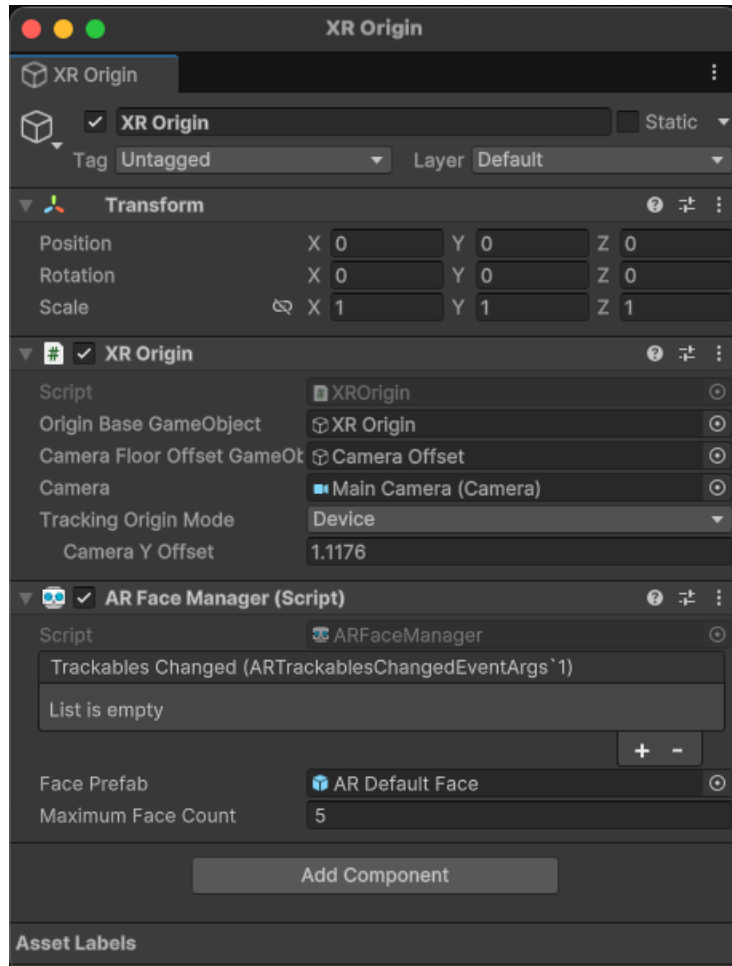
# Use Case: Face Tracking App

This app allows users to enhance their photos with virtual face tracking, helping them experiment with different looks and styles without the need for makeup or accessories. It also ensures that filters fit perfectly to their facial features, providing a seamless and fun experience.



## AR FACE DETECTION

# Required Scene Settings



The **AR Face Manager** is a component of the AR Foundation package that detects and tracks human faces in the physical environment.

**Face Prefab:** When a face is detected, the AR Face Manager instantiates a Face Prefab to represent the face.

# Simulation



# Demo

AR Face Tracking





# AR Image Tracking



## AR IMAGE TRACKING

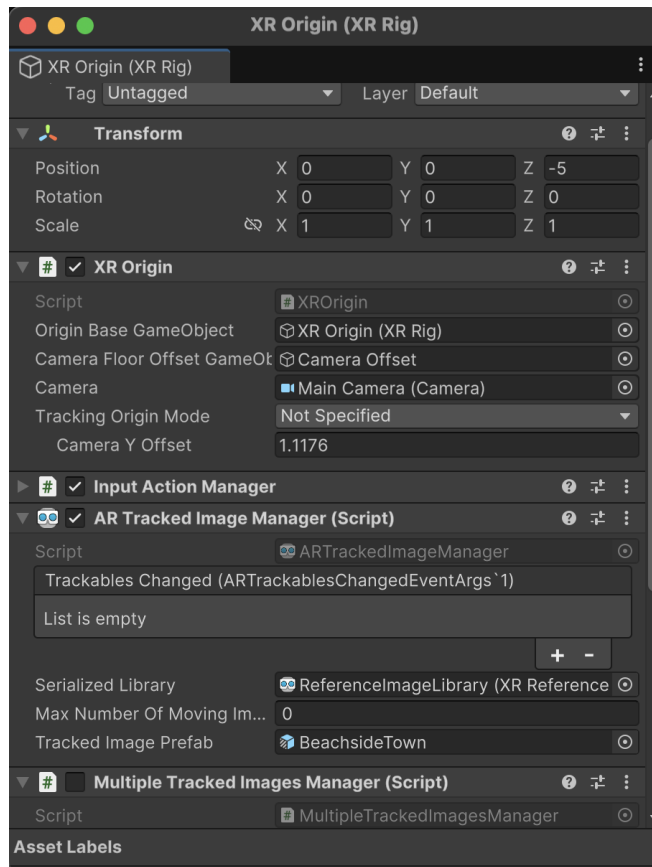
# Use Case: AR interactive App

This app allows users to interact with their environment by scanning images to unlock augmented reality experiences. It helps users access additional content, such as 3D models, videos, and animations, directly from printed materials or objects. This seamless integration of digital content with the real world provides an engaging and informative experience.



## AR IMAGE TRACKING

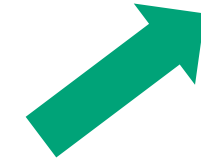
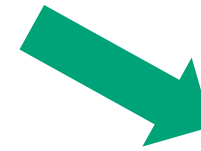
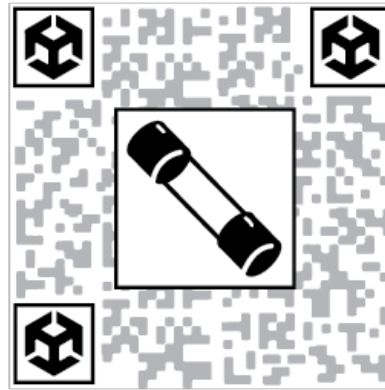
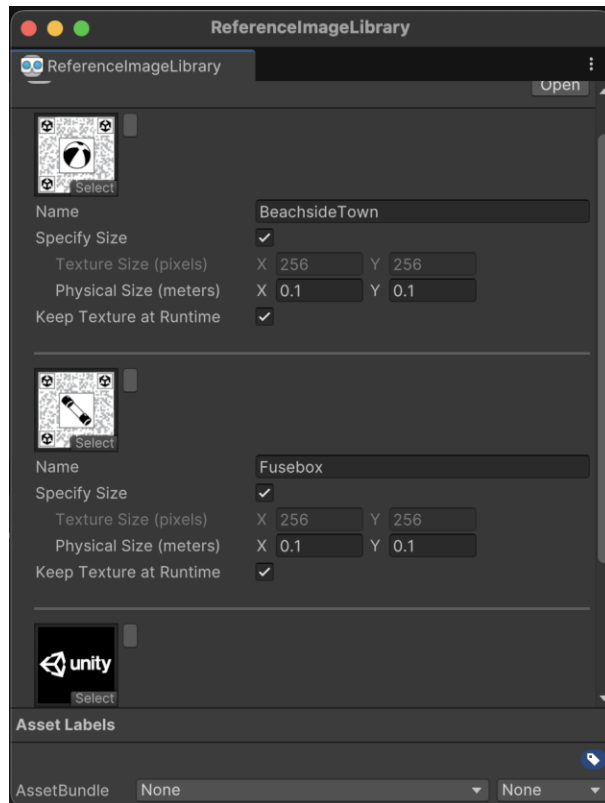
# Required Scene Settings



The **AR Tracked Image Manager** is a component of the AR Foundation package that detects and tracks 2D images in the physical environment, and it displays 3D models on these detected images.

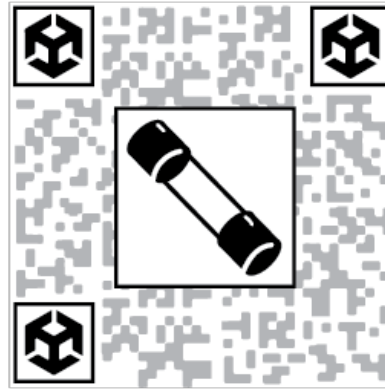
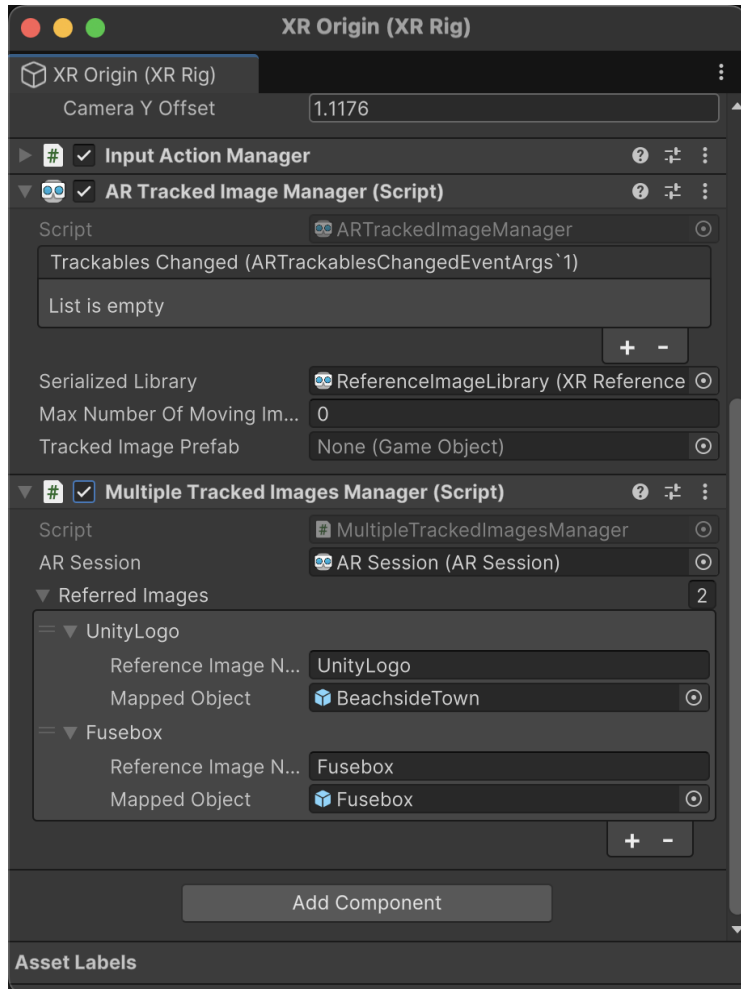
## AR IMAGE TRACKING

# Concept of AR Tracked Image Manager



# AR IMAGE TRACKING

## Multiple Tracked Images



# Demo

AR Image Tracking



# AR Plane Detection



## AR PLANE DETECTION

# Use Case: Virtual Furniture App

This app allows users to decorate their room with virtual 3D furniture, helping them save money by avoiding unnecessary store visits and preventing mistakes like buying furniture that doesn't fit their space.

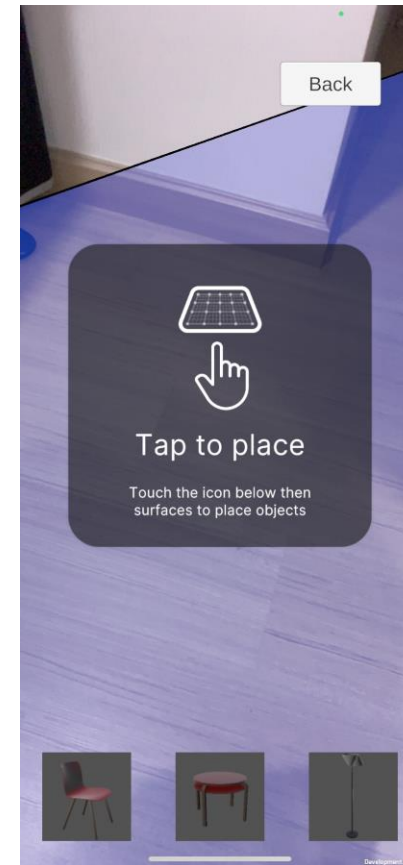
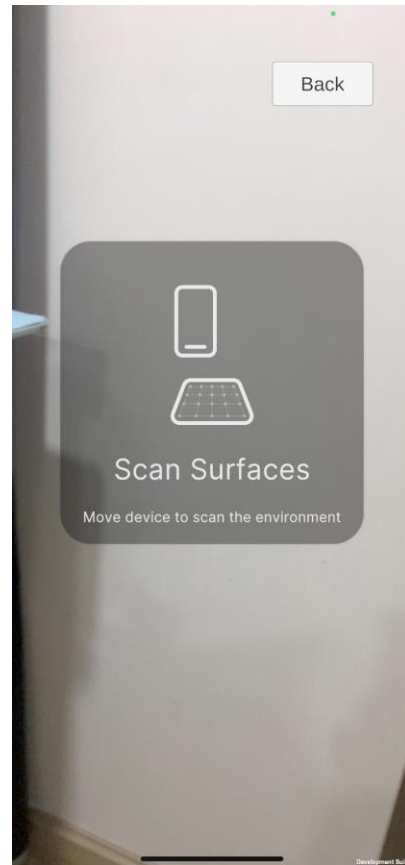




## AR PLANE DETECTION

# Concept of AR Plane Detection

Rotate the camera to scan surfaces



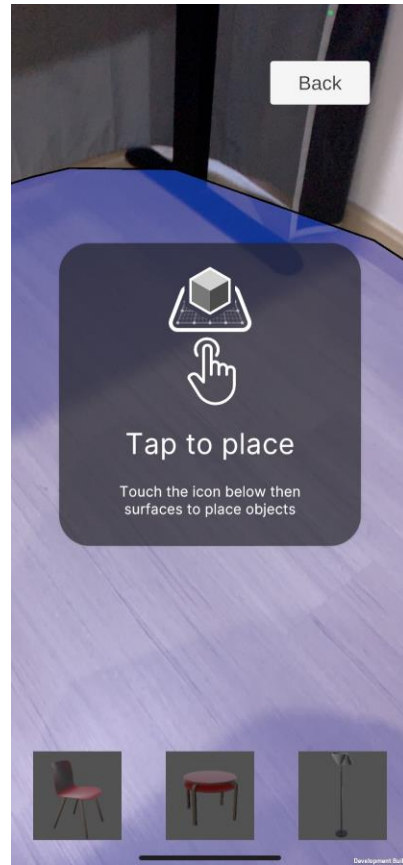
Scanned surfaces turn blue to indicate they're ready for interaction.



## AR PLANE DETECTION

# Concept of AR Ray Casting

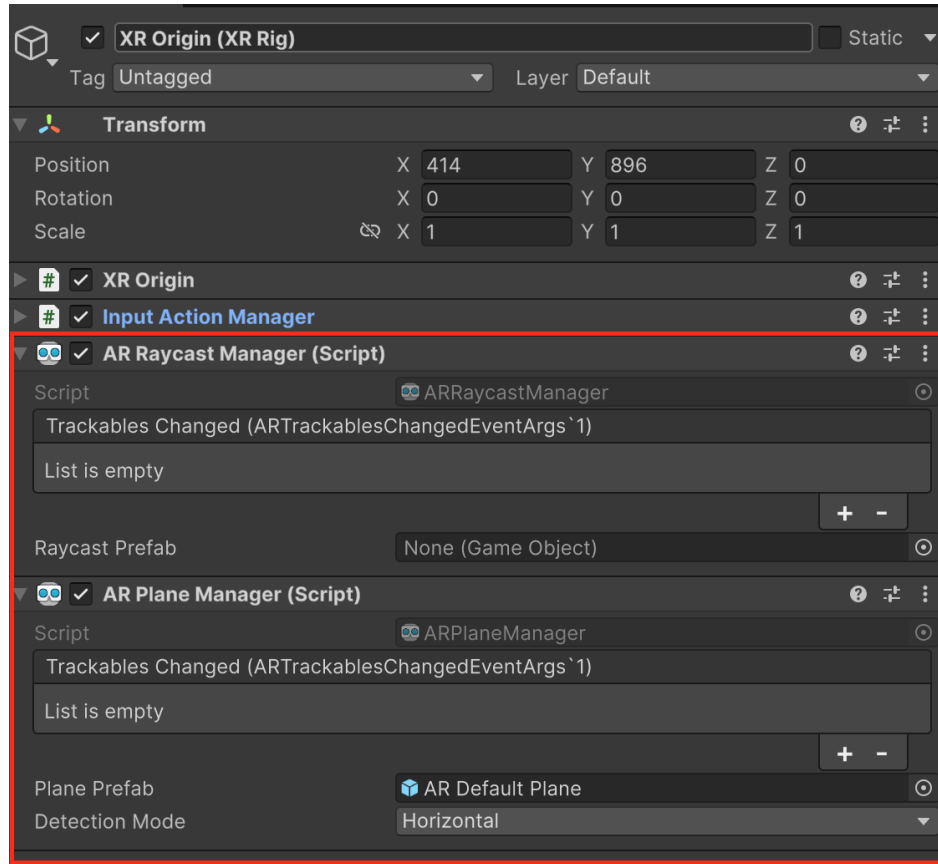
Tap the blue area  
to place



A ray is cast from a screen point into the world, and it checks for collisions with the blue area. If the ray hits the blue area, it indicates that the furniture can be placed there.

## AR PLANE DETECTION

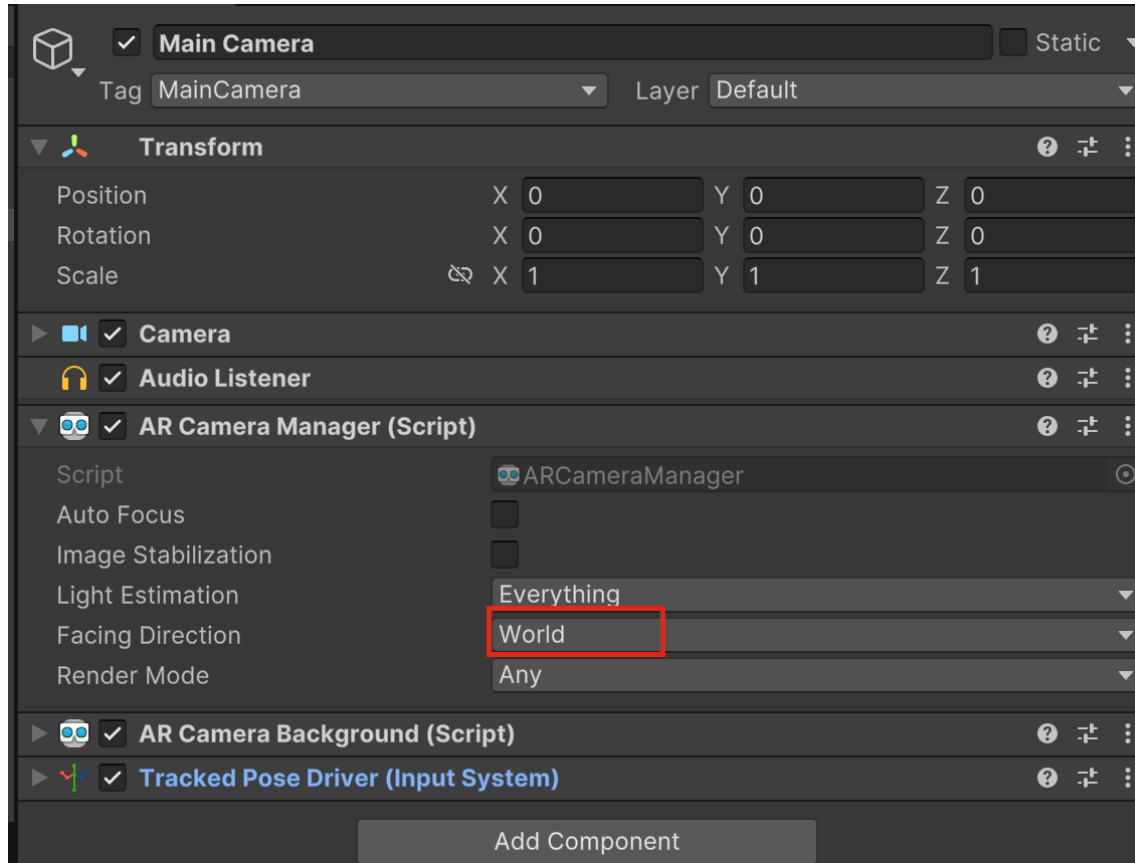
# Required Scene Settings



- The **AR Plane Manager** component in Unity's AR Foundation is responsible for detecting and managing flat surfaces (or "planes") in the real-world environment, such as floors, tables, or walls, through the device's camera. **Plane Prefab** is the virtual plane to display when the system detect the surface.
- The **AR Raycast Manager** component in Unity's AR Foundation allows you to cast "virtual rays" from the camera view into the real world to detect specific AR objects or surfaces

## AR PLANE DETECTION

# Required Scene Settings



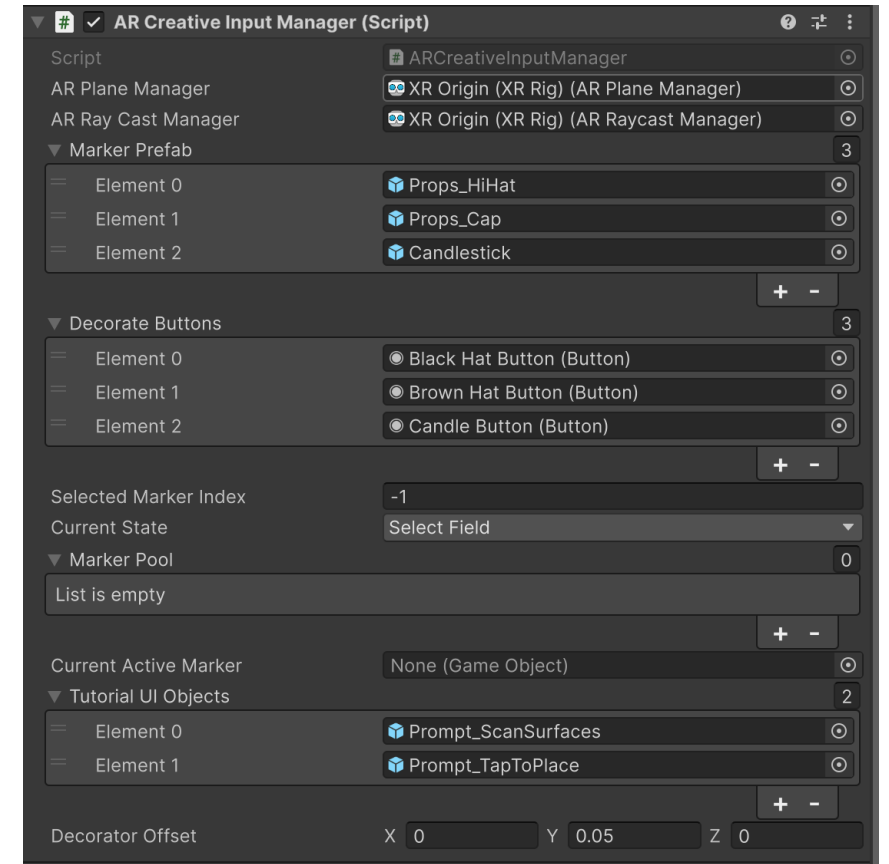
Set the **Facing Direction** to “World” to make sure the app can only use the phone’s back camera. This is essential for detecting AR planes feature.

ADD SECTION HERE

# Required Scene Settings

We need to create a UI script that receives planes detected by the AR Plane Manager.

The script will place a virtual 3D object on a selected plane by using a raycast from the AR Raycast Manager.



# Demo

Virtual Furniture App



# Summary



## SUMMARY

# AR Foundation: Benefit & Limitation

## Benefits:

- **Cross-Platform Compatibility:** AR Foundation is designed to work across both iOS, Android, and VR headsets, saving developers from writing separate code for each platform. This simplifies development and speeds up the process of building AR apps
- **Built-In Support for Advanced Features:** AR Foundation includes plane detection, image tracking, and face tracking, making it easy for developers to create immersive AR experiences.
- **Effective Collaboration:** By using the Unity Engine, we streamline testing and fine-tuning of 3D assets, making it easier for 3D artists and software developers to work together efficiently.

## Limitations:

- **Limited XR Simulation Environment Support:** The XR Simulation Environment does not support certain subsystems like face tracking, body tracking, and object tracking.
- **No Official Support for Web Platforms:** AR Foundation does not support deployment to web-based AR platforms, so apps are limited to mobile and VR headset devices only.





## SUMMARY

# Reference Documents

- AR Foundation Document :  
<https://docs.unity3d.com/Packages/com.unity.xr.arfoundation@6.0/manual/index.html>
- Unity Official Mobile AR Development Course:  
<https://learn.unity.com/pathway/mobile-ar-development>



# Q & A

