

An Introduction to Creating Augmented Reality Pages Using Unity
for the Post-Digital Book Arts Project
pdba.usask.ca
by Brandon Piller and Jon Bath

What you will need:

A computer (Windows or Mac) with a camera

A printout of this file - [bookbot.pdf](#)

An image of the page we want to use as a trigger (must be .jpg or .png) - [bookbot.jpg](#)

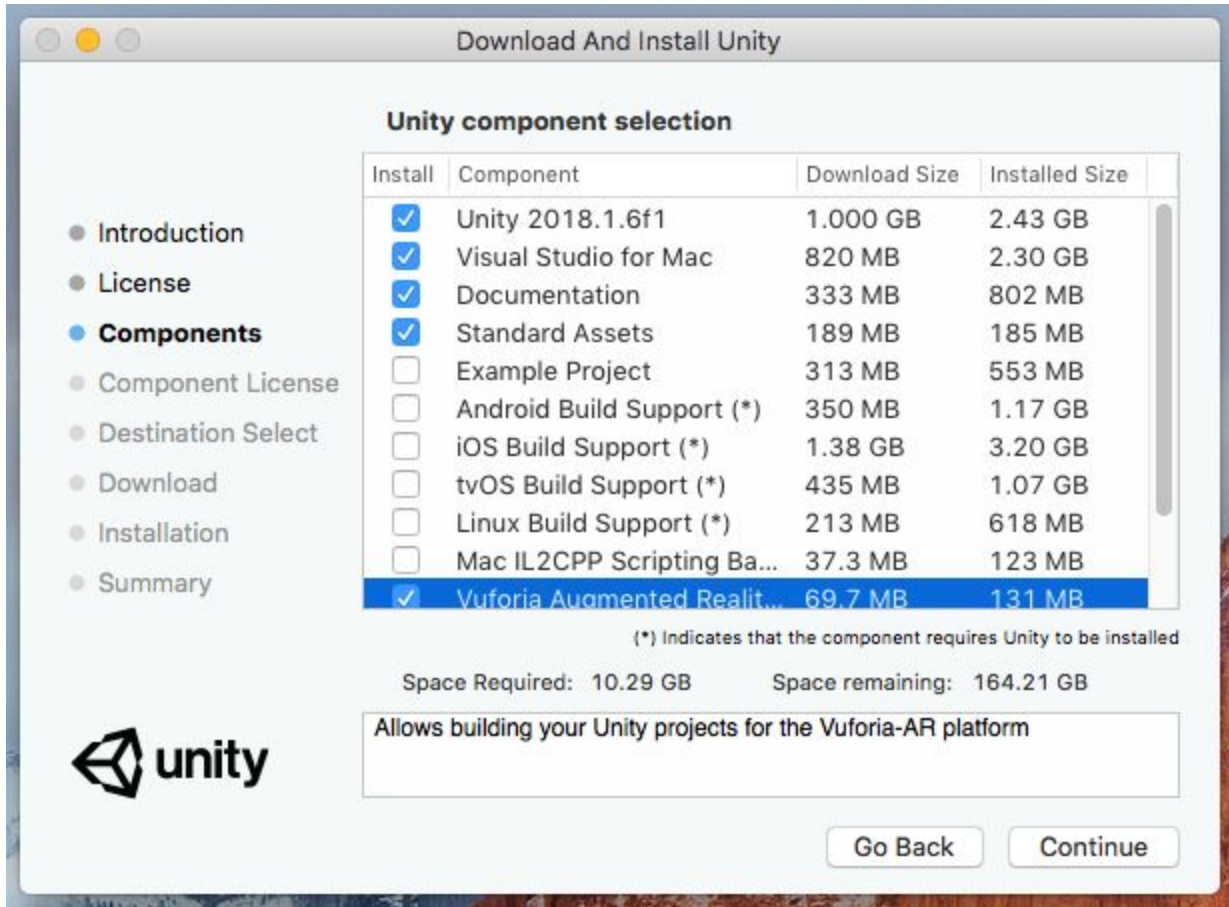
This 3D file - [bookbot3D.fbx](#)

Step 1:

Unity Personal is free to use for people wanting to start 3D development. This tutorial is built around Unity version 2018.1.6 but given Unity just did a major update hopefully it will remain current for some time.

Download and Install Unity 3D - <https://unity3d.com/>

During the installation process under “Components” be sure to check “Vuforia Augmented Reality Support.” You may also want to check “Android Build Support” and/or “iOS Build Support” if you want to develop applications for your phone later. But they are not required for this tutorial, and they are large files so will slow down the installation download.



Step 2:

You will need to create an account with Vuforia so that you can get a development key and upload your images and 3D files.

Go to <https://developer.vuforia.com/> (or search for "Vuforia Developer Portal" if this link is not working)

In the top right click on "Register" and create an account.

Step 3:

While logged into your Vuforia account in the Developer Portal click on the "Develop" tab. You should automatically be on "License Manager," but if not select that tab. Then click the "Get Development Key" button

License Manager

Create a license key for your application.

[Get Development Key](#)[Buy Deployment Key](#)

Name	Type	Status ▾	Date Modified
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Create your first license key

Give your development key an app name of “TestApp” and check the Terms and Conditions box. Then press the “Confirm” button.

Step 4:

Now click on the “Target Manager” tab and then the “Add Database” button. The database name should be “TestApp” and the type “Device”. Click the “Create” button. You will be returned to the “Target Manager” screen. Click on “TestApp”.

Target Manager

Use the Target Manager to create and manage databases and targets.

[Add Database](#)

Database	Type	Targets	Date Modified
TestApp	Device	1	May 30, 2018 10:23

Last updated: Today 1:37 PM [Refresh](#)

Step 5:

Click the “Add Target” button. We need to specify which image will act as a trigger to display our 3D object. The more unique this image the better the application will be able to recognize it and use it as a target. The uniqueness of the object will show up as its “rating” later, and you want to aim for 5 stars. We will use the “bookbot.jpg” file which is available at the top of this tutorial. Type is “Single Image”, File is “bookbot.jpg”, Width is “5”, and Name is “bookbot”. Click “Add”. The image will be uploaded and be shown in your list of targets, along with its rating.

Add Target

Type:



Single Image



Cuboid



Cylinder



3D Object

File:

.jpg or .png (max file 2mb)

Width:

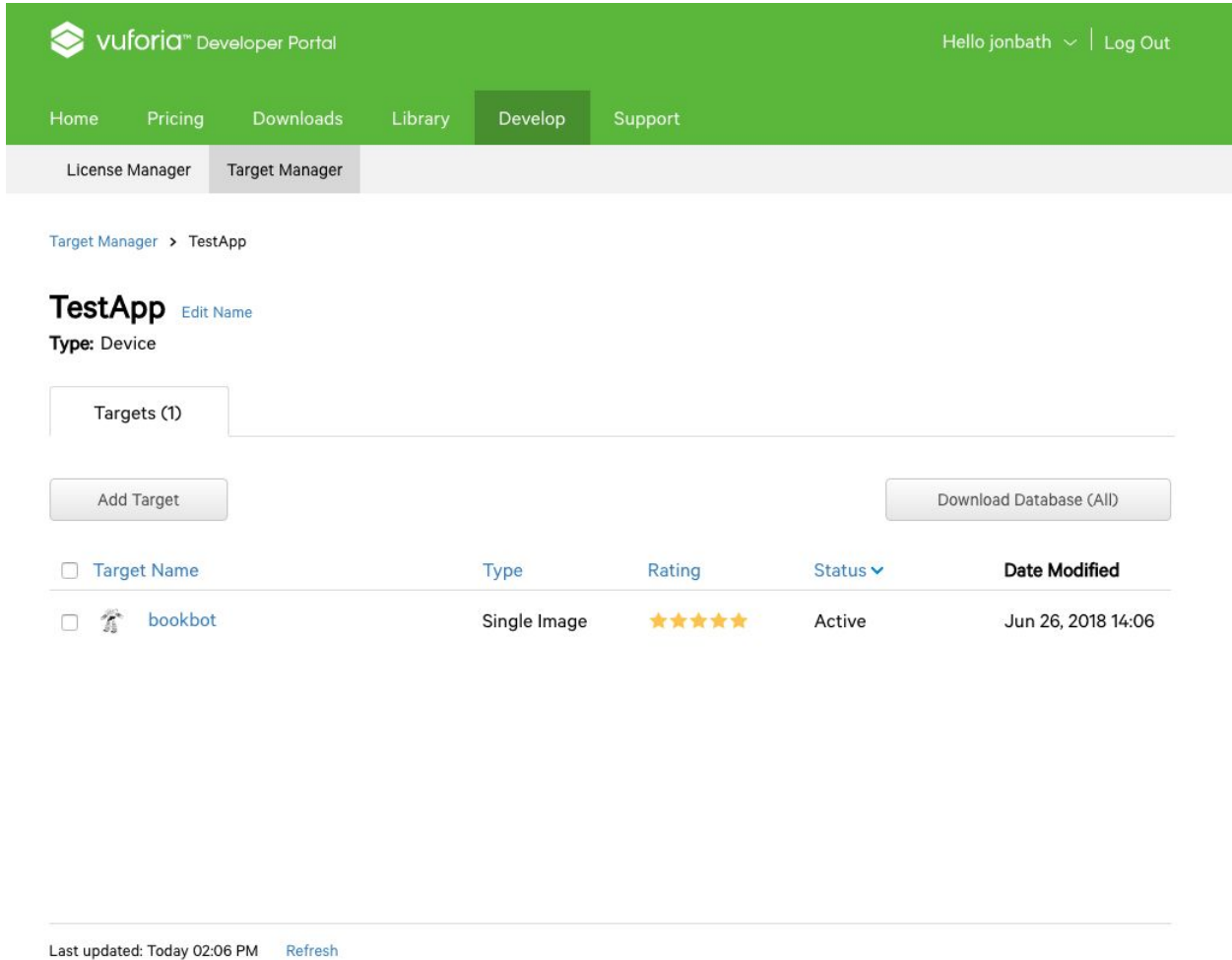
Enter the width of your target in scene units. The size of the target should be on the same scale as your augmented virtual content. Vuforia uses meters as the default unit scale. The target's height will be calculated when you upload your image.

Name:

Name must be unique to a database. When a target is detected in your application, this will be reported in the API.

Step 6:

We now need to download the database so we can use it in our Unity application. Click the “Download Database (All)” button. Select “Unity Editor” as the development platform and click the “Download” button. It might take a moment or two for the file to download.




The screenshot shows the vuforia Developer Portal interface. The top navigation bar is green and contains the vuforia logo, "Developer Portal", and user information "Hello jonbath" with a dropdown arrow and "Log Out". Below the navigation bar are tabs for "Home", "Pricing", "Downloads", "Library", "Develop" (highlighted), and "Support". A secondary navigation bar contains "License Manager" and "Target Manager" (highlighted).

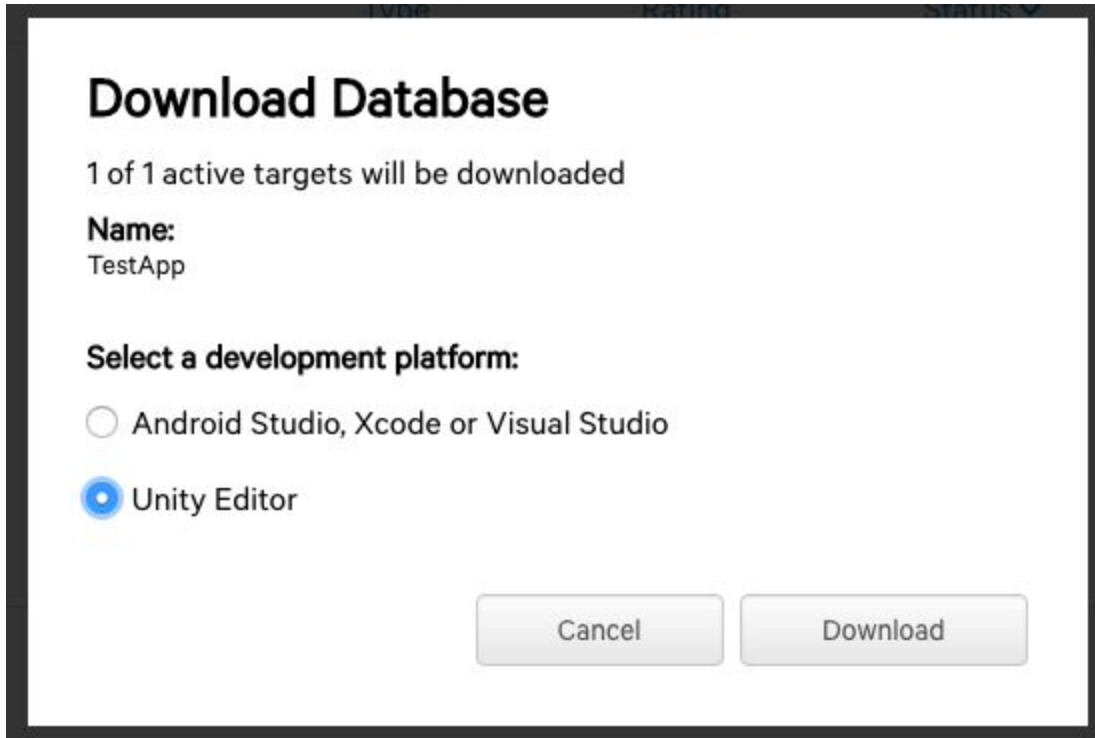
The main content area shows the breadcrumb "Target Manager > TestApp". The title "TestApp" is displayed with an "Edit Name" link. Below the title, it says "Type: Device".

There is a box labeled "Targets (1)" and a button "Add Target". On the right side, there is a button "Download Database (All)".

A table lists the targets:

<input type="checkbox"/>	Target Name	Type	Rating	Status	Date Modified
<input type="checkbox"/>	 bookbot	Single Image	★★★★★	Active	Jun 26, 2018 14:06

At the bottom, it says "Last updated: Today 02:06 PM" with a "Refresh" link.

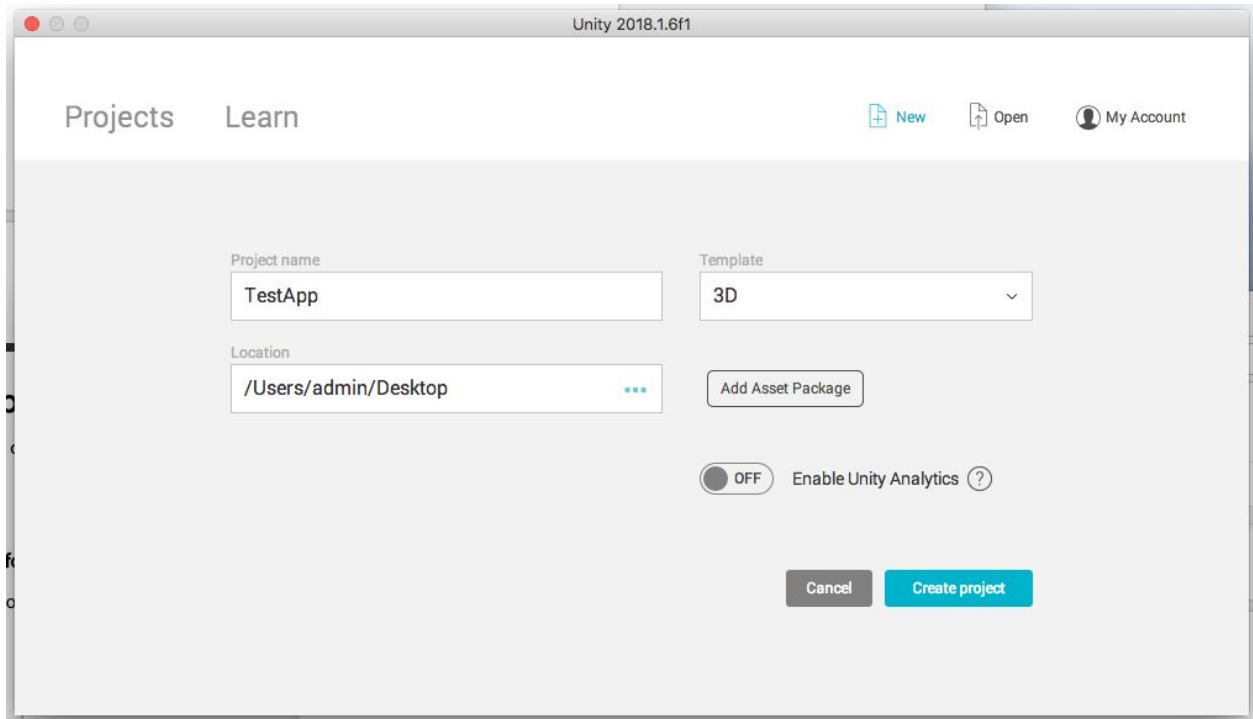


Step 7

Open the Unity application, but keep the Vuforia window open in your web browser because we will need it for a later step. If it is your first time opening the application you will need to create a Unity ID. Under “License Management” select “Unity Personal” and then “I don’t use Unity in a professional capacity.” After activation click the “Start Using Unity” button.

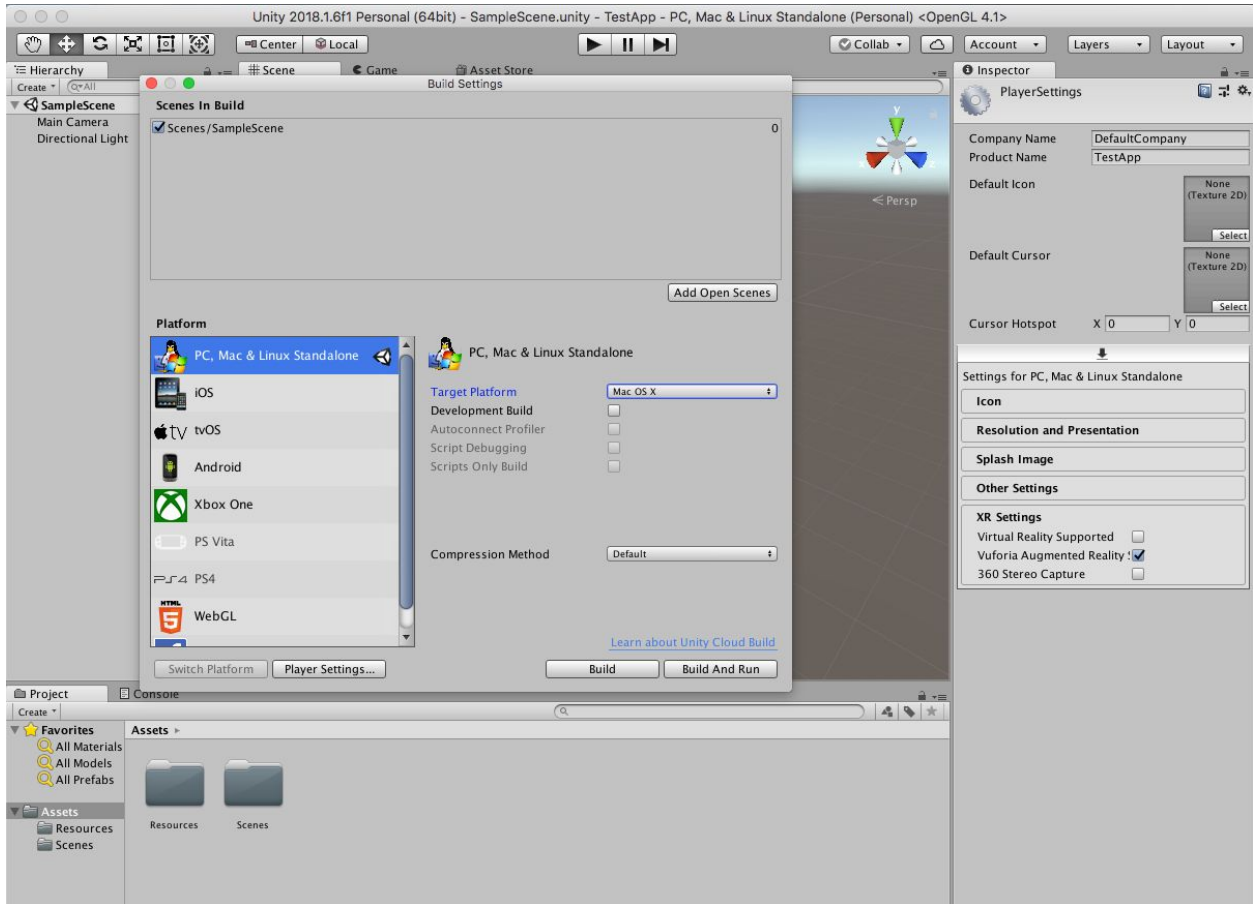
Step 8

Click the “New Project” button. Call your project “TestApp”, use the template “3D”, and select a folder you want to save it in. Switch “Enable Unity Analytics” off. Then click the “Create Project” button. Unity will start (may take a few moments).



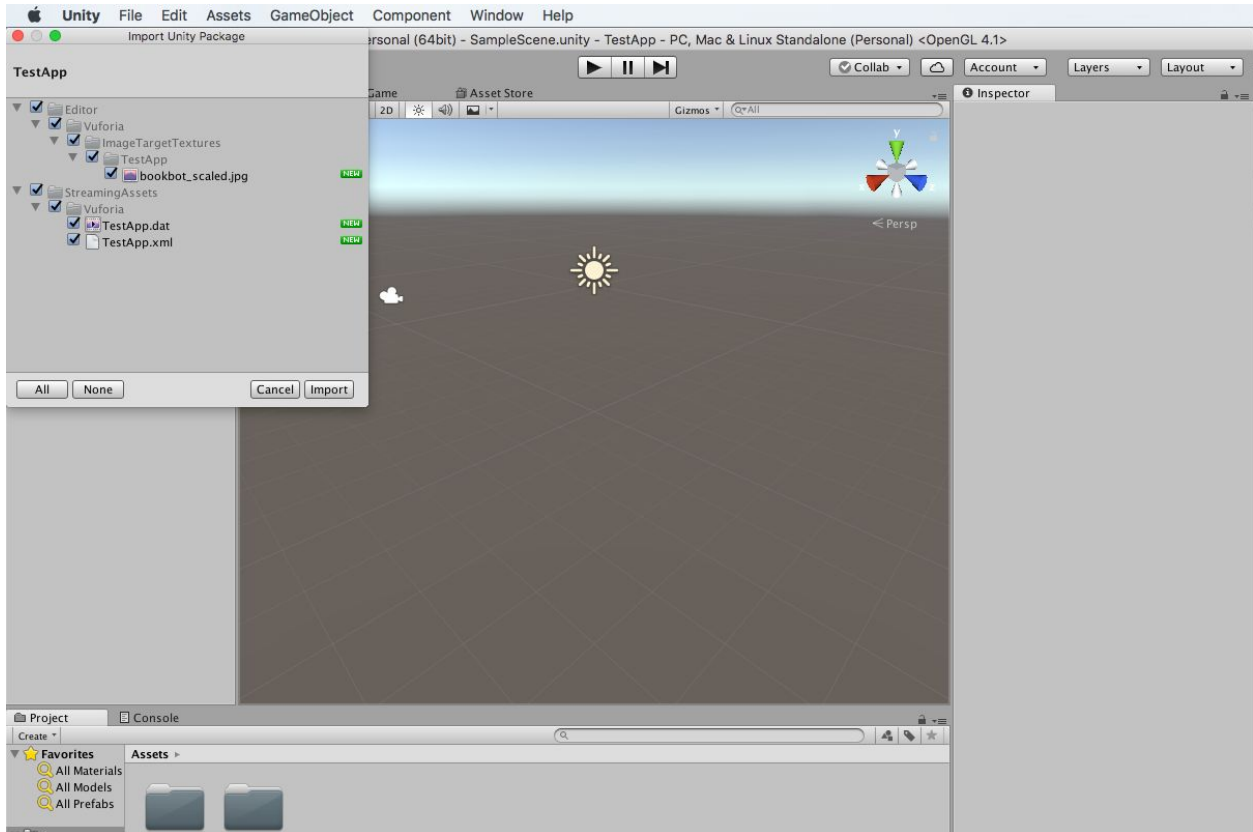
Step 9

Although we downloaded the Vuforia components in Step 1, we still need to tell Unity to enable them. In the top menu bar go to File -> Build Settings . A window will pop open. In the bottom left of that window click the “Player Settings” button. Information will appear in the right side of the Unity window. Click the bottom tab, “XR Settings”, and then check the “Vuforia Augmented Reality” box. You will need to agree to Vuforia’s Terms and Conditions. You can then close the Build Settings window.



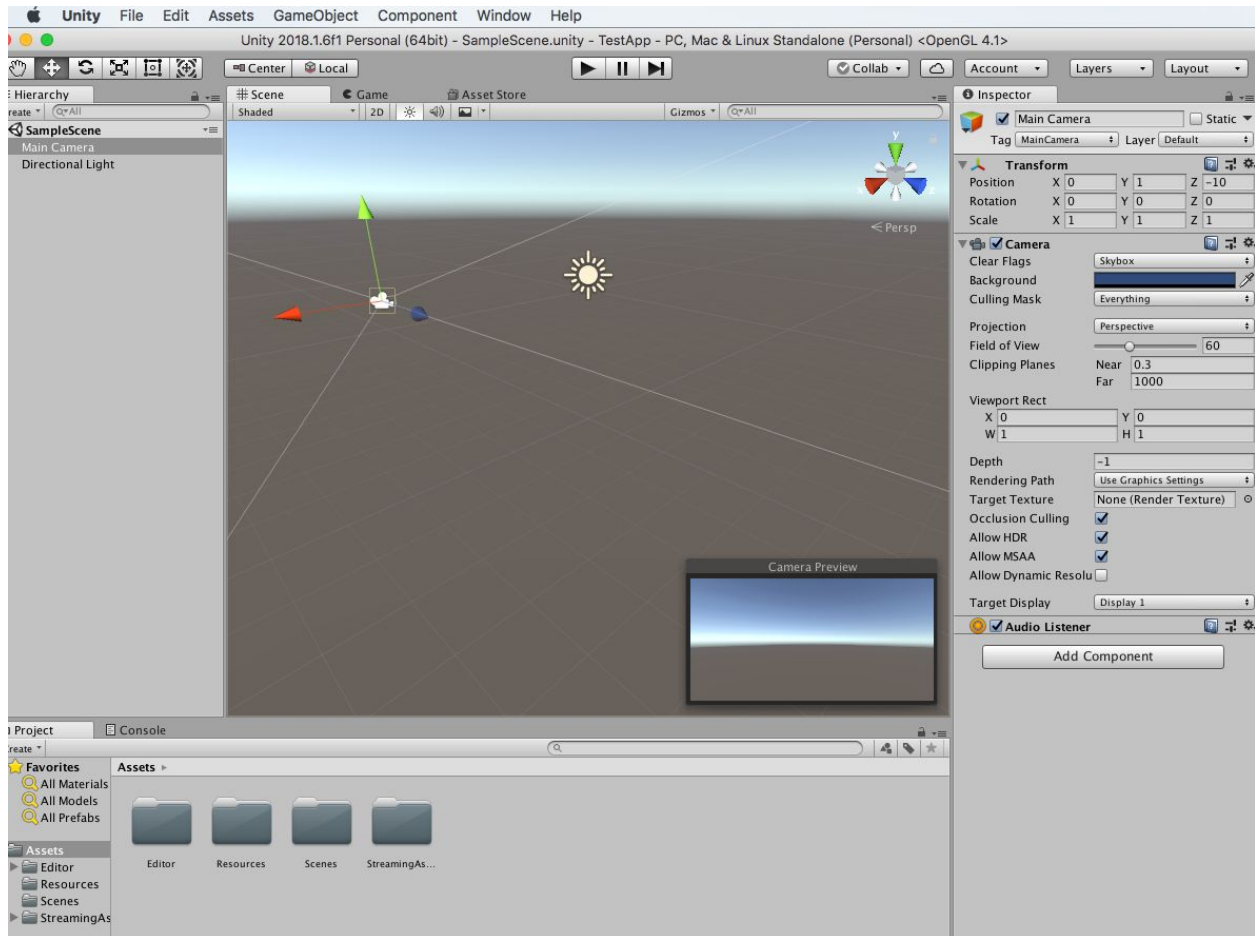
Step 10

The next step is to import our Vuforia assets. In the top menu select Assets -> Import Package -> Custom Package . Navigate to wherever you downloaded the Vuforia database, called "TestApp.unitypackage" if you have been using our suggested names, and open it. A window called "Import Unity Package" displaying the contents of the package will appear. Click "Import".



Step 11

In the Unity “Scene” window click on the movie camera. In the “Inspector” panel on the right it will show that you’ve clicked on “Main Camera”. Press the “Delete” button -- “Command + Delete” if you are on a Mac. The camera should disappear.



Step 12

We now need to add the Augmented Reality camera. In the top menu got to “GameObject -> Vuforia -> AR camera”. If this is your first time doing this step it will need to import some assets. Press the “Import” button in the pop-up window. You’ll get to watch some progress bars and then the camera will appear in the scene.

Step 13

Go back to the Vuforia Developer Portal tab in your web browser. In the “License Manager” tab click on “TestApp”. Copy all the text in the gray rectangle by selecting it and using CTRL+c (Command+c on a Mac).

TestApp

[Edit Name](#) [Delete License Key](#)[License Key](#)[Usage](#)

Please copy the license key below into your app

```
AcEjaKX/////AAABmX4Pyc51LEm1lsRQ1tJ0LXVsnM/2A+aa6oCW
2kPCU+fv6/+RUVpDkd2rGQg+02ikgQLa4nOwNO8iqL5xFbG+KXx4
U4rwUsNGDENVkt7iTo4xFOV0Wwsp8zdf5WbxsUQggD36J4k9tay
5LNgP24iqDzuZkTYrk0biO9Ar7R7qUOC3OJBpcRrDExnAD5QYCRA
z40DfsPZPPFF9TQ3j4/XRdkdjX25r6KzEqk8140feZnp0LmKwUgr
j75z/lKbigWov28Z+7nTsx0/00Ya4+152I0XYCudOSczbNVK27p
1/12czydHx21L2u05k4puYbUT4v19XUDu3FI60ktkMKpE3uPkaWY
LL3CZpYUXEeYvDnZ+
```

Type: Develop

Status: Active

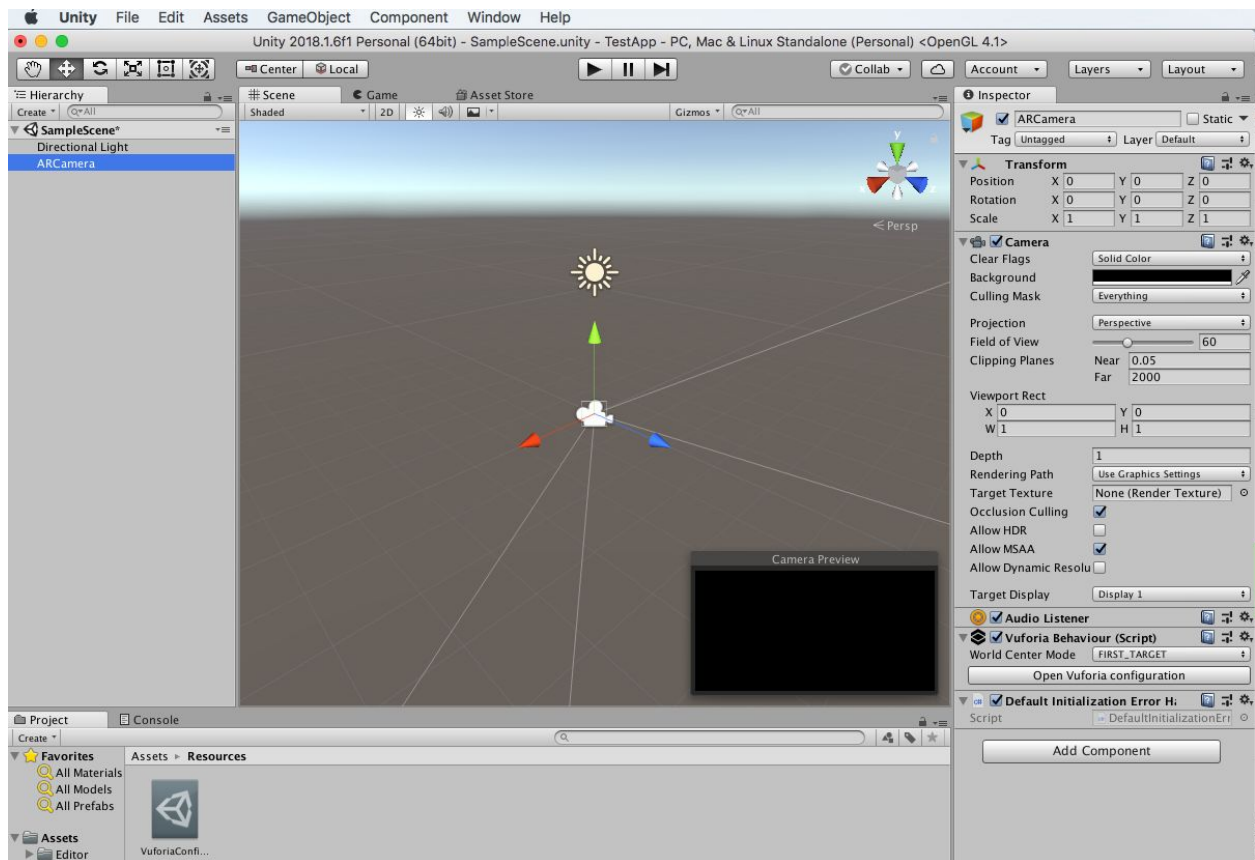
Created: Jun 26, 2018 13:34

History:

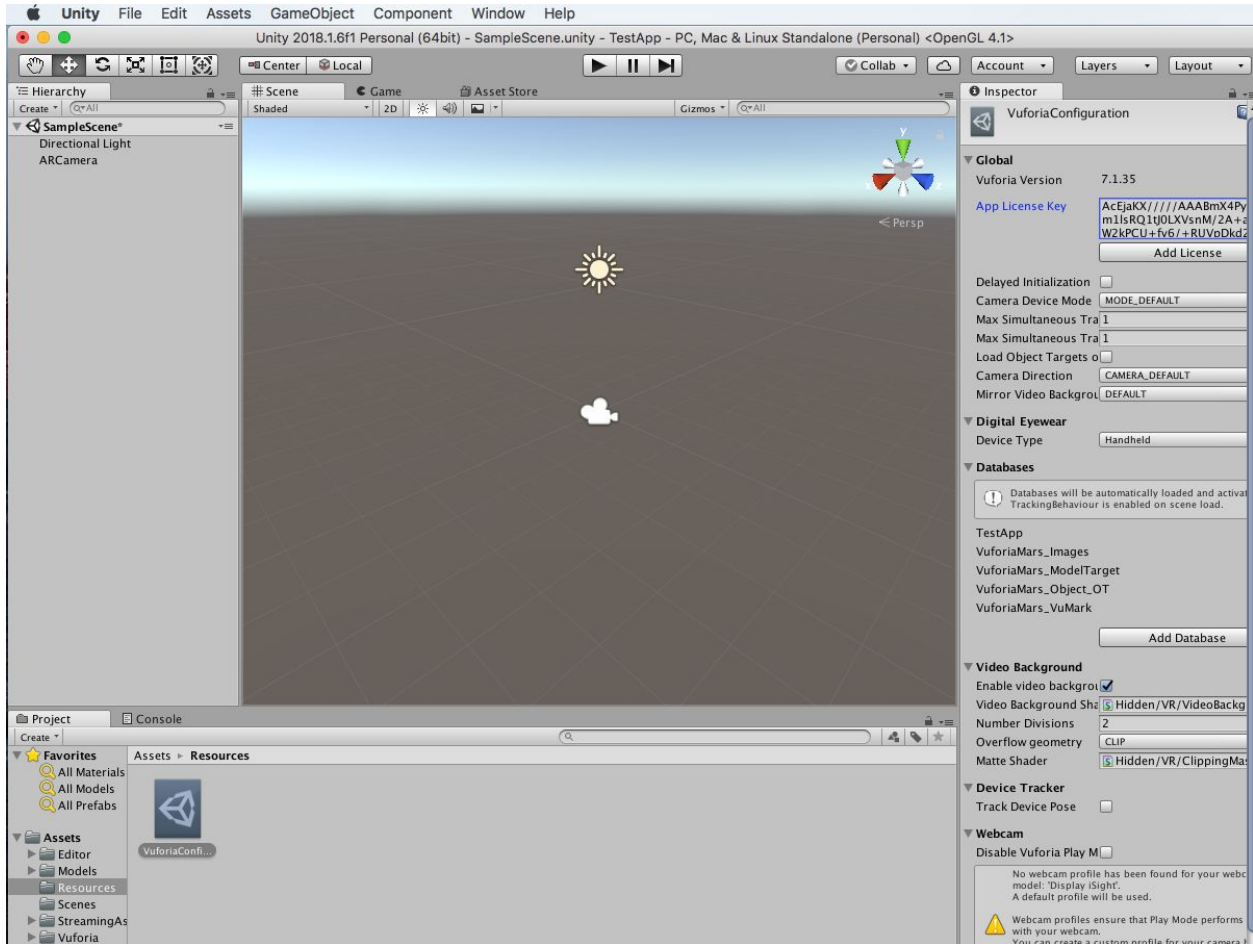
License Created - Today 13:34

Step 14

Go back to Unity. Click on the camera in the Scene window. The right Inspector panel will show “ARCamera”. Near the bottom of the Inspector panel click the “Open Vuforia Configuration” button.

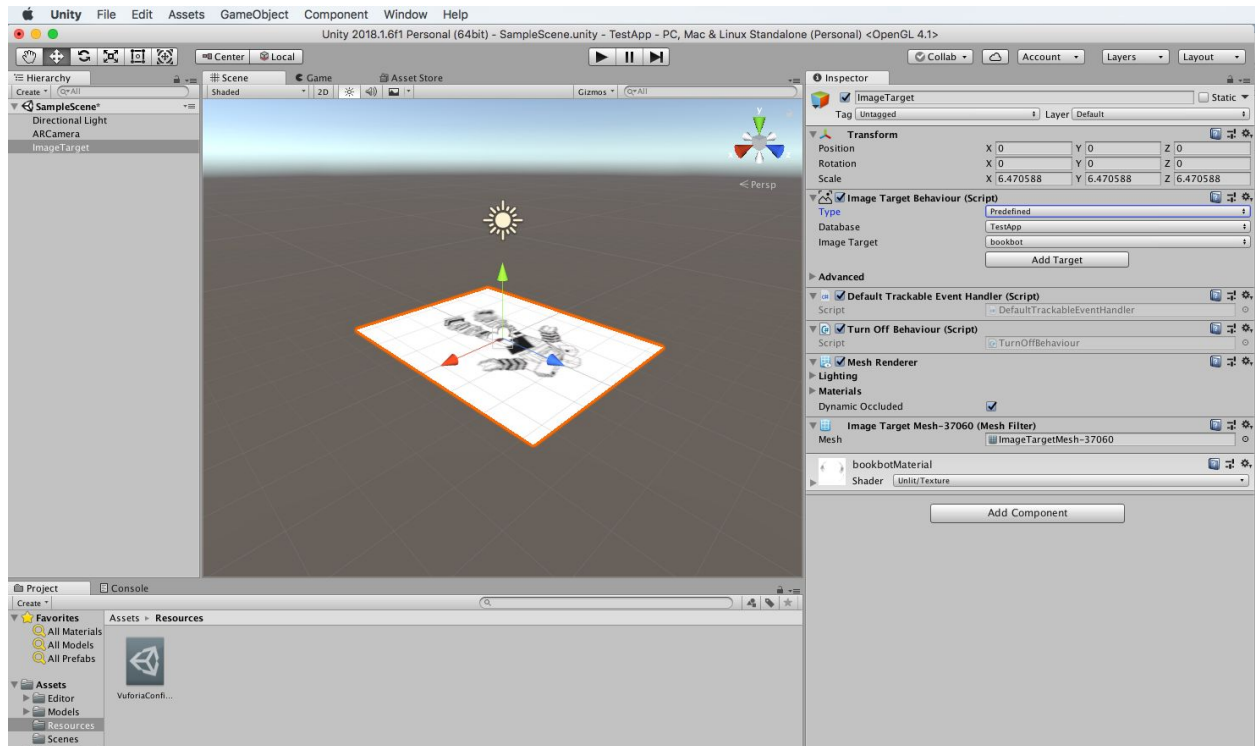


The Inspector panel will change to show you the Vuforia configuration. In the “App License Key” textbox near the top of the Inspector paste the license key by clicking in the box and pressing “Control+v” or “Command+v” on a Mac. You DO NOT need to click the “Add License” button.



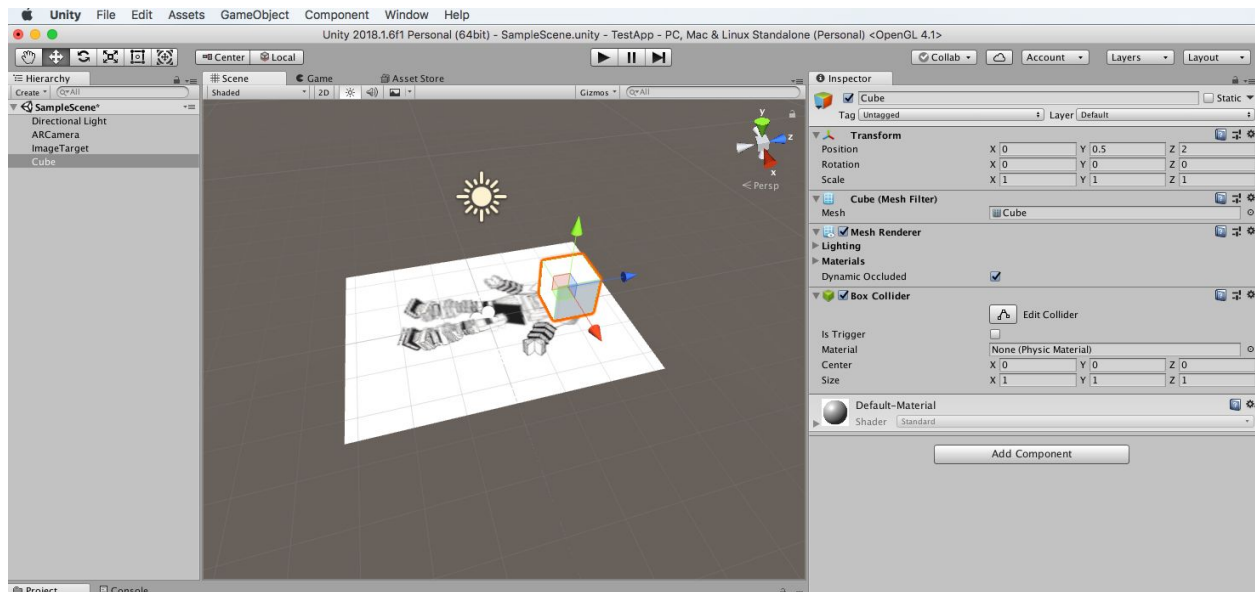
Step 15

The next step is to tell the camera which image to look for to trigger the Augmented Reality. In the top menu go to "GameObject->Vuforia->Camera Image->Camera Image Target". In the right Inspector panel change the "Type" from "User Defined" to "Predefined". The Database field will be autopopulated with "TestApp" and the Image Target with "bookbot". The bookbot image will appear in the scene window.



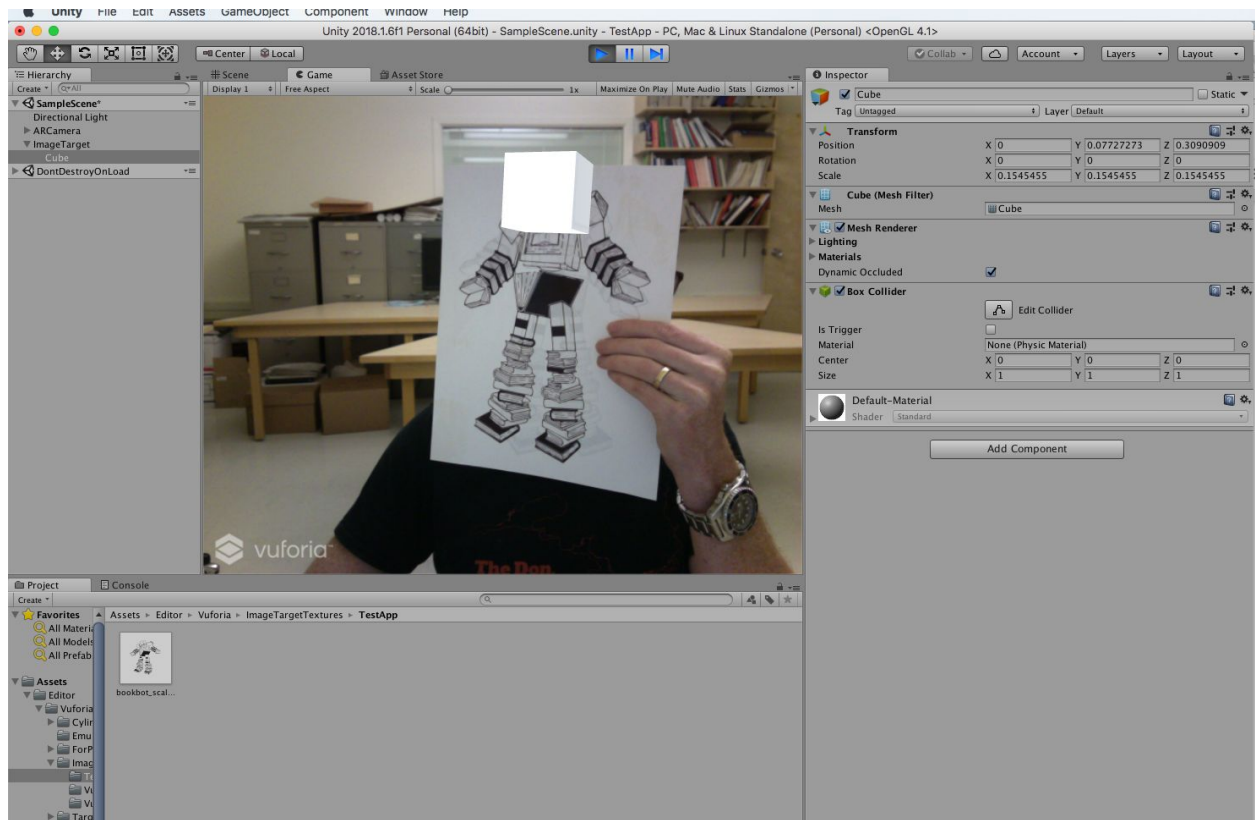
Step 16

For our first test we are just going to have a 3D cube appear when the camera detects the bookbot image. In the top menu select “GameObject->3D Object->Cube”. A cube will appear in the middle of the scene. We need to attach it to the image target so it appears and disappears whenever the target is detected by the camera. In the left “Hierarchy” panel click on “Cube” and drag it onto “ImageTarget”. It will now be a sub-item, or child, of the image target. In the right Inspector panel you can set its Y position to “.5” and Z to “2” to have it appear entirely above the image of bookbot’s head. Or in the Scene window you can use the green, red and blue handles to drag it around the scene. Make sure it is positioned somewhere above the bookbot image.



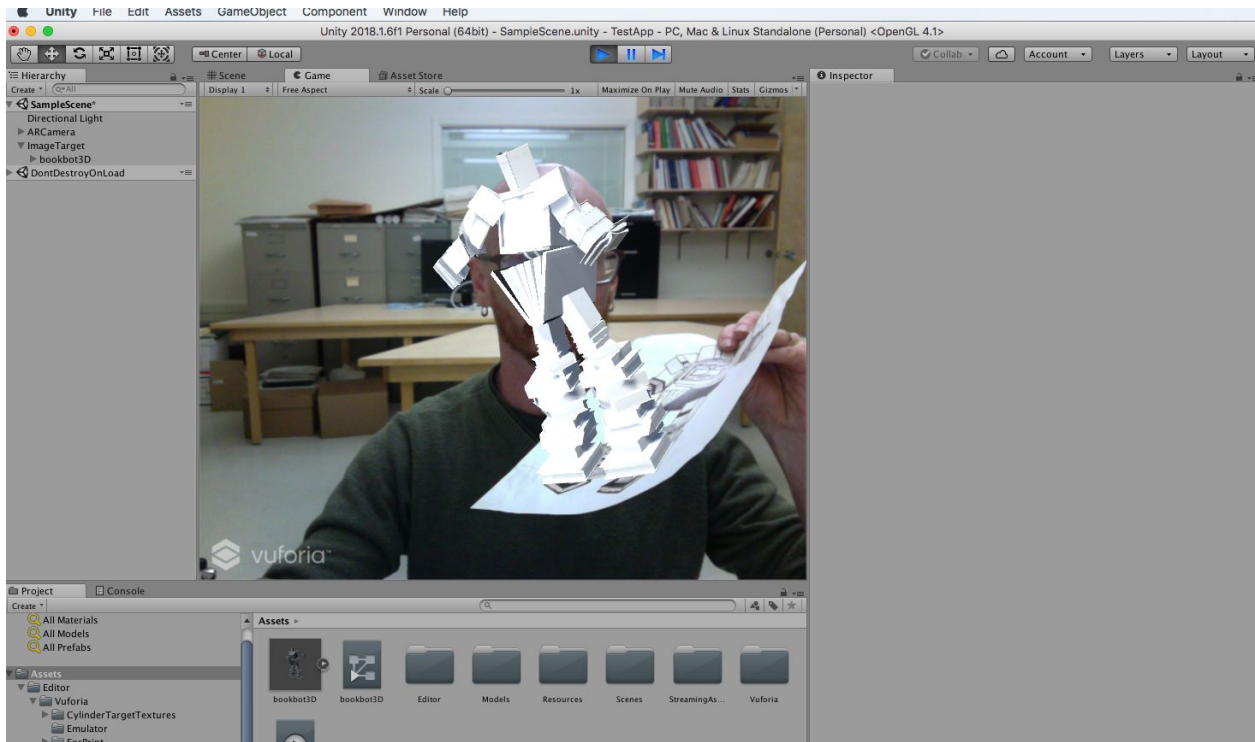
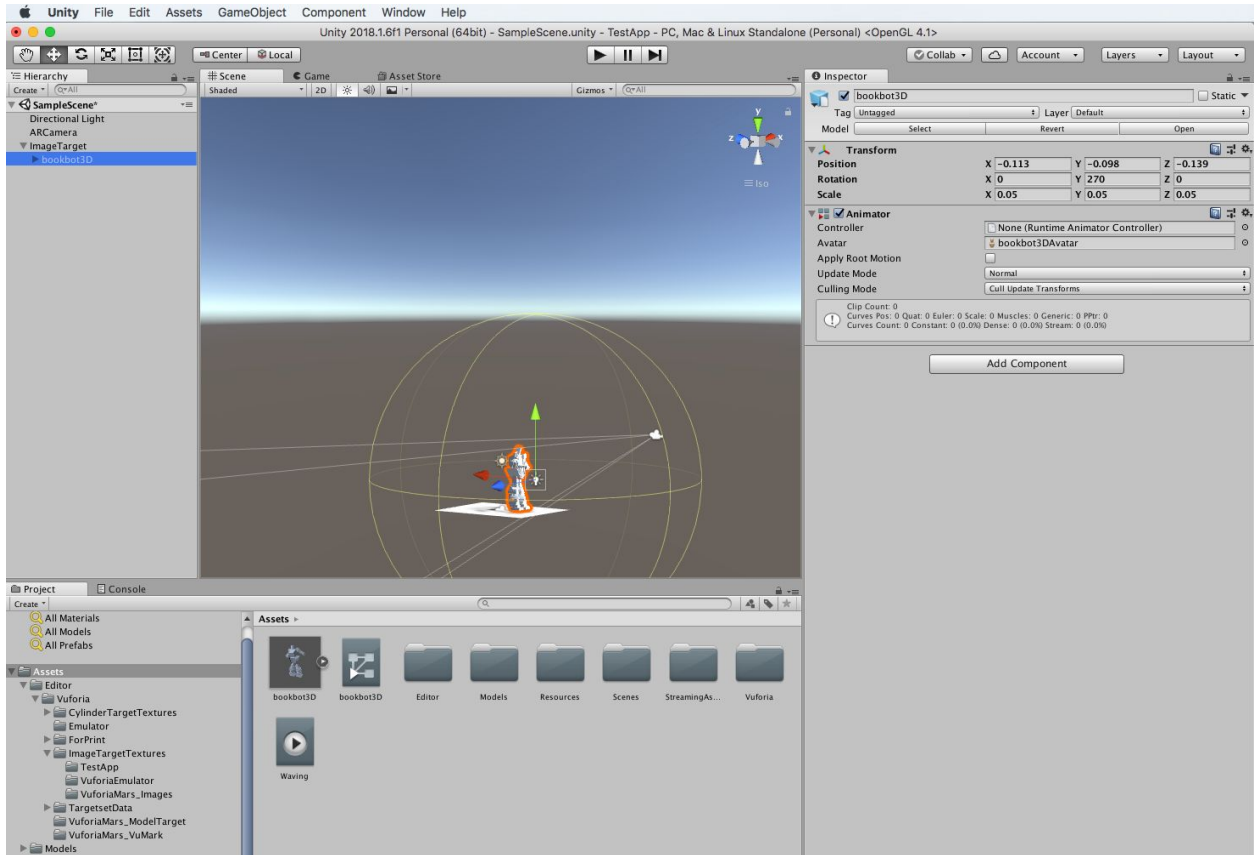
Step 17

It's time to try things out. Press the "Play" arrow, the right facing arrow button, located above the Scene window. It will take a moment to build the file and then the feed from your camera will appear in the Scene window. Hold up your printout of bookbot. A 3D cube will appear where you placed it on the image. Congratulations, you've augmented reality! To stop the simulation press the "Play" arrow again.



Step 18

Once you've tired of basic shapes you can also use 3D assets for your augmented reality. Select the cube in the Scene and delete it (with the Delete key or Command+Delete on Mac). Download the "bookbot3D.fbx" file at the top of this tutorial. In the top menu use "Assets->Import New Asset" and then choose "bookbot3D.fbx". "bookbot3D" will appear in the Assets panel in the bottom middle of the window. You may need to click on the "Assets" folder in the bottom left panel first to be able to see your imported assets. Drag "bookbot3D" up onto "ImageTarget" in the left panel. BookBot will appear in the Scene window but will be very large. Using the Inspector panel you can Position, Scale, and Rotate the model. Setting the X,Y and Z scale to 0.05 will make BookBot a manageable size. Use the "Play" arrow to try things out.



Step 19 - Next steps

Here are some other resources we have found useful:

How to deploy for IOS

<https://medium.com/@MissAmaraKay/build-your-first-ai-ar-app-on-unity-8c12895687fa>

<https://unity3d.com/learn/tutorials/topics/mobile-touch/building-your-unity-game-ios-device-testing>

<https://mobile-ar.reality.news/how-to/arkit-101-using-unity-arkit-plugin-create-apps-for-iphone-ipad-0178022/>

How to deploy for Android

<https://www.sitepoint.com/how-to-build-an-ar-android-app-with-vuforia-and-unity/>

For Hololens(the set up is very similar to the set up for phones)

<https://www.youtube.com/watch?v=u6fT2zaEKVc>

For learning about virtual buttons

<https://www.youtube.com/watch?v=ElmzIq6stNI>

For additional help

https://docs.unity3d.com/Manual/vuforia_tips.html

<https://library.vuforia.com/articles/Training/getting-started-with-vuforia-in-unity.html>

alternatives to Vuforia

<https://unity3d.com/how-to/create-AR-games-in-Unity-efficiently>