Pickrick AR Project Documentation

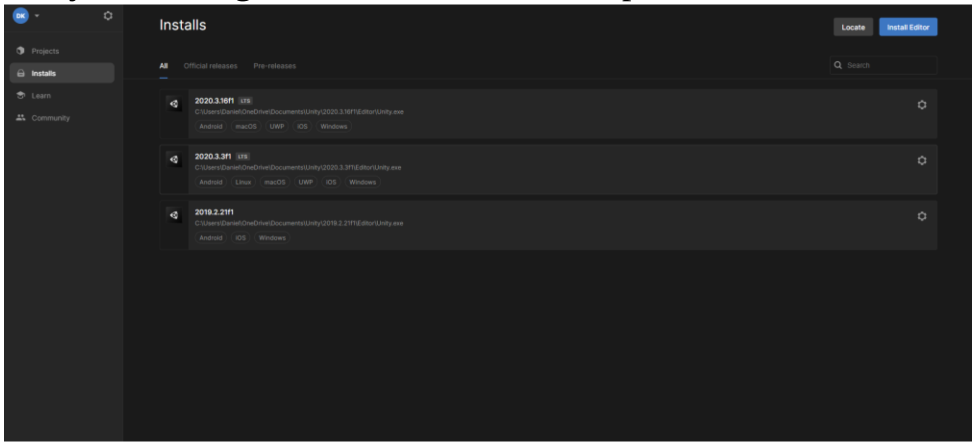
created Fall 2021

Table of Contents

Project Setup:

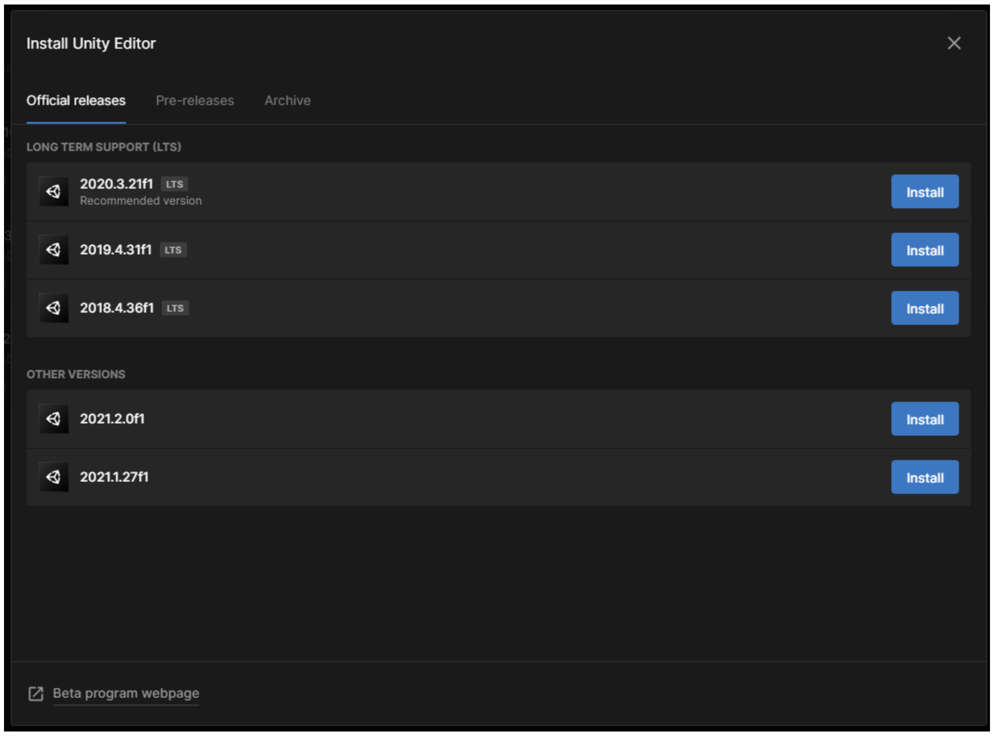
The project setup for this project should be fairly simple. This project uses Unity Collab for source control which is built into Unity. Here are the steps to set up the project…

1) Download Unity Hub here (https://unity3d.com/get-unity/download). The latest version of Unity Hub should work. Note: You should create a Unity account if you do not have one already.
2) Open Unity Hub and go to the Installs Tab and press on Install Editor

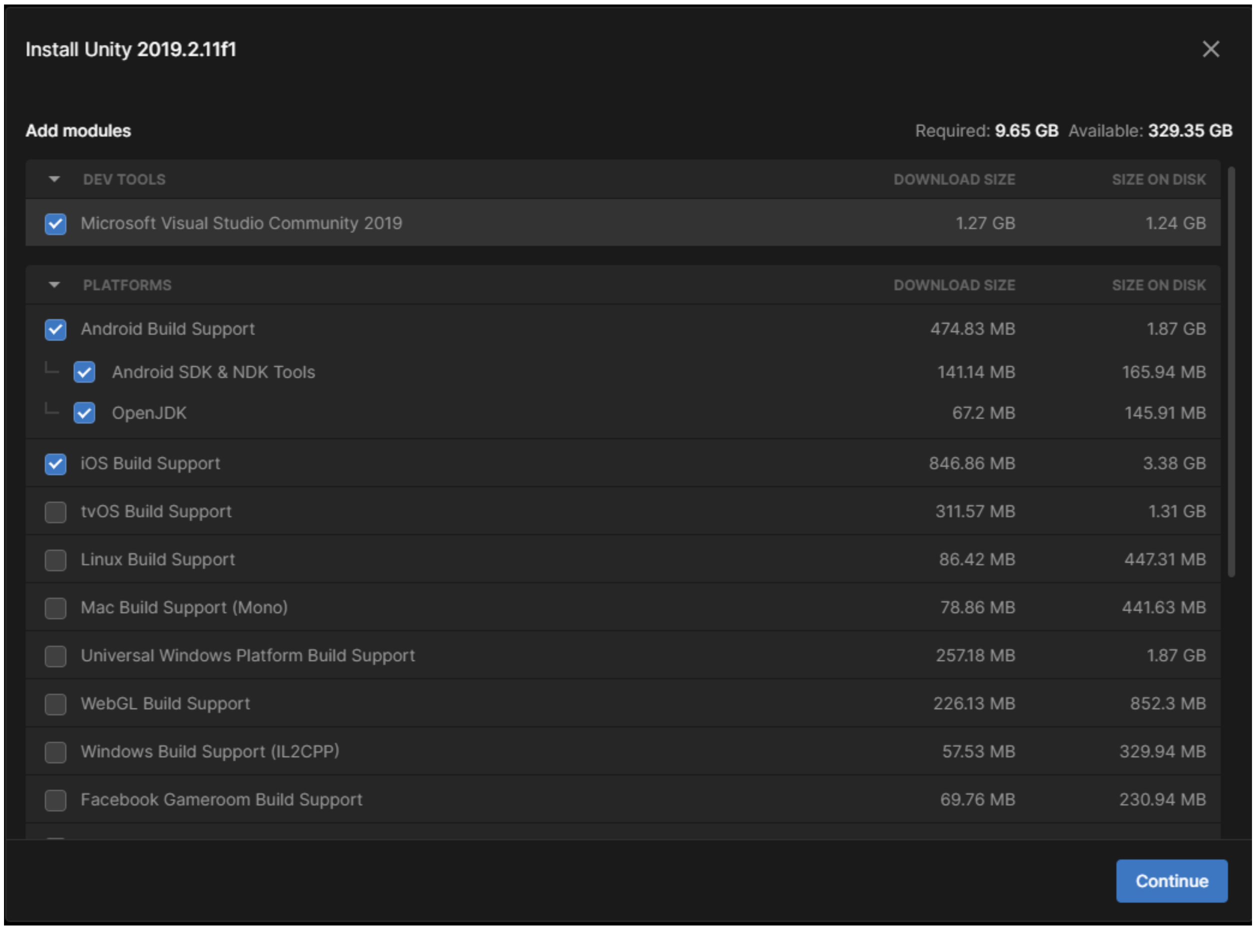


C:\Users\Daniel\OneDrive\Documents\Unity\2020.3.16f1\Editor\Unity.exe
C:\Users\Daniel\OneDrive\Documents\Unity\2020.3.3f1\Editor\Unity.exe
C:\Users\Daniel\OneDrive\Documents\Unity\2019.2.21f1\Editor\Unity.exe

3) Under the official releases section, press the install button for version 2019.4.31f



4) You will see a window like in the image below. Make sure you put a blue check mark and download Android Build Support, Android SDK & NDK Tools, Open JDK, and IOS Build Support, and Microsoft Visual Studio Community 2019. If you want to use Visual Studio Code instead of Visual Studio as your IDE (which I recommend), you can use this link… (https://code.visualstudio.com/docs/other/unity)


Install Unity 2019.2.11f1

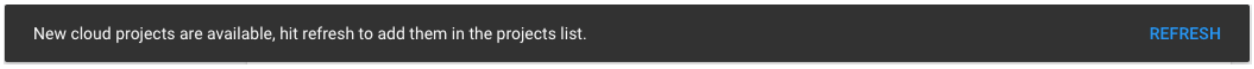
Add modules

Required: 9.65 GB Available: 329.35 GB

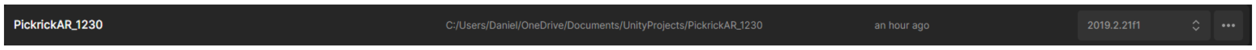
DEV TOOLS	DOWNLOAD SIZE	SIZE ON DISK
✓ Microsoft Visual Studio Community 2019	1.27 GB	1.24 GB

PLATFORMS	DOWNLOAD SIZE	SIZE ON DISK
✓ Android Build Support	474.83 MB	1.87 GB
✓ Android SDK & NDK Tools	141.14 MB	165.94 MB
✓ OpenJDK	67.2 MB	145.91 MB
✓ iOS Build Support	846.86 MB	3.38 GB
tvOS Build Support	311.57 MB	1.31 GB
Linux Build Support	86.42 MB	447.31 MB
Mac Build Support (Mono)	78.86 MB	441.63 MB
Universal Windows Platform Build Support	257.18 MB	1.87 GB
WebGL Build Support	226.13 MB	852.3 MB
Windows Build Support (IL2CPP)	57.53 MB	329.94 MB
Facebook Gameroom Build Support	69.76 MB	230.94 MB

5) After everything is installed properly, you need to be added to the Unity Collaboration project. Once you are added, open or reopen Unity hub and go to the projects tab.
6) You should see a notification on the bottom of your screen like the one below. Once you see this, hit the refresh button.

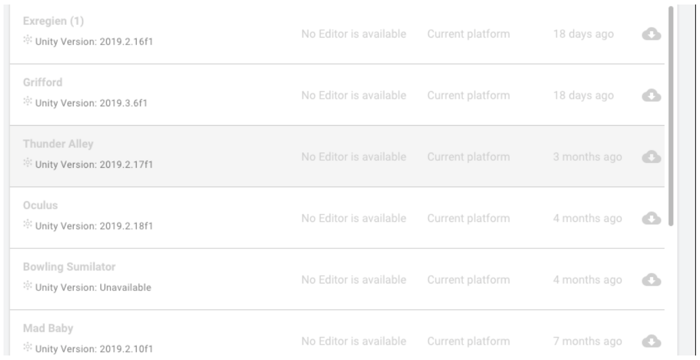

New cloud projects are available, hit refresh to add them in the projects list.

7) Next, you should see a project in your projects tab called PickrickAR_1230. Click on the download button next to his project to download it.



PickrickAR_1230 C:/Users/Daniel/OneDrive/Documents/UnityProjects/PickrickAR_1230 an hour ago 2019.2.21f1

Note that the project will look something more like this and be greyed out with the download button showing

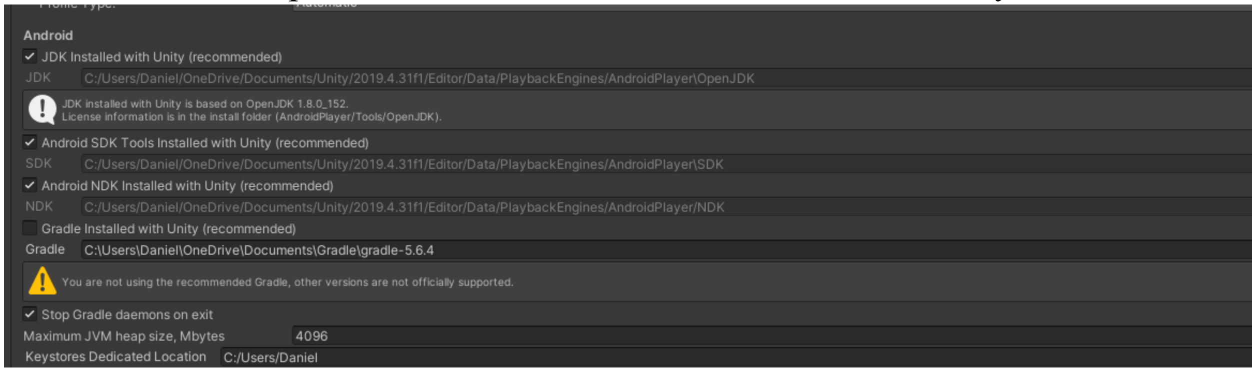


Exregien (1) Unity Version: 2019.2.16f1	No Editor is available	Current platform	18 days ago
Grifford Unity Version: 2019.3.6f1	No Editor is available	Current platform	18 days ago
Thunder Alley Unity Version: 2019.2.17f1	No Editor is available	Current platform	3 months ago
Oculus Unity Version: 2019.2.18f1	No Editor is available	Current platform	4 months ago
Bowling Sumilator Unity Version: Unavailable	No Editor is available	Current platform	4 months ago
Mad Baby Unity Version: 2019.2.10f1	No Editor is available	Current platform	7 months ago

8) Now you should be able to open the project!

Android Build Setup:

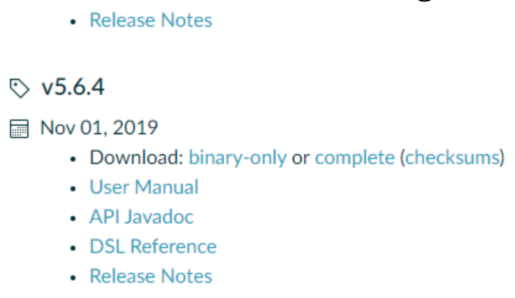
1) Before a project is built on Android, we have to change the gradle version
2) Go to this site (https://gradle.org/releases/) and download version 5.6.4 of gradle. Press on "complete" to download the entire gradle version.
3) You should have a zip file called "gradle-6.9.1-all.zip". Put this file anywhere you want, unzip the folder, and make sure you know the file path.
4) Go back into Unity and go to Edit -> Preferences -> External Tools
5) Find the Android options and uncheck "Gradle Installed with Unity"



Android
✓ JDK Installed with Unity (recommended)
JDK C:/Users/Daniel/OneDrive/Documents/Unity/2019.4.31f1/Editor/Data/PlaybackEngines/AndroidPlayer\OpenJDK
JDK installed with Unity is based on OpenJDK 1.8.0_152.
License information is in the install folder (AndroidPlayer/Tools/OpenJDK).
✓ Android SDK Tools Installed with Unity (recommended)
SDK C:/Users/Daniel/OneDrive/Documents/Unity/2019.4.31f1/Editor/Data/PlaybackEngines/AndroidPlayer\SDK
✓ Android NDK Installed with Unity (recommended)
NDK C:/Users/Daniel/OneDrive/Documents/Unity/2019.4.31f1/Editor/Data/PlaybackEngines/AndroidPlayer/NDK
Gradle Installed with Unity (recommended)
Gradle C:\Users\Daniel\OneDrive\Documents\Gradle\gradle-5.6.4
You are not using the recommended Gradle, other versions are not officially supported.
✓ Stop Gradle daemons on exit
Maximum JVM heap size, Mbytes 4096
Keystores Dedicated Location C:/Users/Daniel

6) Copy and paste the file path in the text box next to the word Gradle like the image above

7) Use this link as a reference if you run into any trouble (https://developers.google.com/ar/develop/unity/android-11-build#unity_20193_20194_and_20201)
8) To build the AR application on Android, go to File -> Build Settings
9) If needed, change the platform to Android by clicking on Android in the platform section of the build settings window

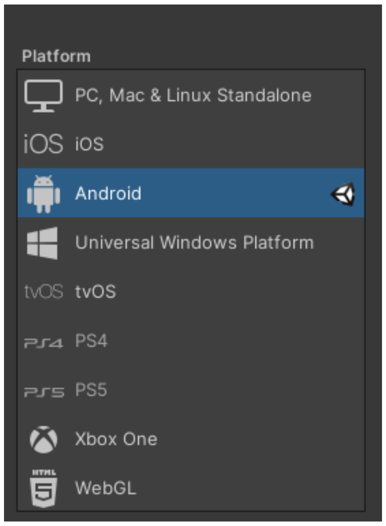


- Release Notes

v5.6.4

Nov 01, 2019

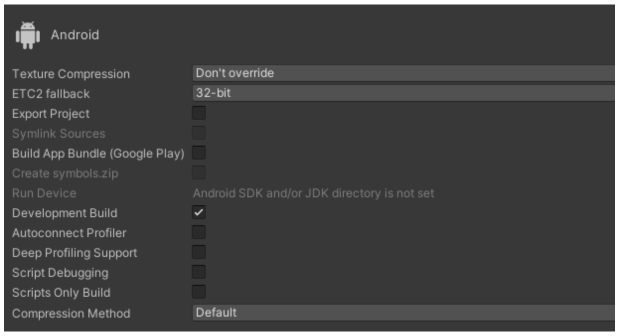
- Download: binary-only or complete (checksums)
- User Manual
- API Javadoc
- DSL Reference
- Release Notes



Platform

- PC, Mac & Linux Standalone
- iOS
- Android
- Universal Windows Platform
- tvOS
- PS4
- PS5
- Xbox One
- WebGL

10) If under run device, you see "Android SDK and/or JDK directory is not set" like shown below…



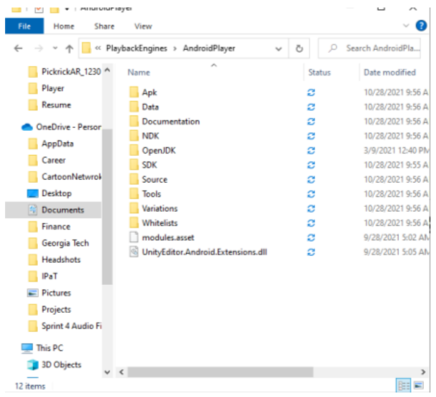
Android

Texture Compression	Don't override
ETC2 fallback	32-bit
Export Project	
Symlink Sources	
Build App Bundle (Google Play)	
Create symbols.zip	
Run Device	Android SDK and/or JDK directory is not set
Development Build	✓
Autoconnect Profiler	
Deep Profiling Support	
Script Debugging	
Scripts Only Build	
Compression Method	Default

Do the following…

- Find the file where your Unity version 2019.4.31f is installed
- Than follow this file path: Editor\Data\PlaybackEngines\AndroidPlayer

- Make sure this directory has all the folders and files of the following

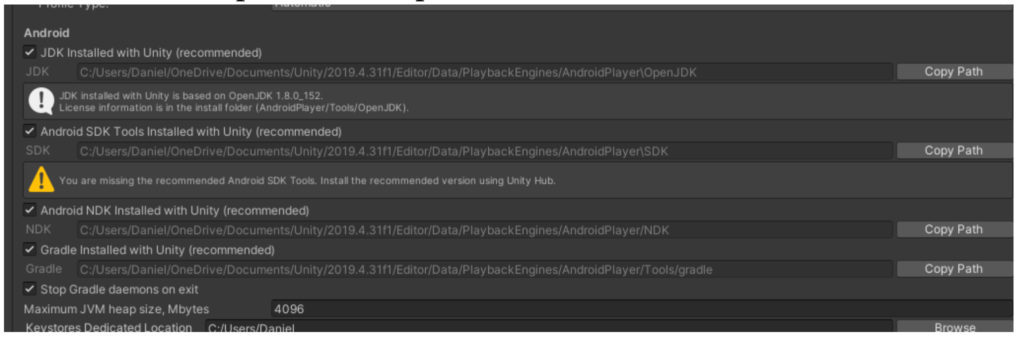


PlaybackEngines > AndroidPlayer

Name	Status	Date modified
Apk		10/28/2021 9:56 A
Data		10/28/2021 9:56 A
Documentation		10/28/2021 9:56 A
NDK		10/28/2021 9:56 A
OpenJDK		3/9/2021 12:40 PM
SDK		10/28/2021 9:55 A
Source		10/28/2021 9:56 A
Tools		10/28/2021 9:56 A
Variations		10/28/2021 9:56 A
Whitelists		10/28/2021 9:56 A
modules.asset		9/28/2021 5:02 AM
UnityEditor.Android.Extensions.dll		9/28/2021 5:05 AM

12 items

- Go back to Unity, and go to Edit -> Preferences -> External Tools
- Look under the android settings and make sure there are no warnings like shown below. Also, make sure the file path matches the folder you found in the previous steps



Android

✓ JDK Installed with Unity (recommended)

JDK C:/Users/Daniel/OneDrive/Documents/Unity/2019.4.31f1/Editor/Data/PlaybackEngines/AndroidPlayer\OpenJDK

JDK installed with Unity is based on OpenJDK 1.8.0_152.
License information is in the install folder (AndroidPlayer/Tools/OpenJDK).

✓ Android SDK Tools Installed with Unity (recommended)

SDK C:/Users/Daniel/OneDrive/Documents/Unity/2019.4.31f1/Editor/Data/PlaybackEngines/AndroidPlayer\SDK

You are missing the recommended Android SDK Tools. Install the recommended version using Unity Hub.

✓ Android NDK Installed with Unity (recommended)

NDK C:/Users/Daniel/OneDrive/Documents/Unity/2019.4.31f1/Editor/Data/PlaybackEngines/AndroidPlayer/NDK

✓ Gradle Installed with Unity (recommended)

Gradle C:/Users/Daniel/OneDrive/Documents/Unity/2019.4.31f1/Editor/Data/PlaybackEngines/AndroidPlayer/Tools/gradle

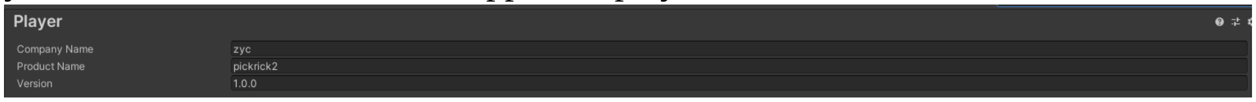
✓ Stop Gradle daemons on exit

Maximum JVM heap size, Mbytes 4096

Keystores Dedicated Location C:/Users/Daniel

- If you have an error like this, you can copy the SDK, NDK, or OpenJDK folders and put them in the directory in the previous steps by finding zipped up versions of these folders under Assets -> AndroidBuildFolders in the Unity project

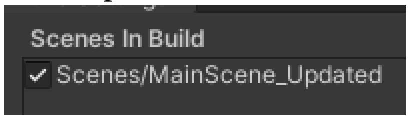
11) When in build settings, press the Player Settings button
12) When in these settings, you can change the product name to whatever you want the name of the built app to display as



Player

Company Name	zyc
Product Name	pickrick2
Version	1.0.0

13) Now you are ready to build to Android, plug in the device you want to build the project
14) On the top left corner of build settings, make sure the scenes in the build include the MainScene_Updated like shown below

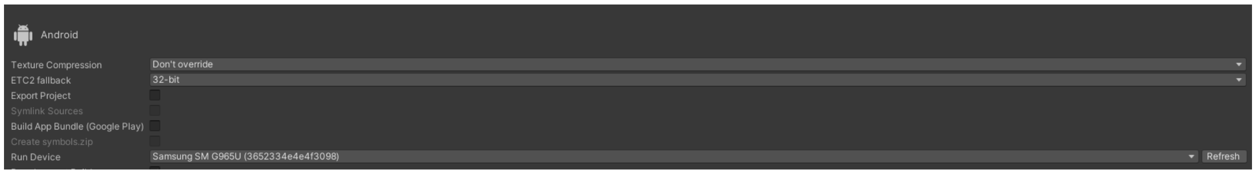


Scenes In Build

✓ Scenes/MainScene_Updated

15) Under run device press, refresh

16) You should than see your device you plugged into your computer. Make sure this is your run device



Android	
Texture Compression	Don't override
ETC2 fallback	32-bit
Export Project	☐
Symlink Sources	☐
Build App Bundle (Google Play)	☐
Create symbols.zip	☐
Run Device	Samsung SM G965U (3652334e4e4f3098)

17) Press the "Build and Run" button on the bottom right corner and name your .apk file whatever you want

Video Tutorials:

This link below links to a YouTube playlist containing 8 videos about how to use the project. The videos cover most of the documentation shown below and should give you a good understanding about the project, but the documentation below can be used as a reference and goes into more detail.

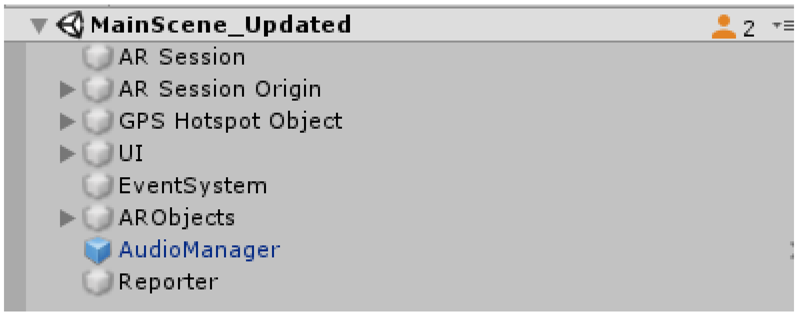
https://www.youtube.com/playlist?list=PL8xj0gkjWKm3v0CkbcC7PjxrPDgdr6xWf

Project Overview:

What Scene to Use:

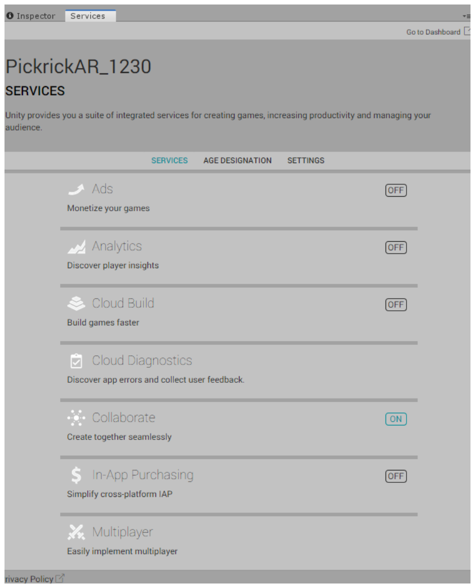
This current version of this project only uses one scene. This scene is called **MainScene_Updated**. To open this scene, in the Project window, go to **Assets->Scenes->MainScene_Updated**. Make sure that your scene hierarchy view looks like below.

Scene Hierarchy View


MainScene_Updated
AR Session
AR Session Origin
GPS Hotspot Object
UI
EventSystem
ARObjects
AudioManager
Reporter

Unity Collab:

You should also make sure Unity Collab is On. To do this, open the Services window by going to **Window->General->Services**. In the services window, turn Unity Collaborate on.


Inspector | Services

Go to Dashboard

PickrickAR_1230

SERVICES

Unity provides you a suite of integrated services for creating games, increasing productivity and managing your audience.

SERVICES | AGE DESIGNATION | SETTINGS

Ads — OFF
Monetize your games

Analytics — OFF
Discover player insights

Cloud Build — OFF
Build games faster

Cloud Diagnostics
Discover app errors and collect user feedback.

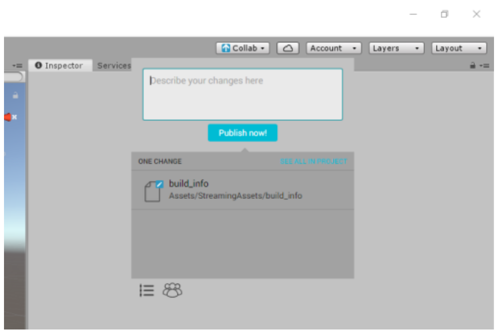
Collaborate — ON
Create together seamlessly

In-App Purchasing — OFF
Simplify cross-platform IAP

Multiplayer
Easily implement multiplayer

rivacy Policy

You should now see a button that says collab on the top right of the screen. This is how you will push changes and pull changes other people have made. When you make changes, you will see a blue error going up on the collab button, and you will see all the changes shown in the window shown below. Write a brief description of your changes and press Publish Now! To publish all your changes.



build_info
Assets/StreamingAssets/build_info

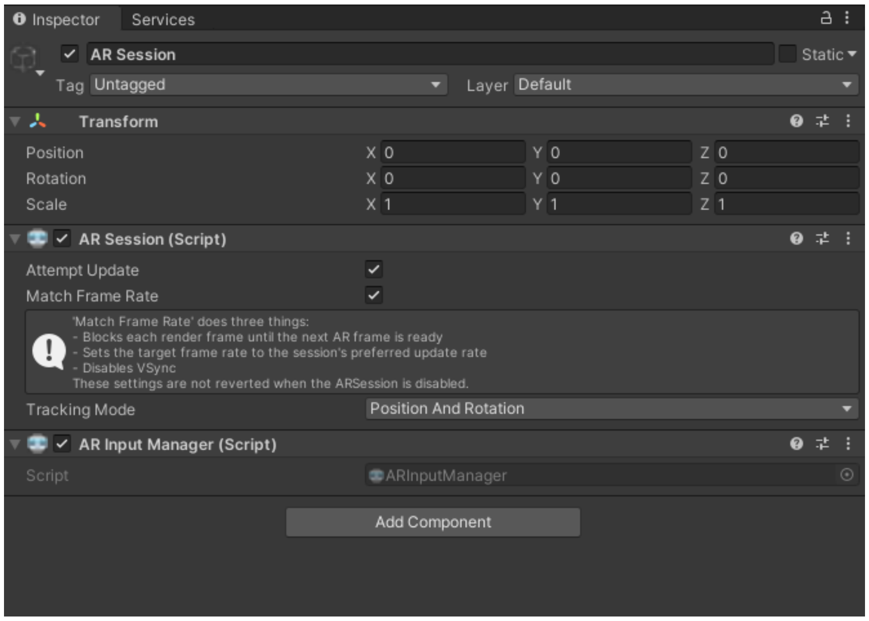
Normally before working on anything, check the collab window to see if there are any new changes from other people to pull.

Scene Hierarchy Overview:

This section describes what all of the Game Objects do in the scene used for this project.

AR Session:

This Game Object contains the AR Session and AR Input Manger scripts. These are both necessary scripts to configure AR in Unity. Just make sure this object stays in the scene.



AR Session
Tag Untagged
Layer Default

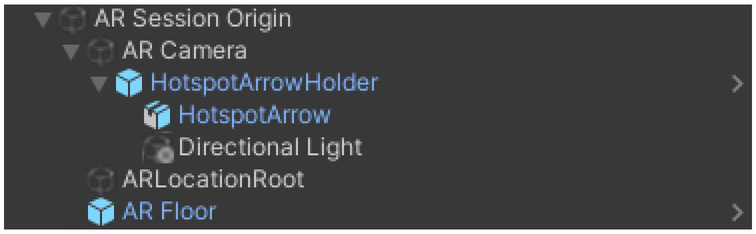
Transform
Position X 0 Y 0 Z 0
Rotation X 0 Y 0 Z 0
Scale X 1 Y 1 Z 1

AR Session (Script)
Attempt Update ✓
Match Frame Rate ✓
'Match Frame Rate' does three things:
- Blocks each render frame until the next AR frame is ready
- Sets the target frame rate to the session's preferred update rate
- Disables VSync
These settings are not reverted when the ARSession is disabled.
Tracking Mode Position And Rotation

AR Input Manager (Script)
Script ARInputManager

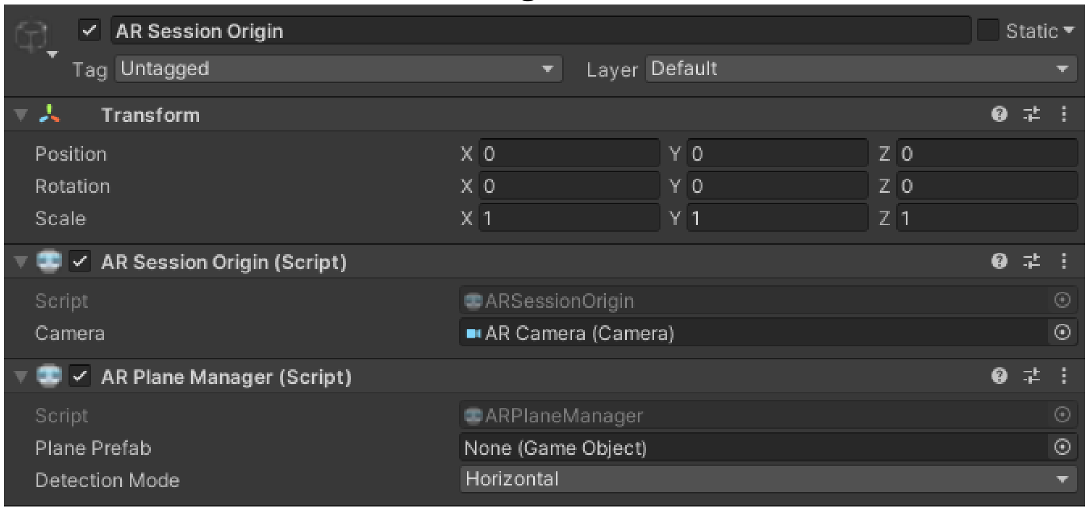
AR Session Origin:

This Game Object contains scripts necessary to run an AR project. It contains the AR Camera, AR Floor, and some scripts from the AR Location Plugin.



```
▼ AR Session Origin
  ▼ AR Camera
    ▼ HotspotArrowHolder
        HotspotArrow
        Directional Light
    ARLocationRoot
    AR Floor
```

1) **AR Session Origin (Parent Object) –** This Game Object contains the AR Session Origin and AR Plane Manager scripts which are necessary to create an AR scene. Notice AR Session Origin has a reference to the AR camera.



AR Session Origin — Static
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

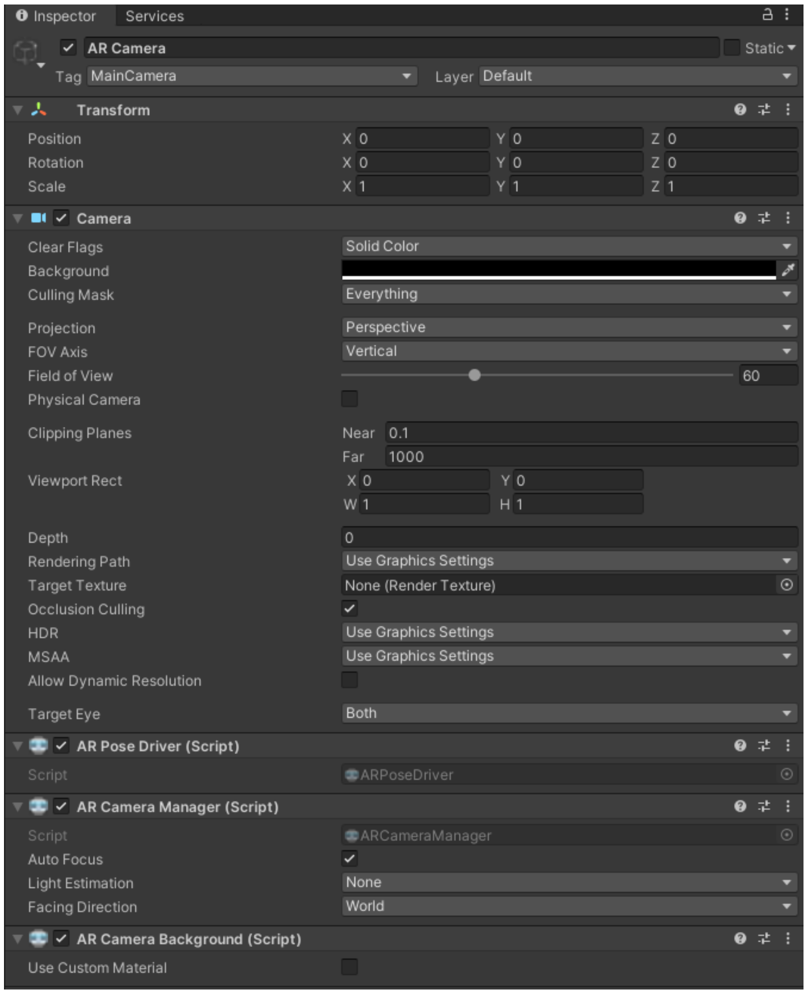
AR Session Origin (Script)

Script	ARSessionOrigin
Camera	AR Camera (Camera)

AR Plane Manager (Script)

Script	ARPlaneManager
Plane Prefab	None (Game Object)
Detection Mode	Horizontal

2) **AR Camera –** This game object contains a Camera component which is the default camera component in Unity. It also contains the AR Pose Driver, AR Camera Manager, and AR Camera Background scripts which are necessary scripts to have an AR scene in Unity.



AR Camera
Static
Tag MainCamera
Layer Default

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

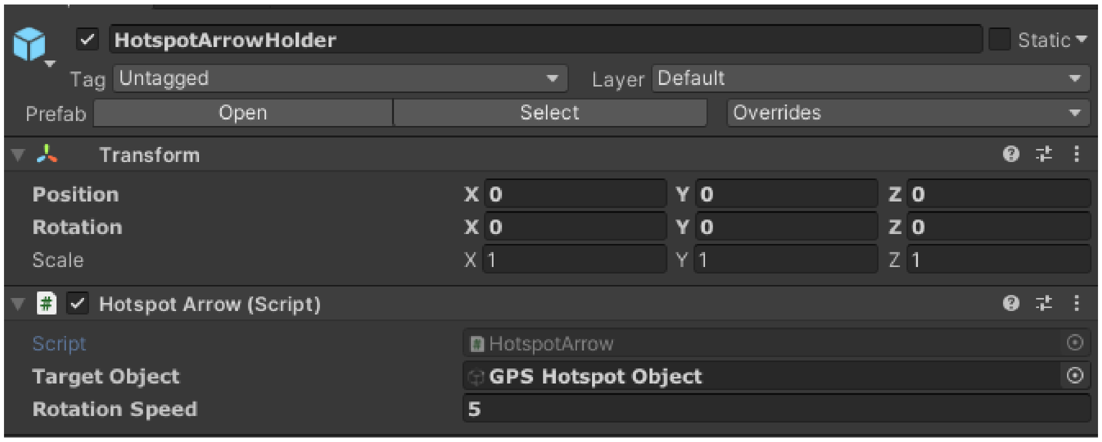
Camera
Clear Flags: Solid Color
Background
Culling Mask: Everything
Projection: Perspective
FOV Axis: Vertical
Field of View: 60
Physical Camera
Clipping Planes: Near 0.1, Far 1000
Viewport Rect: X 0 Y 0 W 1 H 1
Depth: 0
Rendering Path: Use Graphics Settings
Target Texture: None (Render Texture)
Occlusion Culling: ✓
HDR: Use Graphics Settings
MSAA: Use Graphics Settings
Allow Dynamic Resolution
Target Eye: Both

AR Pose Driver (Script)
Script: ARPoseDriver

AR Camera Manager (Script)
Script: ARCameraManager
Auto Focus: ✓
Light Estimation: None
Facing Direction: World

AR Camera Background (Script)
Use Custom Material

This game object also contains a **HotspotArrowHolder** game object which contains a script called Hotspot Arrow which causes a Red Arrow 3d Model to point towards the longitude and latitude to the **GPS Hotspot Object.** The children of this game object are the actual arrow 3D model and a directional light for the model. This game object is hidden once the player is the proper location to launch the rest of the AR scene and the setup part of this app is complete.



HotspotArrowHolder — Static
Tag: Untagged — Layer: Default
Prefab: Open | Select | Overrides

Transform

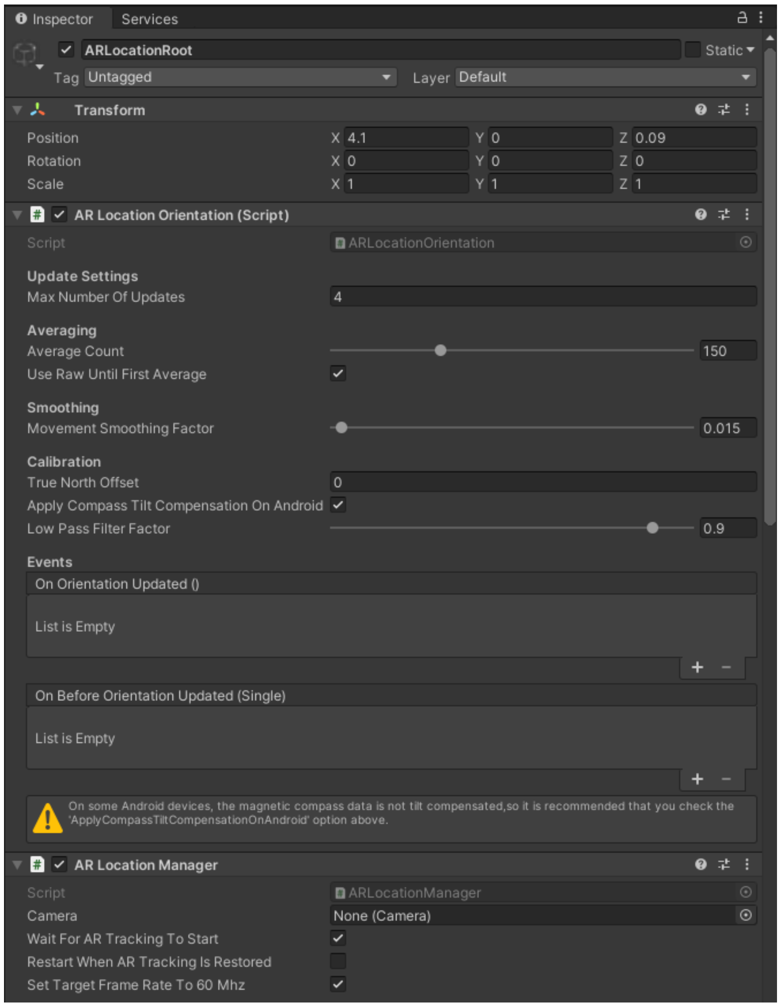
	X	Y	Z
Position	0	0	0
Rotation	0	0	0
Scale	1	1	1

Hotspot Arrow (Script)

Script	HotspotArrow
Target Object	GPS Hotspot Object
Rotation Speed	5

Inside the **Hotspot Arrow Script,** there is a GPS Hotspot Object script which references what the arrow is pointing towards and a rotation speed parameter which determines how fast the arrow rotates when adjusting its position to point towards the GPS Hotspot object transform.

3) **AR Location Root –** This game object comes from the AR Location (https://docs.unity-ar-gps-location.com/#main-features) plugin used for this project. This game object is basically settings about how objects using the AR Location plugin spawn based on given coordinates. These are all the default settings, but a lot about spawning based on location can be edited here.



Inspector Services

ARLocationRoot Static

Tag Untagged Layer Default

Transform

Position X 4.1 Y 0 Z 0.09

Rotation X 0 Y 0 Z 0

Scale X 1 Y 1 Z 1

AR Location Orientation (Script)

Script ARLocationOrientation

Update Settings

Max Number Of Updates 4

Averaging

Average Count 150

Use Raw Until First Average ✓

Smoothing

Movement Smoothing Factor 0.015

Calibration

True North Offset 0

Apply Compass Tilt Compensation On Android ✓

Low Pass Filter Factor 0.9

Events

On Orientation Updated ()

List is Empty

On Before Orientation Updated (Single)

List is Empty

On some Android devices, the magnetic compass data is not tilt compensated,so it is recommended that you check the 'ApplyCompassTiltCompensationOnAndroid' option above.

AR Location Manager

Script ARLocationManager

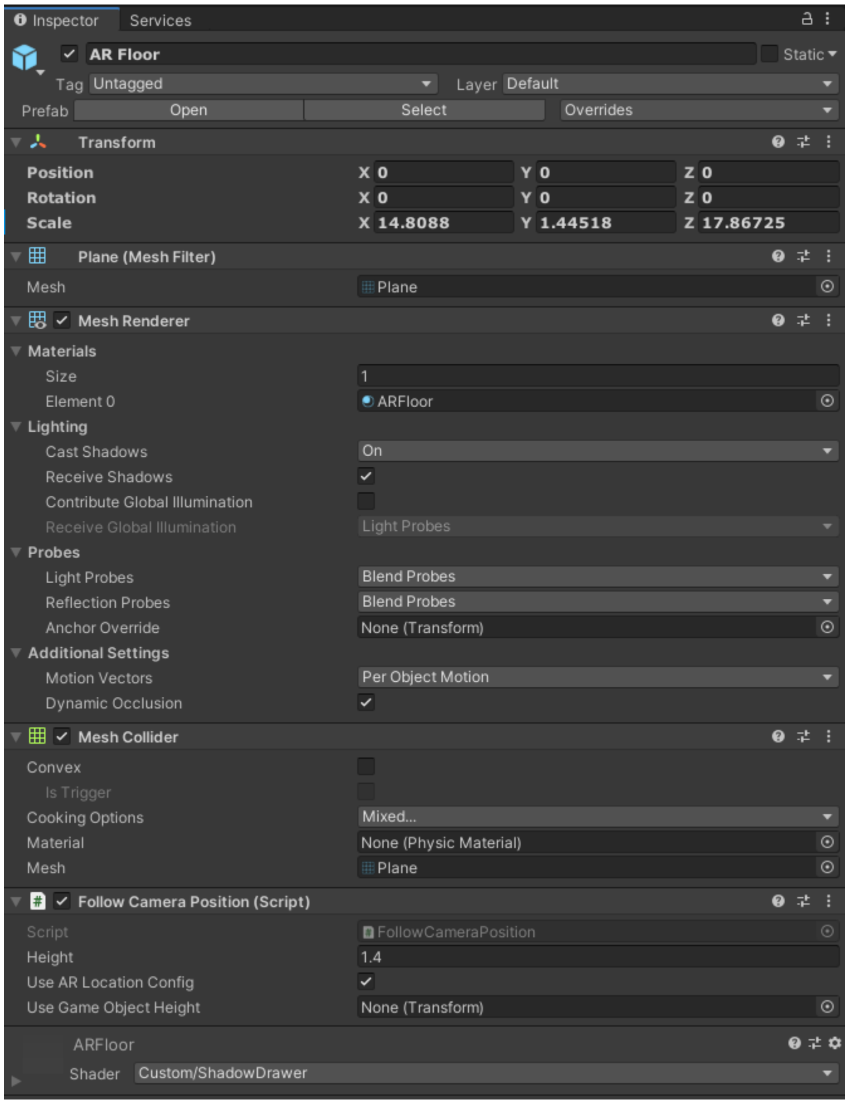
Camera None (Camera)

Wait For AR Tracking To Start ✓

Restart When AR Tracking Is Restored

Set Target Frame Rate To 60 Mhz ✓

4) **AR Floor** – This game object creates a transparent floor in the AR scene that allows shadows to be shown. The plane and mesh renderer components make up the object geometry, and the ARFloor shader makes this geometry invisible but allows for shadows to still be created. The Follow Camera position is an AR Location script that allows the AR Floor to adjust based on the camera position.



Inspector | Services

AR Floor | 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 14.8088	Y 1.44518	Z 17.86725

Plane (Mesh Filter)

Mesh	Plane

Mesh Renderer ✓

Materials	
Size	1
Element 0	ARFloor
Lighting	
Cast Shadows	On
Receive Shadows	✓
Contribute Global Illumination	
Receive Global Illumination	Light Probes
Probes	
Light Probes	Blend Probes
Reflection Probes	Blend Probes
Anchor Override	None (Transform)
Additional Settings	
Motion Vectors	Per Object Motion
Dynamic Occlusion	✓

Mesh Collider ✓

Convex	
Is Trigger	
Cooking Options	Mixed...
Material	None (Physic Material)
Mesh	Plane

Follow Camera Position (Script) ✓

Script	FollowCameraPosition
Height	1.4
Use AR Location Config	✓
Use Game Object Height	None (Transform)

ARFloor

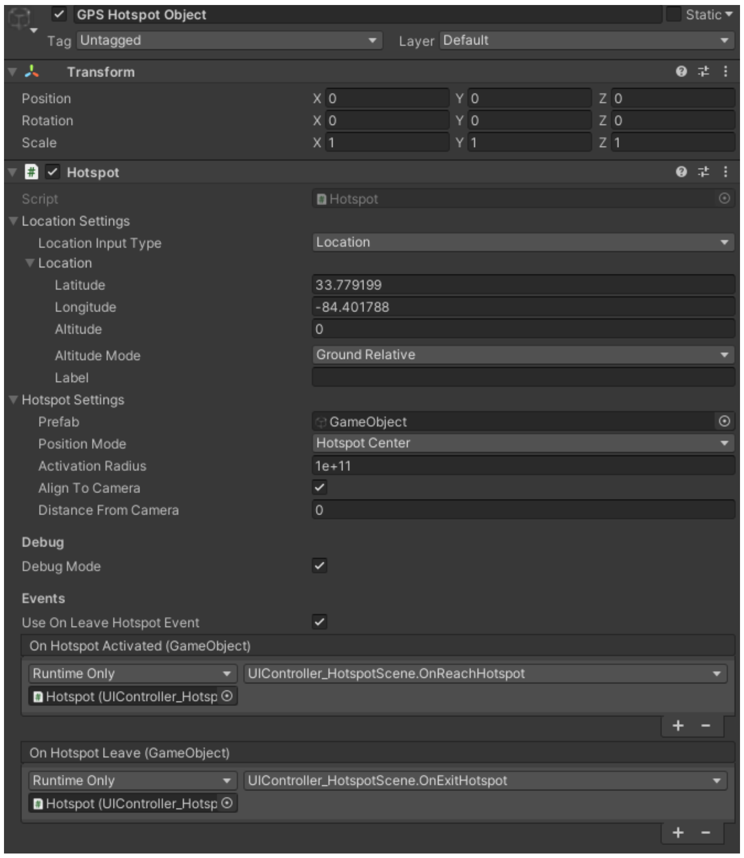
Shader Custom/ShadowDrawer

GPS Hotspot Object:

This game object uses the Hotspot script from the AR Location plugin. Basically, this script detects if a player is in a certain range of a specified location. When looking at the script component, you can see that the **latitude** and **longitude** of the hotspot were specified below.

Inside the **Hotspot Settings** part of this component, you can see the **Activation Radius** parameter. This determines how far the player must be for the hotspot to be activated. For example, the activation radius is 1e + 11 which means the hotspot can activate from very far away which can be useful for testing purposes. A value around 10 is what was previously used for the activation radius in the latest build of the project. The **Prefab** parameter is the object that is spawned when the player is in the hotspot. The GameObject prefab object used for this project is simply an empty game object which is the child of this game object, which is just used as a placeholder, so the hotspot script will run properly.

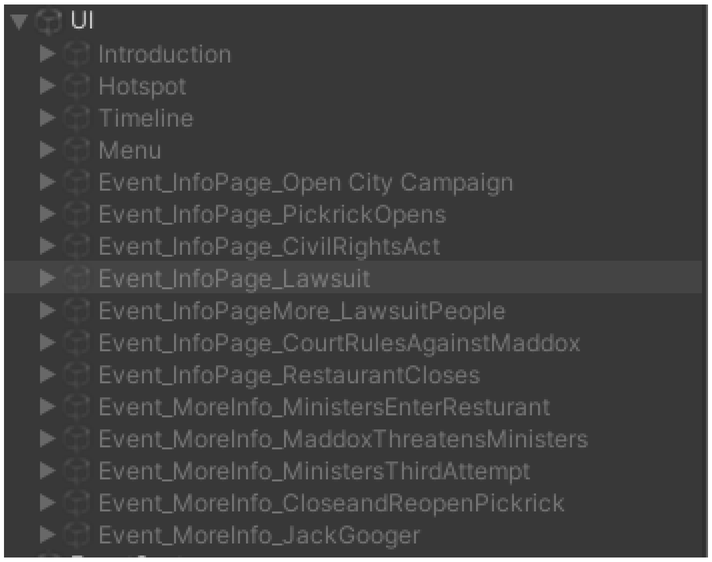
The **On Hotspot Activated** and **On Hotspot Leave** events are both used in this project. On Hotspot Activated references a function called **OnReachHotspot** and On Hotspot Leave references a function called **OnExitHotspot.** These functions are referenced from a script called **UIController_HotspotScene** found inside the **UI -> Hotspot** game object in the scene. These functions basically hide and unhide certain UI elements.



```
GPS Hotspot Object                                   Static
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
Hotspot
Script                          Hotspot
Location Settings
  Location Input Type           Location
  Location
    Latitude                    33.779199
    Longitude                   -84.401788
    Altitude                    0
    Altitude Mode               Ground Relative
    Label
Hotspot Settings
  Prefab                        GameObject
  Position Mode                 Hotspot Center
  Activation Radius             1e+11
  Align To Camera               ✓
  Distance From Camera          0
Debug
Debug Mode                      ✓
Events
Use On Leave Hotspot Event      ✓
On Hotspot Activated (GameObject)
  Runtime Only    UIController_HotspotScene.OnReachHotspot
  Hotspot (UIController_Hotsp
On Hotspot Leave (GameObject)
  Runtime Only    UIController_HotspotScene.OnExitHotspot
  Hotspot (UIController_Hotsp
```

UI:

All of the UI elements contained in this scene are under this Game Object. Each child object of the UI game object represents a page type and all page types are controlled by one script called the **Page Controller** in the UI parent object.



```
UI
  Introduction
  Hotspot
  Timeline
  Menu
  Event_InfoPage_Open City Campaign
  Event_InfoPage_PickrickOpens
  Event_InfoPage_CivilRightsAct
  Event_InfoPage_Lawsuit
  Event_InfoPageMore_LawsuitPeople
  Event_InfoPage_CourtRulesAgainstMaddox
  Event_InfoPage_RestaurantCloses
  Event_MoreInfo_MinistersEnterResturant
  Event_MoreInfo_MaddoxThreatensMinisters
  Event_MoreInfo_MinistersThirdAttempt
  Event_MoreInfo_CloseandReopenPickrick
  Event_MoreInfo_JackGooger
```

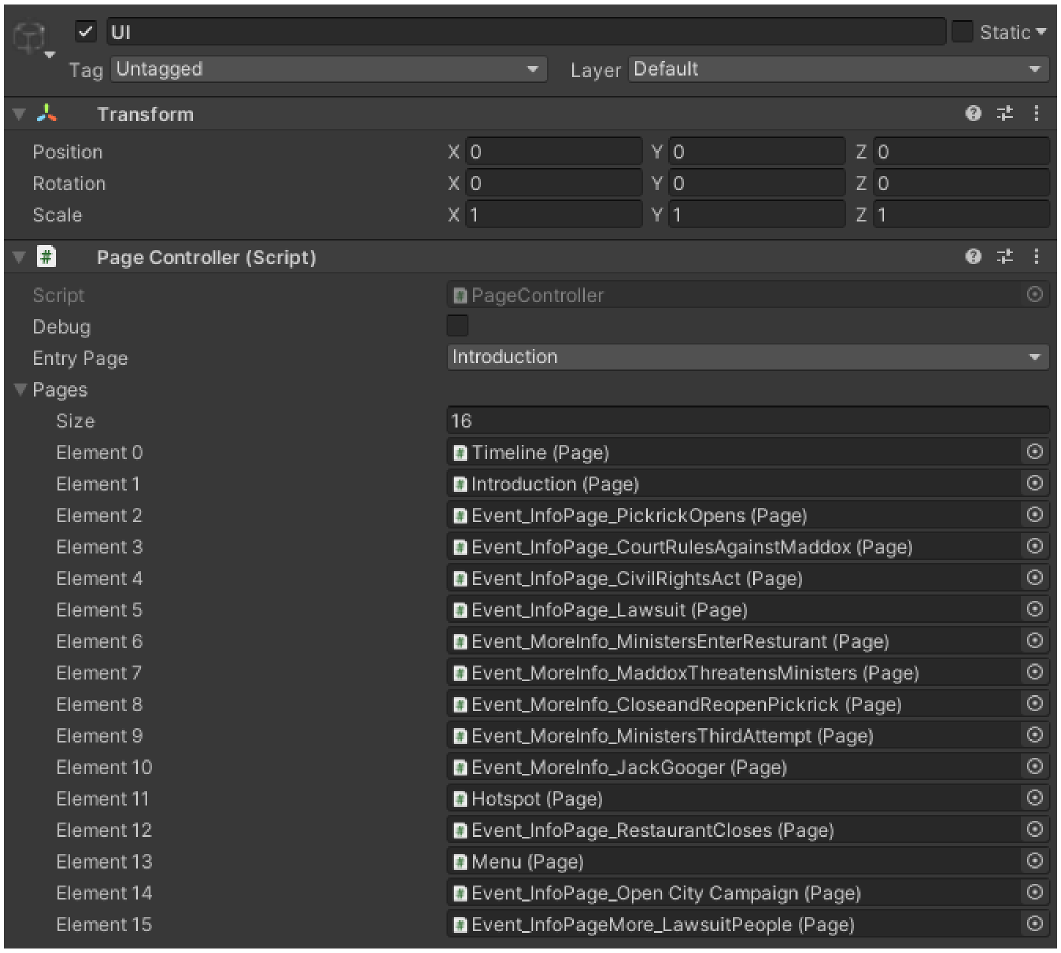
1) **UI (Parent Object)**

   This game object contains a script called **Page Controller** which contains all the categories of UI this project uses. Notice there are 16 child objects and 16 pages in the page controller script. This is because each child of this game object represents a category of UI. This is not necessary to do but is very useful for organization purposes. Inside the Page Controller script, you can check or uncheck the **Debug** parameter. Checking the debug parameter can be useful if you think there is a problem with the page controller or overall UI system.

   Notice the **Pages** array have elements that reference a script. Each element in the Pages array represents a **Page** script. Each of these 16 children have a page script attached which allows it to connect to the Page Controller. Each Page script is also associated with an Enum called **PageType.** You should create a PageType for every new category of UI you want to make. You can create a PageType by editing the script under Assets -> Scripts ->UI->PageType.

To control what pages are hidden and shown, you do this in a script by referencing the Page Controller script and calling functions within this script. You turn a page off by calling **TurnPageOff(PageType)** and turn a page on by calling **TurnPageOn(PageType).** Note that you can also turn a page on simultaneously while turning a page off by using an optional second parameter in the TurnPageOff function. For example, calling TurnPageOff(Type1, Type2) would turn the page with Type1 off and turn the page with Type2 on.

Finally, when looking at the Page Controller component, you can see an **Entry Page** parameter. This parameter essentially allows you to assign a PageType that appears on screen when a scene is first launched. For example, the Introduction page type is launched when first running this project.



UI — Static
Tag: Untagged — Layer: Default

Transform

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

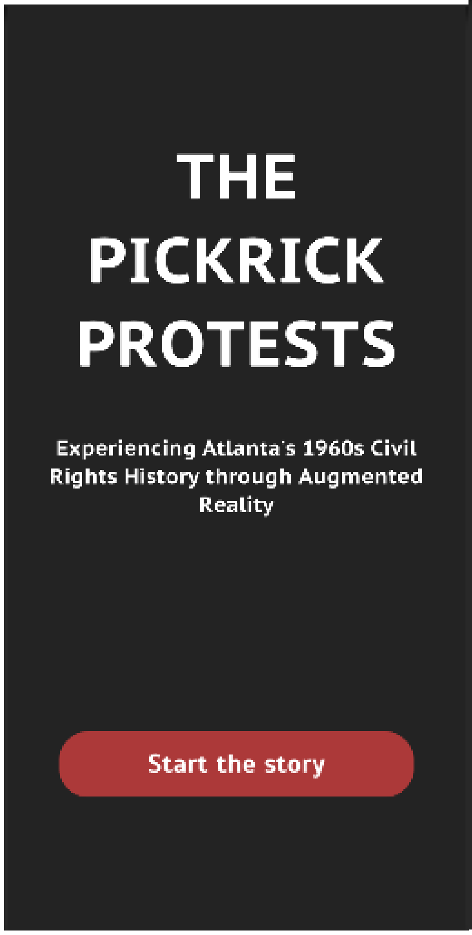
Page Controller (Script)

Script	PageController
Debug	
Entry Page	Introduction
Pages	
Size	16
Element 0	Timeline (Page)
Element 1	Introduction (Page)
Element 2	Event_InfoPage_PickrickOpens (Page)
Element 3	Event_InfoPage_CourtRulesAgainstMaddox (Page)
Element 4	Event_InfoPage_CivilRightsAct (Page)
Element 5	Event_InfoPage_Lawsuit (Page)
Element 6	Event_MoreInfo_MinistersEnterResturant (Page)
Element 7	Event_MoreInfo_MaddoxThreatensMinisters (Page)
Element 8	Event_MoreInfo_CloseandReopenPickrick (Page)
Element 9	Event_MoreInfo_MinistersThirdAttempt (Page)
Element 10	Event_MoreInfo_JackGooger (Page)
Element 11	Hotspot (Page)
Element 12	Event_InfoPage_RestaurantCloses (Page)
Element 13	Menu (Page)
Element 14	Event_InfoPage_Open City Campaign (Page)
Element 15	Event_InfoPageMore_LawsuitPeople (Page)

2) Introduction

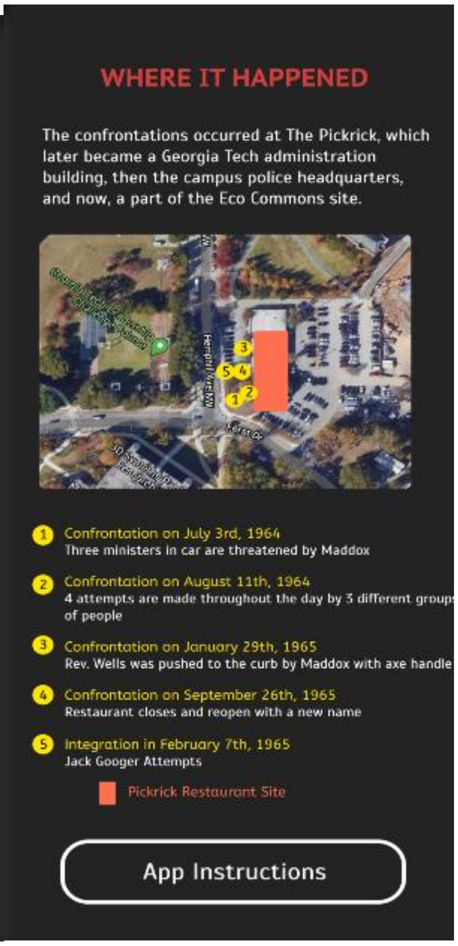
The **Introduction UI** are the first screens that the user sees when they open the app. The first and last screens of the introduction UI are shown below. The **Introduction UI Controller** script contains all the logic for this category of UI. This script adds all the children of the Introduction game object to a list in the order they appear on the scene hierarchy.

Each page for the introduction UI contains a button which runs the **GoToNextIntroductionPage()** method. This method hides the current UI page and unhides the next page in the list of pages until the last page is reached. When the last UI page is reached, the UI Controller will switch to the Hotspot category of UI and hide the Introduction UI. This script also shows the Menu UI once the player enters the second introduction UI screen.



THE PICKRICK PROTESTS

Experiencing Atlanta's 1960s Civil Rights History through Augmented Reality



WHERE IT HAPPENED

The confrontations occurred at The Pickrick, which later became a Georgia Tech administration building, then the campus police headquarters, and now, a part of the Eco Commons site.

1 Confrontation on July 3rd, 1964
Three ministers in car are threatened by Maddox

2 Confrontation on August 11th, 1964
4 attempts are made throughout the day by 3 different groups of people

3 Confrontation on January 29th, 1965
Rev. Wells was pushed to the curb by Maddox with axe handle

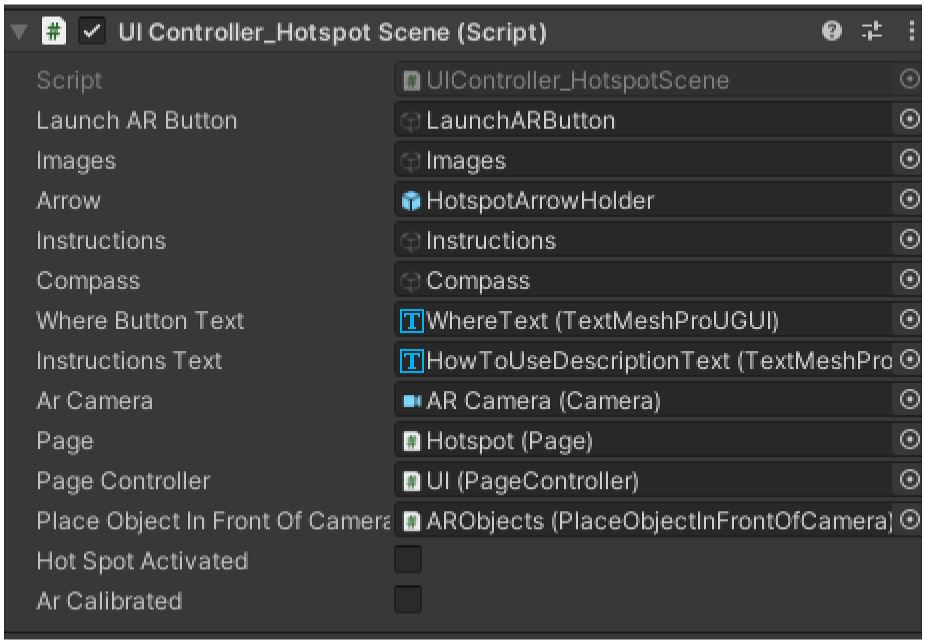
4 Confrontation on September 26th, 1965
Restaurant closes and reopen with a new name

5 Integration in February 7th, 1965
Jack Googer Attempts

🟥 Pickrick Restaurant Site

3) Hotspot

The **Hotspot UI** are the second screens the user sees when running the project. These screens are essentially the setup before the user can launch the AR scenes and timeline. The player needs to be in the right location and have the phone in the right direction so the AR can spawn in an accurate location. The **UI Controller Hotspot Scene** script controls the logic for the Hotspot UI. The user will see three screens when looking through this part of the project.



UI Controller_Hotspot Scene (Script)

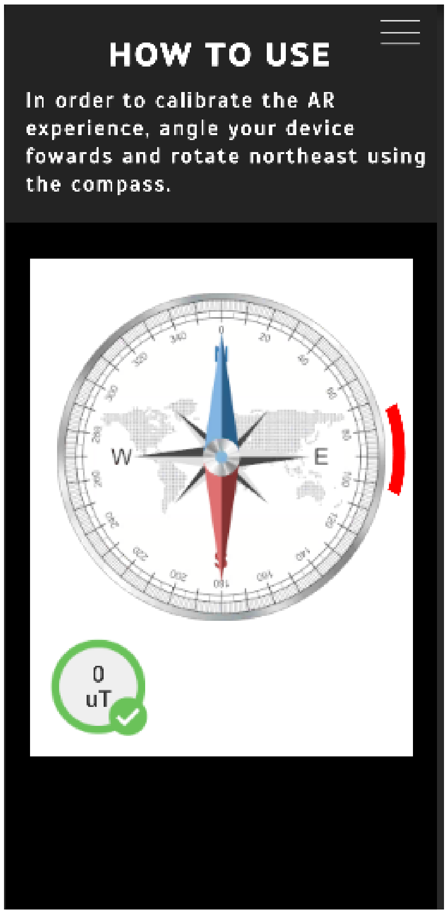
Script	UIController_HotspotScene
Launch AR Button	LaunchARButton
Images	Images
Arrow	HotspotArrowHolder
Instructions	Instructions
Compass	Compass
Where Button Text	WhereText (TextMeshProUGUI)
Instructions Text	HowToUseDescriptionText (TextMeshPro
Ar Camera	AR Camera (Camera)
Page	Hotspot (Page)
Page Controller	UI (PageController)
Place Object In Front Of Camera	ARObjects (PlaceObjectInFrontOfCamera)
Hot Spot Activated	☐
Ar Calibrated	☐

1st Screen- Going to the Proper Location:

The player will see a red arrow, instructions, and reference images of the location they need to go to get to the proper location. The user can press the **Where?** button to hide and unhide the reference images of the location the user needs to go to. The player also can follow the direction the red arrow is pointing to go in the proper direction of the location. When the player enters the Hotspot, the second screen for the hotspot UI will be shown. If the player exits the Hotspot, they will return to this screen. There is a Boolean called **hotSpotActivated** which keeps track if the player is in the Hotspot and controls what screen is shown.

2nd Screen- Compass (Looking in the right direction):

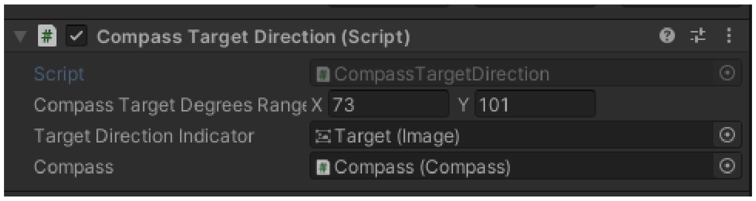
The player will get a new set of written directions and a compass object with a red marker for the next screen. The compass keeps track of the orientation in degrees of the player and contains a uT meter. There is a **Compass game object** inside the Hotspot UI which contains a script called **IsCompassSetUpCorrectly.** This makes sure the uT meter is at a proper level and that the user if facing in the right direction. The player will go to the final screen once the IsCompassSetUpCorrectly value is true.



HOW TO USE

In order to calibrate the AR experience, angle your device fowards and rotate northeast using the compass.

There are three children of the Compass game object: another game object called **Compass, uTMeter, and Target Direction**. The Compass and uTMeter game objects were all taken from the compass plugin. However, the Target Direction game object does not use this plugin and determines what direction the user needs to face for the compass to be set up correctly. You can set the values of where the player needs to be facing as shown below.



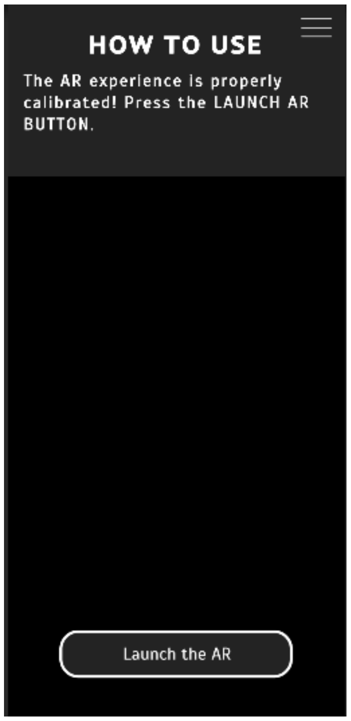
Compass Target Direction (Script)

Script	CompassTargetDirection
Compass Target Degrees Range	X 73 Y 101
Target Direction Indicator	Target (Image)
Compass	Compass (Compass)

The compass was implemented using this plugin:
https://assetstore.unity.com/packages/tools/integration/compass-81806

3rd Screen- Set Up Complete:

The third screen confirms that the AR project is properly set up. The place where the instructions were for the past two screens now says the AR experience is calibrated and the user is instructed to press the **Launch AR** button. This button will hide the Hotpost UI and shows the **Timeline UI** which begins the core experience of the app.

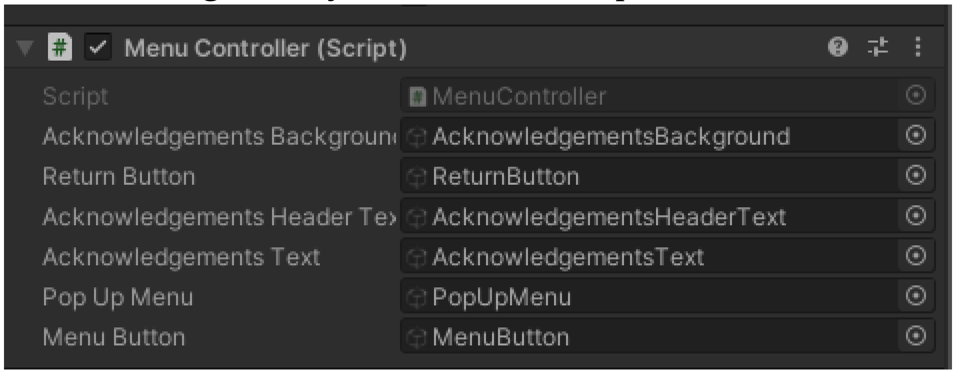


HOW TO USE

The AR experience is properly calibrated! Press the LAUNCH AR BUTTON.

4) Menu

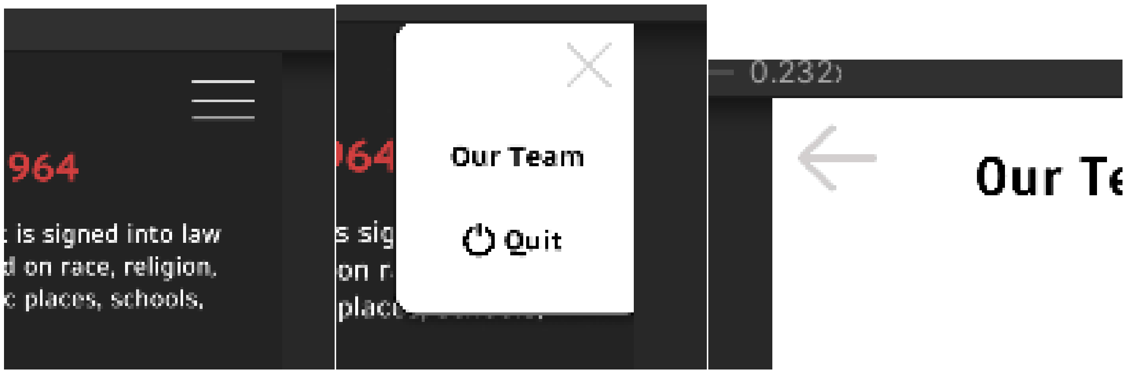
The **Menu UI** is activated after the very first button on the Introduction UI is pressed and always stays activated. The logic for the Menu UI is all found under the **Menu Controller** script attached to the Menu game object. All the elements under this game object are the UI components for the menu.



Menu Controller (Script)

Script	MenuController
Acknowledgements Backgroun	AcknowledgementsBackground
Return Button	ReturnButton
Acknowledgements Header Tex	AcknowledgementsHeaderText
Acknowledgements Text	AcknowledgementsText
Pop Up Menu	PopUpMenu
Menu Button	MenuButton

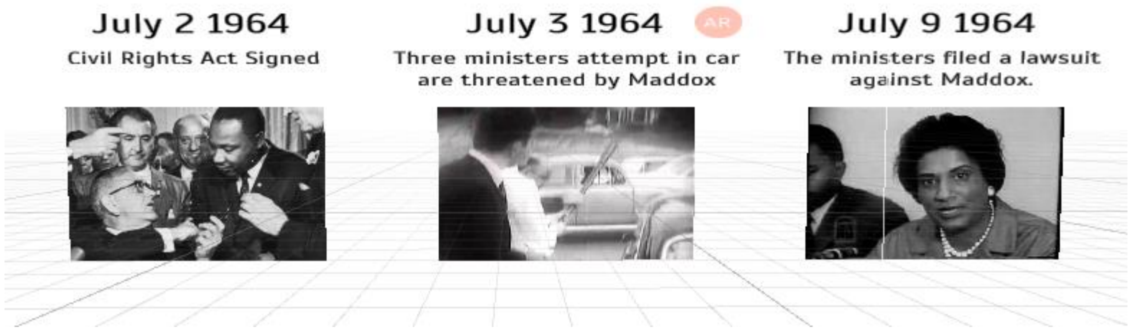
To use the menu, you press on the icon with the three white horizontal lines which runs the **ShowMenuPopUp()** function in the Menu Controller script. Like the image shown below, you will get a menu pop up with **an Exit, Our Team, and Quit Button**. The Exit button is a grey X logo and will run a function called **HideMenuPopUp()** which shows the player only the three white horizontal lines again. The Our Team button will lead to an **acknowledgments page** that is not yet finished. When in the acknowledgments page, you can press the return button which is a grey arrow on the top left of the screen like shown below. The Quit button will exit the application but this only works when building the app and not in the editor.



5) Timeline

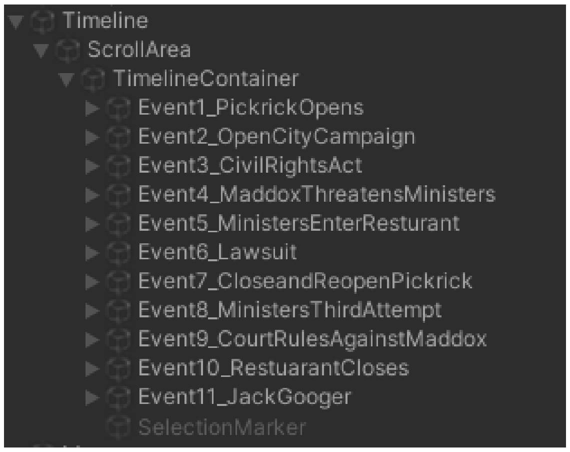
Timeline Overview:

The timeline is a historical timeline that allows users to view different historical events surrounding the Pickrick restaurant. The user clicks on the image associated with each event to launch the event. The types of events are organized into two categories: **info events and AR events**. Info events shows the users historical events through text, videos, and images. AR events show the users historical events using AR, in addition to things the info events show.


July 2 1964
Civil Rights Act Signed
July 3 1964
AR
Three ministers attempt in car are threatened by Maddox
July 9 1964
The ministers filed a lawsuit against Maddox.

Game Object Hierarchy:

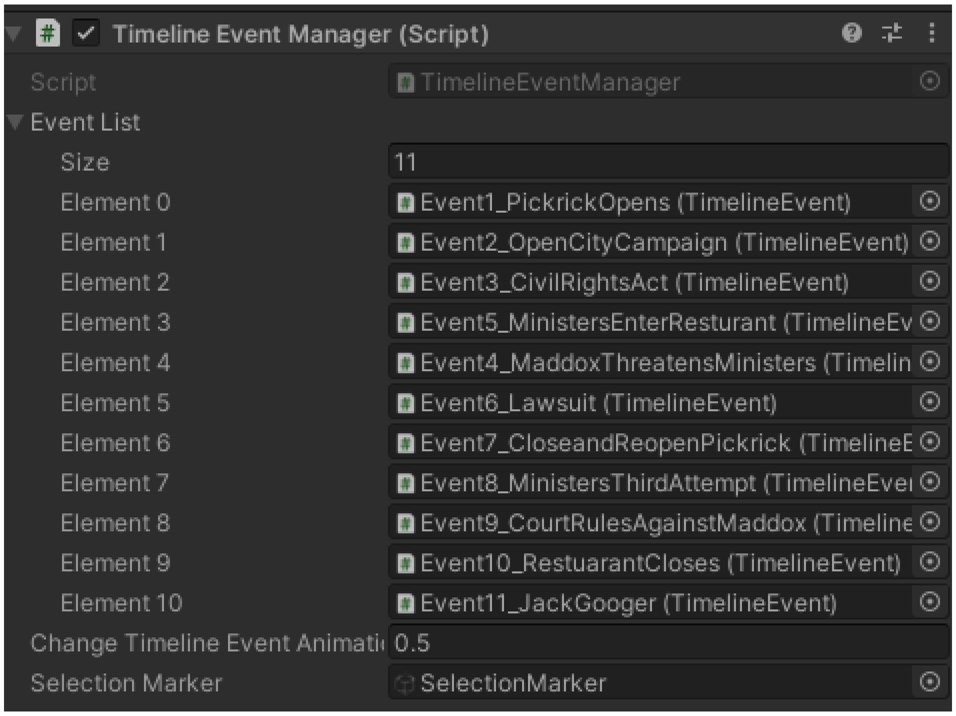
The timeline UI contains a timeline object which is an empty game object with a Page script to connect it to the Page Controller. This parent game object contains a scroll area which contains a Scroll Rect, which is a UI element in Unity which allows the player to scroll through UI. Some settings in the Scroll Rect are specified which controls how the user can scroll through the timeline. For example, the user can only scroll horizontally. Within this ScrollArea is the **Timeline Container** object which contains all the actual **Timeline Events**.



```
▼ Timeline
  ▼ ScrollArea
    ▼ TimelineContainer
      ▶ Event1_PickrickOpens
      ▶ Event2_OpenCityCampaign
      ▶ Event3_CivilRightsAct
      ▶ Event4_MaddoxThreatensMinisters
      ▶ Event5_MinistersEnterResturant
      ▶ Event6_Lawsuit
      ▶ Event7_CloseandReopenPickrick
      ▶ Event8_MinistersThirdAttempt
      ▶ Event9_CourtRulesAgainstMaddox
      ▶ Event10_RestuarantCloses
      ▶ Event11_JackGooger
        SelectionMarker
```

Timeline Event Manager:

The Timeline Container game object contains a script called **Timeline Event Manager** which stores and controls all the Timeline Events. For organization purposes, all the timeline events are children of the Timeline Container. The Timeline Event Manager script has a list called **Event List** which contains all the timeline events. Each Timeline Event contains a **Timeline Event Script** which allows it to be added to the Event List. The Change Timeline Event Animation speed variable controls how fast a timeline event will snap to the center of the timeline. The Selection Marker is a reference to the red rectangle that marks which event is currently viewing.

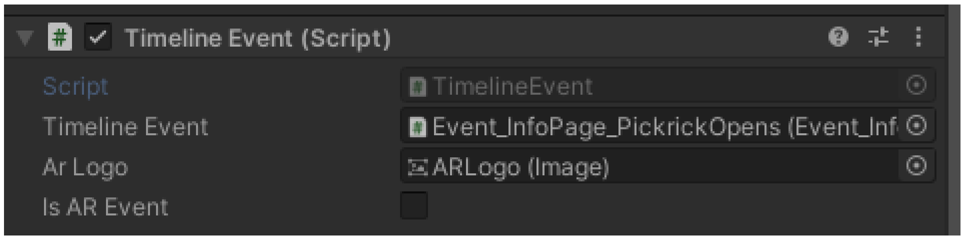


Timeline Event Manager (Script)

Script	TimelineEventManager
Event List	
Size	11
Element 0	Event1_PickrickOpens (TimelineEvent)
Element 1	Event2_OpenCityCampaign (TimelineEvent)
Element 2	Event3_CivilRightsAct (TimelineEvent)
Element 3	Event5_MinistersEnterResturant (TimelineEv
Element 4	Event4_MaddoxThreatensMinisters (Timelin
Element 5	Event6_Lawsuit (TimelineEvent)
Element 6	Event7_CloseandReopenPickrick (TimelineE
Element 7	Event8_MinistersThirdAttempt (TimelineEve
Element 8	Event9_CourtRulesAgainstMaddox (Timeline
Element 9	Event10_RestuarantCloses (TimelineEvent)
Element 10	Event11_JackGooger (TimelineEvent)
Change Timeline Event Animati	0.5
Selection Marker	SelectionMarker

Timeline Events:

The Timeline Events as mentioned before all contain a Timeline Event script. The Timeline Event game objects also contain an image that acts as a button where you can add the picture that associated with each timeline event. This image is also a button which runs the **PressOnEvent()** function within the timeline script that launches the historical event and informs the Timeline Event Manager that the event was changed. The Timeline Event script also contains a Boolean called isArEvent which determines if the AR logo should be shown for each timeline event. Timeline events also have child game objects called **Event Name and Event Date** which are text UI objects that can be edited for each event.



Timeline Event (Script)

Script	TimelineEvent
Timeline Event	Event_InfoPage_PickrickOpens (Event_Inf
Ar Logo	ARLogo (Image)
Is AR Event	

<u>Prefabs:</u>

Instead of making a timeline from scratch, you can look under Assets -> Prefabs -> UI to find a prefab called **Timeline** which creates an empty timeline with no events. You can then use the **Timeline Event** prefab to create a timeline event game object. You only need to edit the UI elements and add your new timeline event to the Event List in Timeline Event Manager to get the timeline to work properly and show the information you want.

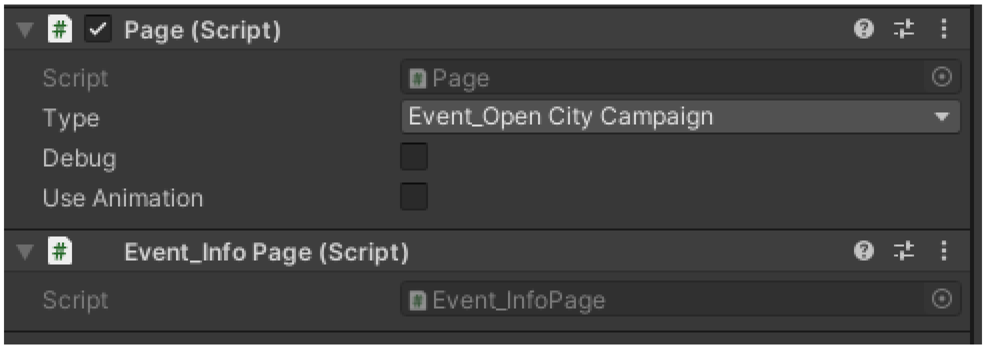
6) Event_InfoPage

Each Timeline Event either links to an info event or an AR event. To make an info event, you need to create a **Event_InfoPage.** This type of page shows the name and date of a historical event, text information about this event, and either a video or image associated with this event.

<u>Creating an Info Page:</u>

To create an info page, drag either the **Event_InfoPage_Image** or **Event_InfoPage_Video** prefab found under Assets -> Prefabs -> UI into the scene under the UI object. If you want your historical event to include an image, drag Event_InfoPage_Image, and if you want your historical event to include a video, drag Event_InfoPage_Video.

Notice that these prefabs include a Page script and **Event_InfoPage** script. The Event_InfoPage script controls how this Page you just created turns on and off. Create a unique PageType and change the type to this new page type you created to set up this event correctly.



Page (Script)

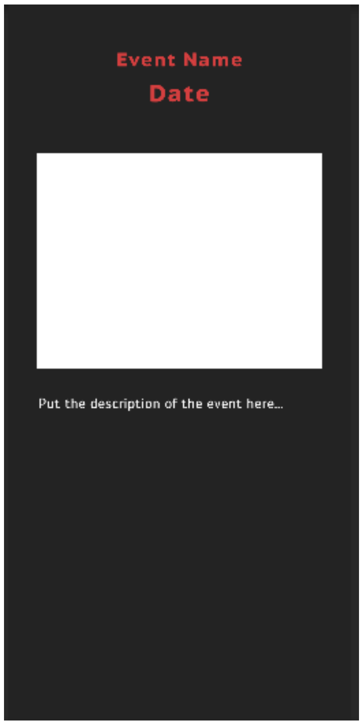
Script	Page
Type	Event_Open City Campaign
Debug	☐
Use Animation	☐

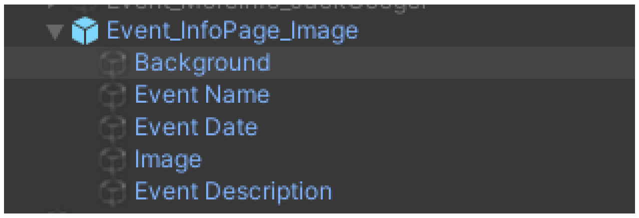
Event_Info Page (Script)

Script	Event_InfoPage

Editing the Info Page:

When you add one of the info page prefabs, you will see something like the image below. You can edit what the event looks like by changing the text in the **Event Name, Event Date, and Event Description** game objects. If you select the image prefab, you can simply drag the image you want by finding the Image component under the **Image** game object. If you want to add a video, you need to create a new **Video Renderer Texture** and place it under Assets - > UI -> Videos. Then drag this texture under the **Texture** variable in the **Raw Image** component inside the **Video Renderer** game object. At this same texture in the **Target Texture** variable in the **Video Player Component** inside the **Video** game object. Lastly, add the actual video in this same component in the **Video Clip** variable.

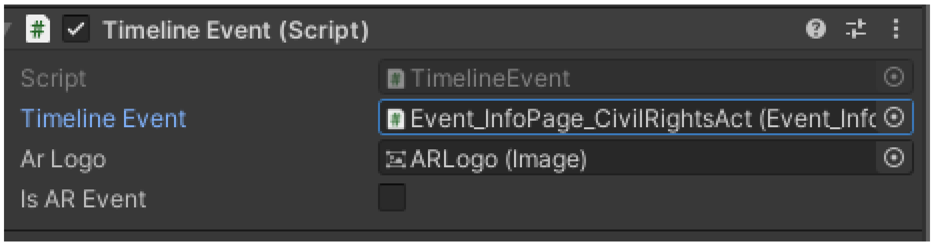




- Event_InfoPage_Image
  - Background
  - Event Name
  - Event Date
  - Image
  - Event Description

Connecting the Info Page to Timeline:

The last thing you need to do to set up a timeline event with an info page is reference this page to the timeline event. To do this, assign the **Timeline Event variable** in the Timeline event script to the info page game object you created. This will connect the timeline event to your info page, and the info page will show on screen when you touch the associated timeline event.

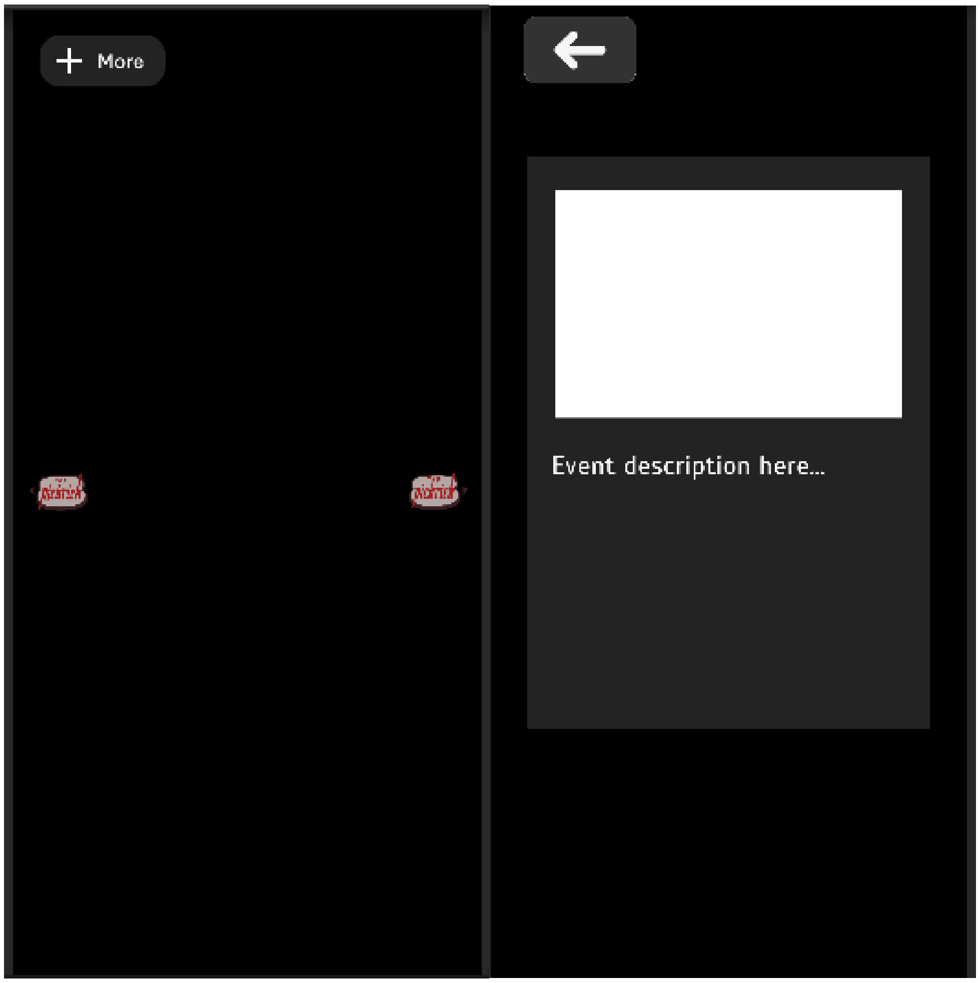


Timeline Event (Script)

Script	TimelineEvent
Timeline Event	Event_InfoPage_CivilRightsAct (Event_Infc
Ar Logo	ARLogo (Image)
Is AR Event	☐

7) Event_MoreInfo

When you create an AR Event on the timeline, you also create a More Info Page which allows the user to read about the AR event they are looking at. The user clicks on a button that says More Info to view the information on this page and clicks a back arrow to hide this information. Just like the Info Page, the More Info page shows the name and date of a historical event, text information about this event, and either a video or image associated with this event.



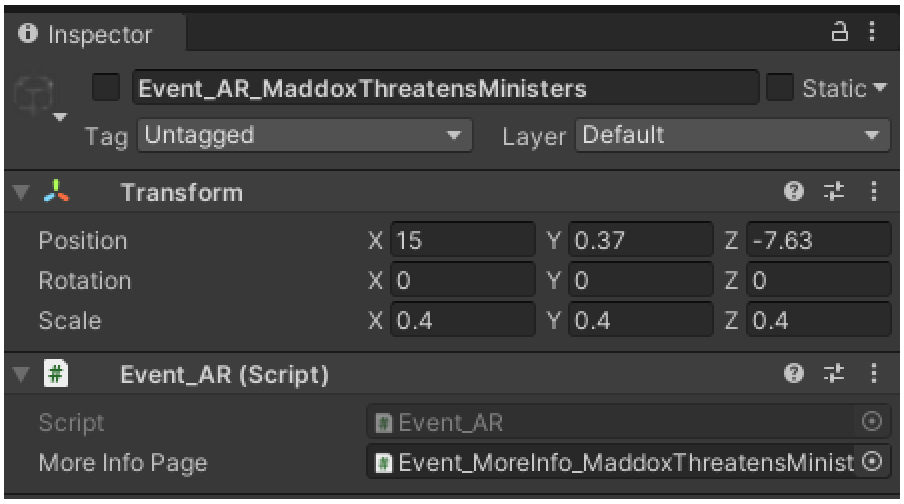
Creating and Editing a More Info Page:

Creating a more info page is very similar to creating a normal info page. Drag either an **Event_MoreInfo_Image** or **Event_MoreInfo_Video** prefab found under Assets -> Prefabs -> UI and drag this game object under the UI game object. Create a new page type and add it to this object just like you do for a normal Info Page.

Editing the more info page works the same way as you would edit the info page, so refer to the previous page for this.

Setting Up Buttons and Connecting AR Event to More Info Page:

Each More Info Page needs to be connected to an actual AR Event. For organization, all AR Events are found under the **ARObjects** game object. The parent game object for all AR Events contains a **Event_AR** script, so find the appropriate game object with this script to connect to your more event page. To connect your More Event Page with the AR object, drag the More Info Page into the More Info Page variable in the Event_AR script.

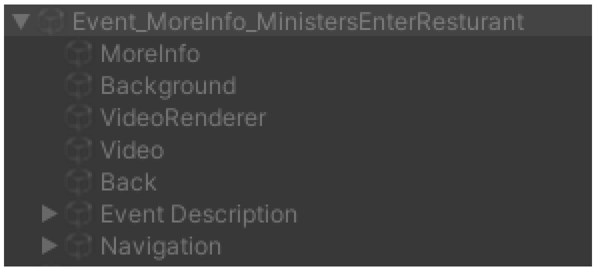


Event_AR_MaddoxThreatensMinisters
Tag Untagged
Layer Default

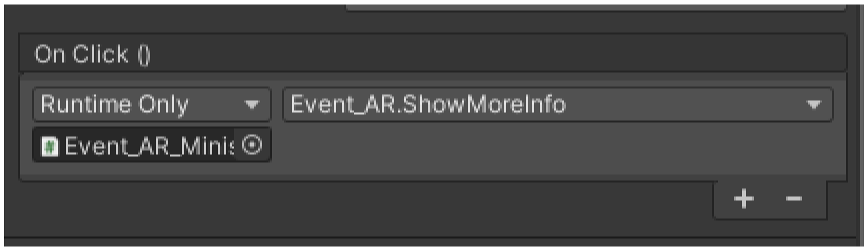
	X	Y	Z
Position	15	0.37	-7.63
Rotation	0	0	0
Scale	0.4	0.4	0.4

Script: Event_AR
More Info Page: Event_MoreInfo_MaddoxThreatensMinist

Under the **MoreInfo** and **Back** game objects in the more info page, there are two buttons you need to assign functions to. On the OnClick Event for these two buttons, reference the AR Object that you just assigned this more info page to. Add the **ShowMoreInfo()** function to the more button and the **HideMoreInfo()** function to the back button.

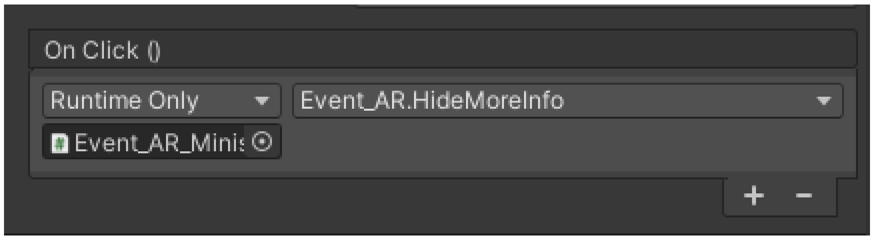


```
Event_MoreInfo_MinistersEnterResturant
    MoreInfo
    Background
    VideoRenderer
    Video
    Back
  ▶ Event Description
  ▶ Navigation
```


On Click ()

Runtime Only — Event_AR.ShowMoreInfo

Event_AR_Mini:


On Click ()

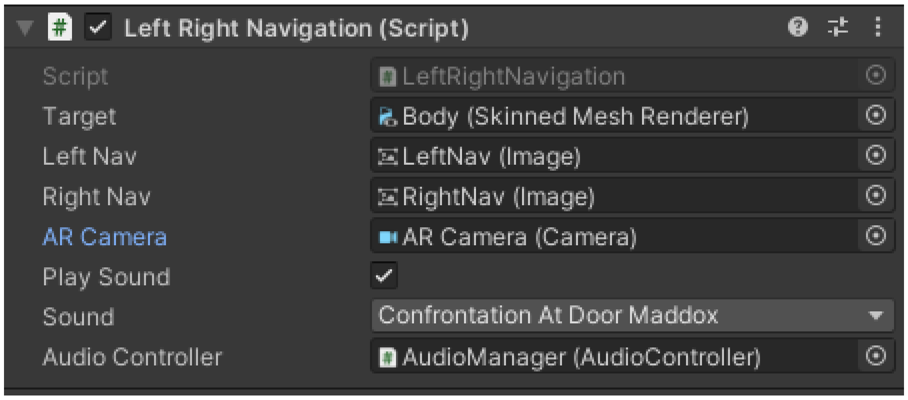
Runtime Only — Event_AR.HideMoreInfo

Event_AR_Mini:

<u>Navigation:</u>

The **Navigation** game object in the more info page allows you to target an object in the AR scene you want the player to look at. If the user is left of a target object, a right arrow will show, and if the user is right of a target object, a left arrow will show. If the user is looking at this target object, no arrow will be shown, and audio will play. When the player is not looking at this target, the audio will stop playing.

Under the Navigation game object, find the **LeftRightNavigation** script. This script controls all the logic described above. Go to the AR Object associated with this page to find an object to target and assign the Target variable to this game object in the LeftRight Navigation script. Next, assign the AR Camera variable with the camera in the scene. If you want to add the audio feature described above, check the Play Sound Boolean. Lastly, assign the Audio Controller object and pick the sound you want to play. The audio logic is described later in the documentation in the Audio Manger Section.

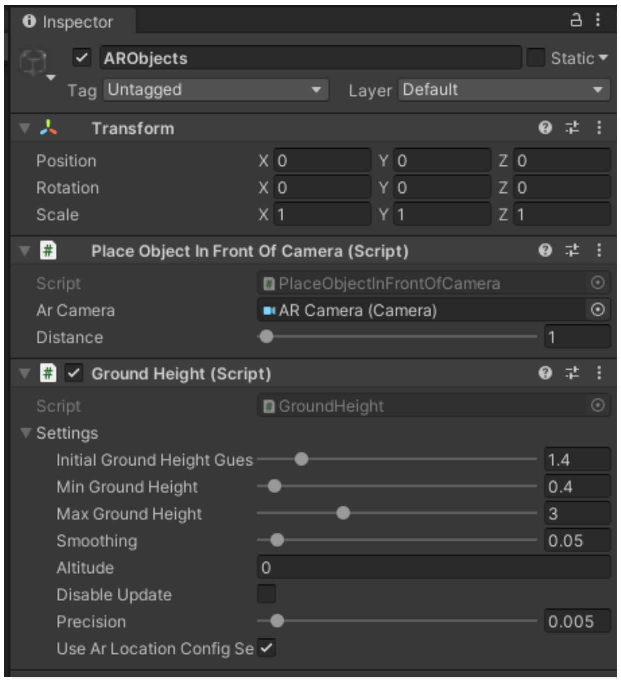

Left Right Navigation (Script)

Script	LeftRightNavigation
Target	Body (Skinned Mesh Renderer)
Left Nav	LeftNav (Image)
Right Nav	RightNav (Image)
AR Camera	AR Camera (Camera)
Play Sound	✓
Sound	Confrontation At Door Maddox
Audio Controller	AudioManager (AudioController)

ARObjects:

This game object is where all the models and animations are located for AR Timeline Events. For each of the AR Scenes, there is one parent object containing all the models and animations. There are also some lighting related game objects found under this.

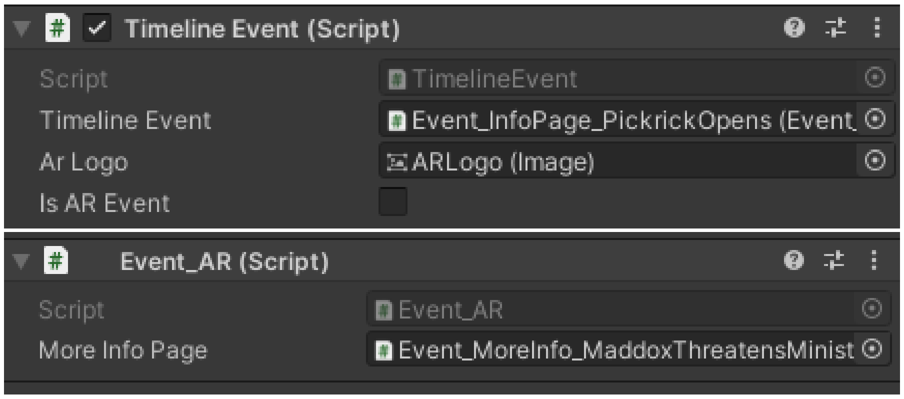
1) **AR Objects (Parent Object)**
   This parent object contains two scripts: the **PlaceObjectInFrontOfCamera** script and **GroundHeight** script. The PlaceObjectInFrontOfCamera script places the AR Objects in the proper location and runs right when the player has the phone in the right direction according to the compass. GroundHeight is a script that came with the ARLocation Plugin that orients a game object on the real world ground.



```
Inspector
ARObjects                                   Static
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
Place Object In Front Of Camera (Script)
Script          PlaceObjectInFrontOfCamera
Ar Camera       AR Camera (Camera)
Distance                                 1
Ground Height (Script)
Script          GroundHeight
Settings
  Initial Ground Height Gues             1.4
  Min Ground Height                      0.4
  Max Ground Height                      3
  Smoothing                              0.05
  Altitude      0
  Disable Update
  Precision                              0.005
  Use Ar Location Config Se ✓
```

2) **AR Events/Connecting AR Events to Timeline**
   For each AR Event, there is a single parent object that contains an **Event_AR** script. This script allows this AR Event to attach with the timeline. Go to the timeline event you want associated with this AR Event and assign the Timeline Event variable inside the Timeline Event script to the Event_AR script. Now this AR Event object and all the children on this

AR Event containing the models and animations will turn on when the associated timeline event is pressed.



Timeline Event (Script)

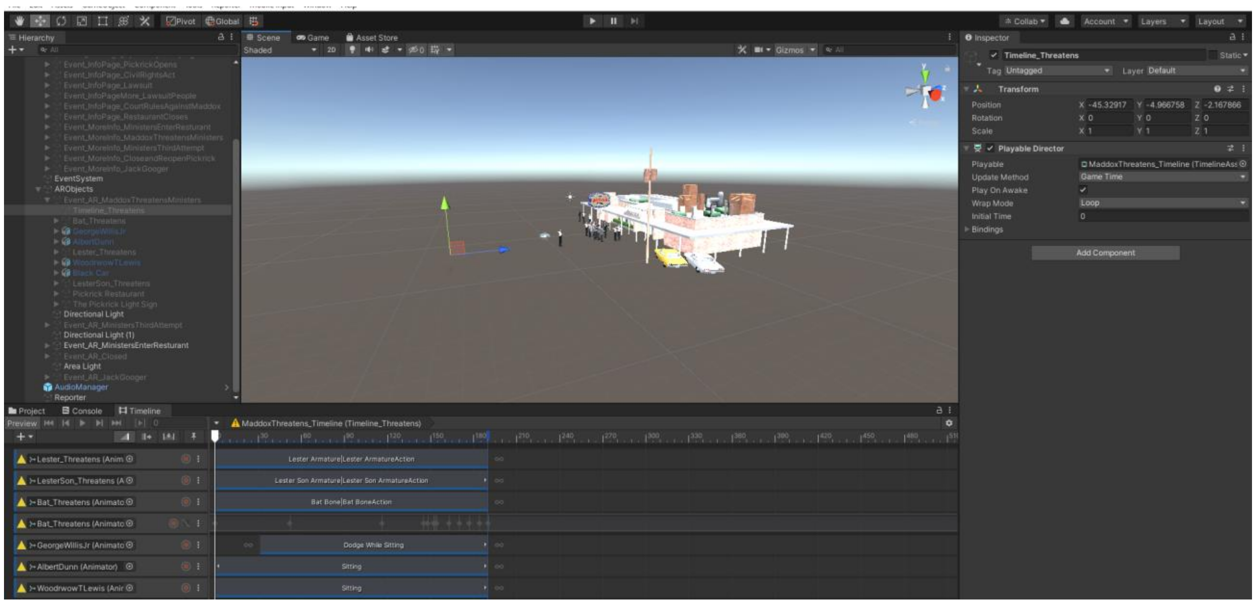
Script	TimelineEvent
Timeline Event	Event_InfoPage_PickrickOpens (Event
Ar Logo	ARLogo (Image)
Is AR Event	☐

Event_AR (Script)

Script	Event_AR
More Info Page	Event_MoreInfo_MaddoxThreatensMinist

3) **Animations**

The animated objects in the AR scenes are animated using Unity's Sequencing Timeline. If you look at all the children object under an AR Event, you'll find a game object labeled as the timeline. This timeline contains a **Playable Director** script which launches the Unity timeline. More information about how this worked can be found here (https://docs.unity3d.com/Packages/com.unity.timeline@1.2/manual/index.html) or simply by Googling "Unity Sequencing Timeline."



Timeline_Threatens — Tag: Untagged — Layer: Default

Transform

Position	X -45.32917	Y -4.966758	Z -2.167866
Rotation	X 0	Y 0	Z 0
Scale	X 1	Y 1	Z 1

Playable Director

Playable	MaddoxThreatens_Timeline (TimelineAss
Update Method	Game Time
Play On Awake	✓
Wrap Mode	Loop
Initial Time	0

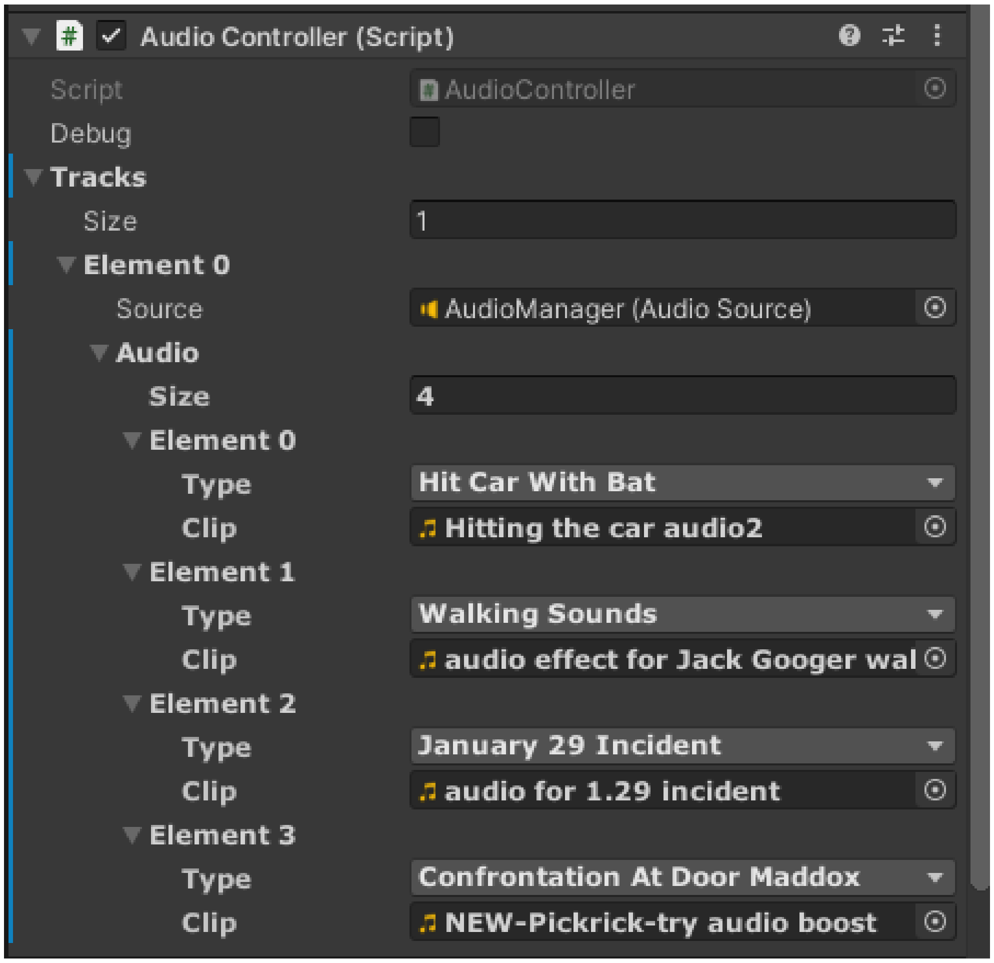
Bindings

MaddoxThreatens_Timeline (Timeline_Threatens)

Lester_Threatens (Anim	Lester Armature|Lester ArmatureAction
LesterSon_Threatens (A	Lester Son Armature|Lester Son ArmatureAction
Bat_Threatens (Animato	Bat Bone|Bat BoneAction
Bat_Threatens (Animato	
GeorgeWillisJr (Animato	Dodge While Sitting
AlbertDunn (Animator)	Sitting
WoodrwowTLewis (Anir	Sitting

AudioManager:

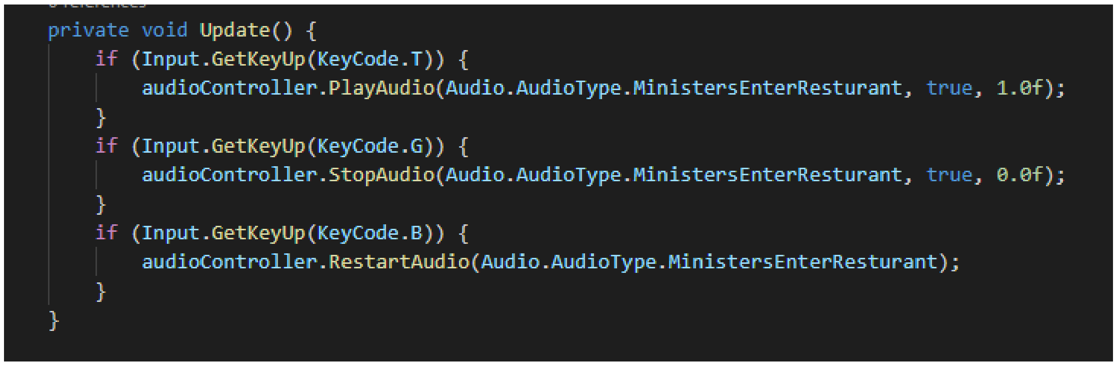
The **Audio Manger** game object contains all the audio clips used for this project in a way very similar to the UI Controller. The **Audio Controller** script specifically contains all these audio clips and organizes them into a list of tracks. Each track contains an audio source and that a list of audio tracks. Note that this project only contains one audio track because only one audio file plays at a time. If you wanted multiple audio files playing at once, you would need to create more audio tracks.


Audio Controller (Script)

Script	AudioController
Debug	☐
Tracks	
Size	1
Element 0	
Source	AudioManager (Audio Source)
Audio	
Size	4
Element 0	
Type	Hit Car With Bat
Clip	Hitting the car audio2
Element 1	
Type	Walking Sounds
Clip	audio effect for Jack Googer wal
Element 2	
Type	January 29 Incident
Clip	audio for 1.29 incident
Element 3	
Type	Confrontation At Door Maddox
Clip	NEW-Pickrick-try audio boost

You add audio clips to each track by adding the audio clips to a list called Audio. First, each audio clip needs an **AudioType.** Just like the PageType in the UI Controller, the Audio Type is an Enum that assigns an audio clip to a name. You should create a new AudioType for every new audio clip, and you can add a new AudioType by editing the script under **Assets->Scripts->Audio->AudioType**. Once you create a unique audio type, add the audio clip and audio type to a new element in the Audio array like the above images displays.

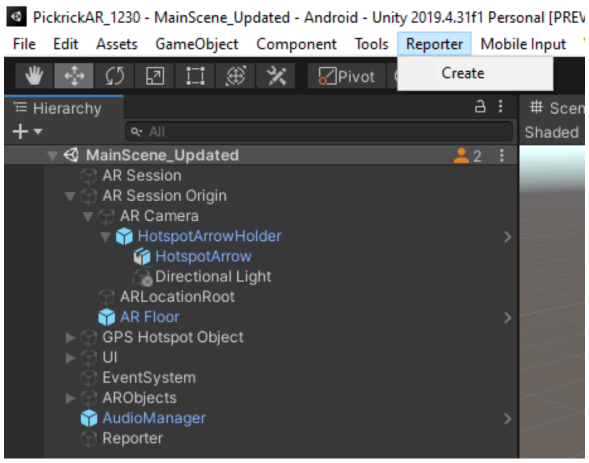
To control audio clips playing, stopping, and restarting, you do this in a script by referencing the AudioController script and calling functions within this script. You play an audio clip by using the **PlayAudio()** function, stop an audio clip by using the **StopAudio()** function, and restart audio using the **RestartAudio()** function. These functions have three parameters. The first parameter you put the actual audio type you want to play, the second parameter is a boolean where you can decide if you want the audio to fade, and the third parameter is a float that allows you to assign a delay to the audio. The image below is an example of how these functions are used.



```
private void Update() {
    if (Input.GetKeyUp(KeyCode.T)) {
        audioController.PlayAudio(Audio.AudioType.MinistersEnterResturant, true, 1.0f);
    }
    if (Input.GetKeyUp(KeyCode.G)) {
        audioController.StopAudio(Audio.AudioType.MinistersEnterResturant, true, 0.0f);
    }
    if (Input.GetKeyUp(KeyCode.B)) {
        audioController.RestartAudio(Audio.AudioType.MinistersEnterResturant);
    }
}
```

Reporter:

This Game Object allows you to check the console when you are testing the app on a mobile device. This uses a Unity package called Log Viewer. (https://assetstore.unity.com/packages/tools/integration/log-viewer-12047) This game object was created by going to Reporter and pressing create like in the image below. When testing the project on a mobile device, **quickly move your finger in a circular motion to see the debug log.**


PickrickAR_1230 - MainScene_Updated - Android - Unity 2019.4.31f1 Personal [PREV
File
Edit
Assets
GameObject
Component
Tools
Reporter
Mobile Input
Pivot
Create
Hierarchy
All
Scen
Shaded
MainScene_Updated
AR Session
AR Session Origin
AR Camera
HotspotArrowHolder
HotspotArrow
Directional Light
ARLocationRoot
AR Floor
GPS Hotspot Object
UI
EventSystem
ARObjects
AudioManager
Reporter