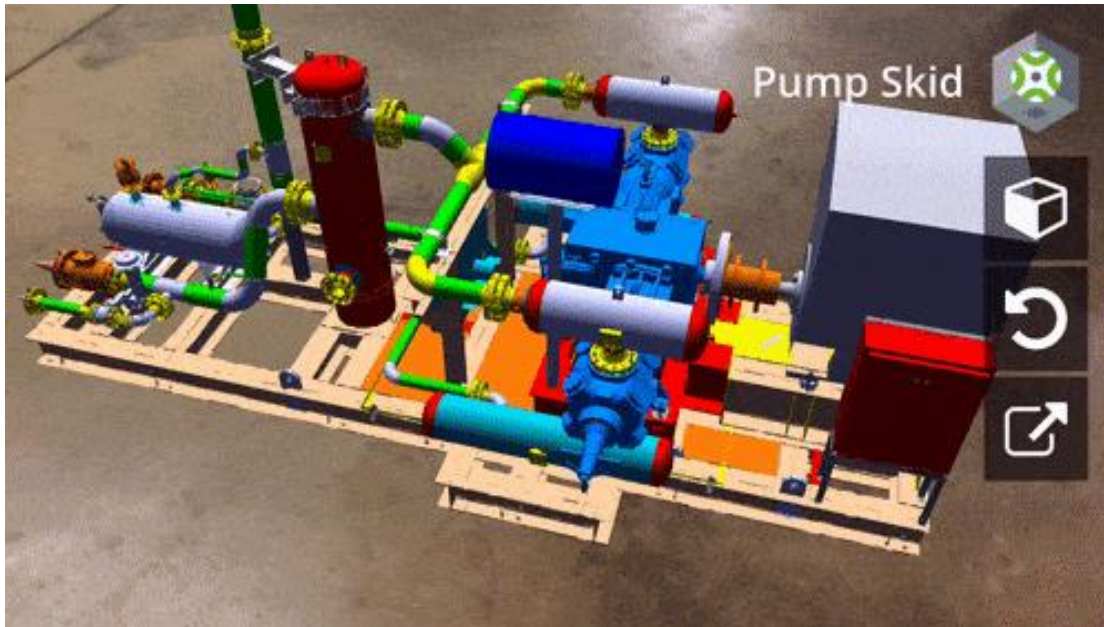


# Vuforia

CPS592 – Visual Computing and Mixed Reality

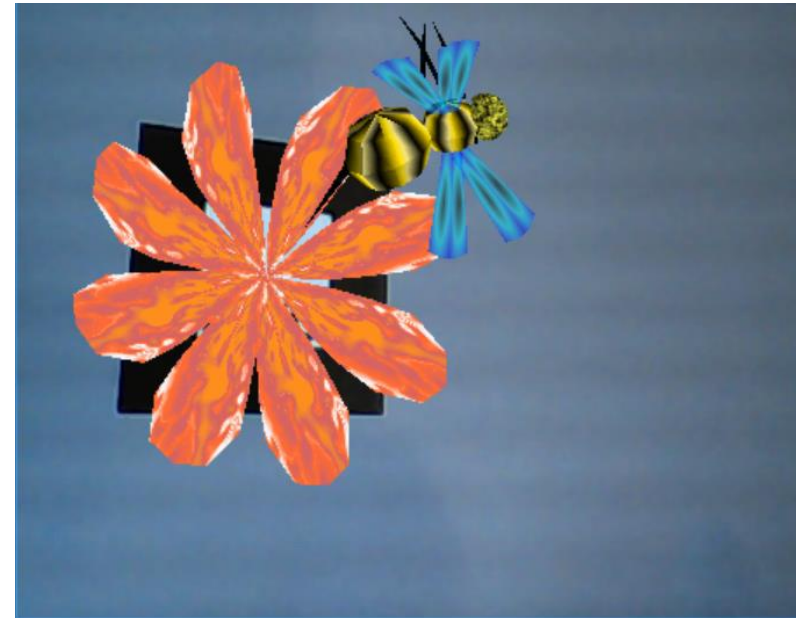
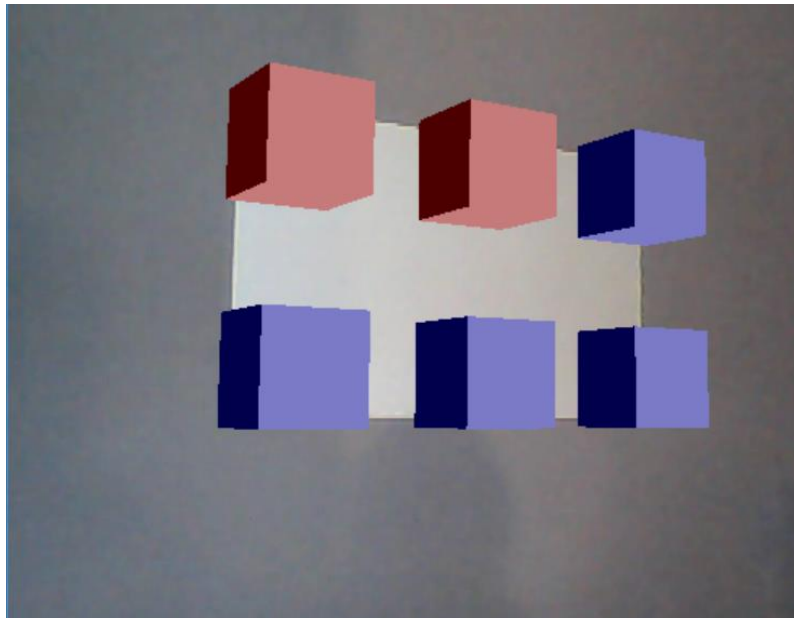
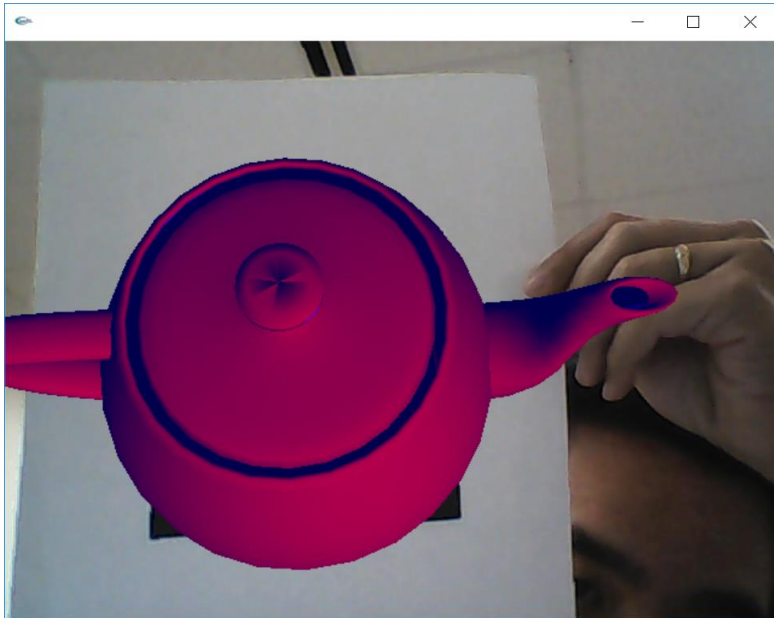
# What we study so far

- What AR can do



# What we study so far

- ARToolkit

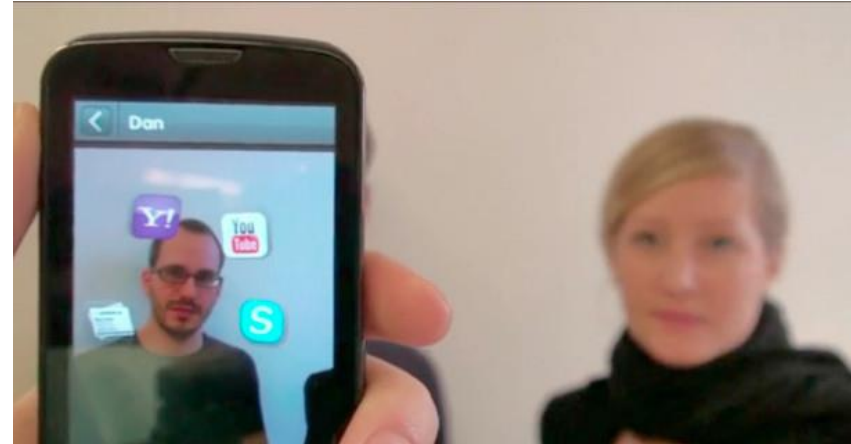


# What they have in common? **RECOGNITION**

**Marker Recognition**



**Face Recognition**



**Image Recognition**



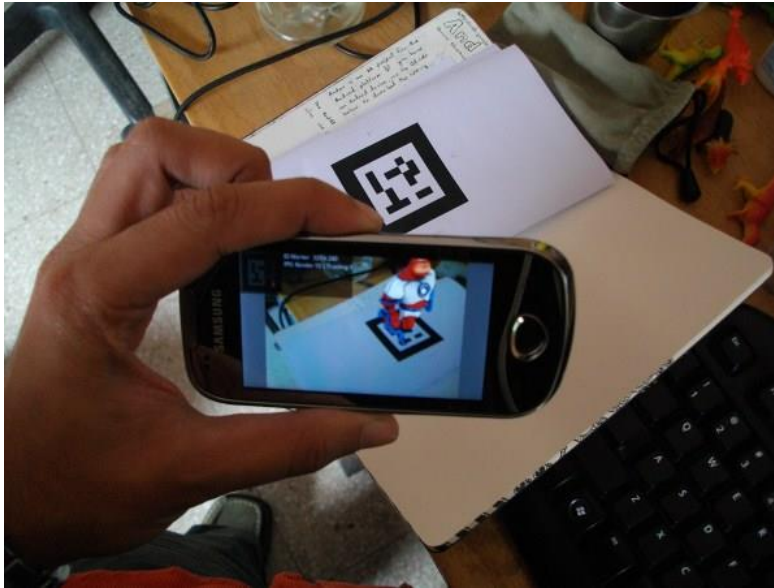
**Object Recognition**





# Rendering virtual objects

**Binary Marker Based**



**Color Marker Based**



**Image Based**



# AR platforms supporting image recognition

## String SDK

### Pros

Somewhat Reliable and accurate

Frame based AR (makes for a more content flexible target)

Very easy to setup , great documentation

Simple Unity Plugin for iOS and Android!

Simple SDK to integrate with iOS using OpenGL and android using OpenGL



### Cons

Not simple to setup and use

Big learning curve

Can be unreliable if not configured properly

Marker based AR supported only

Does not support occlusion

Expensive depending on use ( anywhere from 0 for a demo to Campaign at \$7000)

Demo	Developer	Indie	Pro	Campaign
\$0	\$99	\$499 per app per year	\$999 per app per year	\$7,000 per app per year
No App Store release	No App Store release	App Store release	App Store release	App Store release
Track 1 marker	Track unlimited markers	Track 1 marker	Track unlimited markers	Track unlimited markers
Splash & Reticle	Splash & Reticle	Splash & Custom Reticle	Splash	White Label
	Unity® Cocoa Touch Hook		Unity® Cocoa Touch Hook	Unity® Cocoa Touch Hook
	Live Color Sampling		Live Color Sampling	Live Color Sampling
DOWNLOAD	BUY	BUY	BUY	BUY

# AR platforms

## Metaio SDK

### Pros

- Somewhat reliable and accurate

- Marker / Frame and Image based recognition

- Location based AR

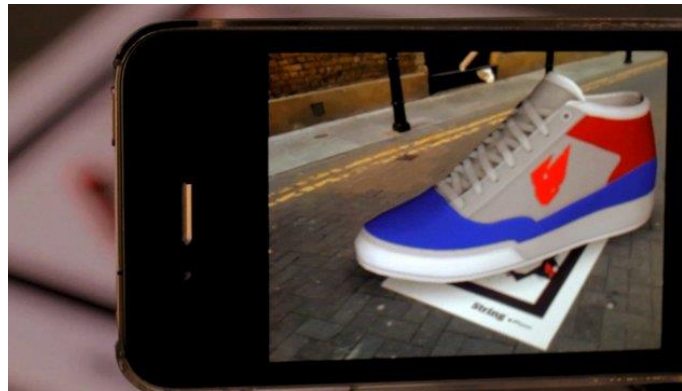
- 3D SLAM /3D

- MARKERLESS

- Very easy to setup

- Simple Unity Plugin for iOS and Android!

- Simple SDK to integrate with iOS using OpenGL and android using OpenGL



#### SDK BASIC (For 2-D Tracking)

Remove the metaio Watermark from an unlimited number of apps published with your developer account. There is no time limitation or download restriction for your apps. One licence is good to publish for all your apps on iOS, Android and Windows. The Basic license removes the watermark from all AR-apps using 2-D tracking technology.

2.990€ / **\$3,490**

[Purchase SDK Basic Licensing](#) ▶

#### SDK PRO (For 3-D Tracking)

Remove the metaio Watermark from an unlimited number of apps published with your developer account. There is no time limitation or download restriction for your apps. One licence is good to publish for all your apps on iOS, Android and Windows. In addition to SDK Basic licensing, add 3-D Tracking, SLAM, premium support and free invitations to metaio special events.

4.950€ / **\$5,490**

[Purchase SDK Pro Licensing](#) ▶

### Cons

- More friction to setup a project (you need a dev key)

- Not great for multiple target recognition

- 3D markerless is not there

- Not the best support for devs (my experience)

- Scattered documentation

- Expensive for commercial use



# AR platforms

## Pros

- Very Reliable
- Frame and Image based recognition
- Cloud based campaign AR
- User created targets
- Very easy to setup , great documentation
- Simple Unity Plugin for iOS and Android!
- Simple SDK to integrate with iOS using OpenGL and android using OpenGL
- Totally Free!!! (with the exception of an enterprise cloud AR DB setup)
- Great support from Qualcomm

## Vuforia SDK



## Cons

- Image based targets really need to be in a certain way content wise to make for a good target



# Why Vuforia?

- Vuforia uses advanced technologies in Computer Vision.



## Creative Empowerment

The SDK offers developers the creative freedom to build unique experiences that reflect brands and drive business results.



## Maximum Reach

The Vuforia platform supports Android and iOS smartphones and tablets as well as digital eyewear. Developers can build Vuforia apps in Android Studio, Xcode and Unity cross-platform game engine.



## Advanced Vision

Vuforia-enabled apps can recognize a range of everyday objects like books, magazines, toys, product packaging, and more.

# Why Vuforia?

- Vuforia is supported by a global ecosystem of 275,000+ registered developers and has powered 30,000+ apps with more than 300 million app installs worldwide.

## What developers are saying



### Scope AR

No other SDK can match Vuforia's robust tracking and performance, which is essential for an excellent user experience. - Scott Montgomerie, CEO, Scope AR



### ViewAR

Vuforia offers great robustness, and is our choice for AR applications. - Markus Meixner, CTO, ViewAR GmbH



### Vuframe

Vuforia is the leading AR SDK available, and continuously allows us to push the limits of the immersive experiences we create. - Andreas Zeitler, Managing Director, Vuframe

# Vuforia's timeline

- Vuforia Augmented Reality SDK, formerly known as QCAR, was found by Qualcomm.

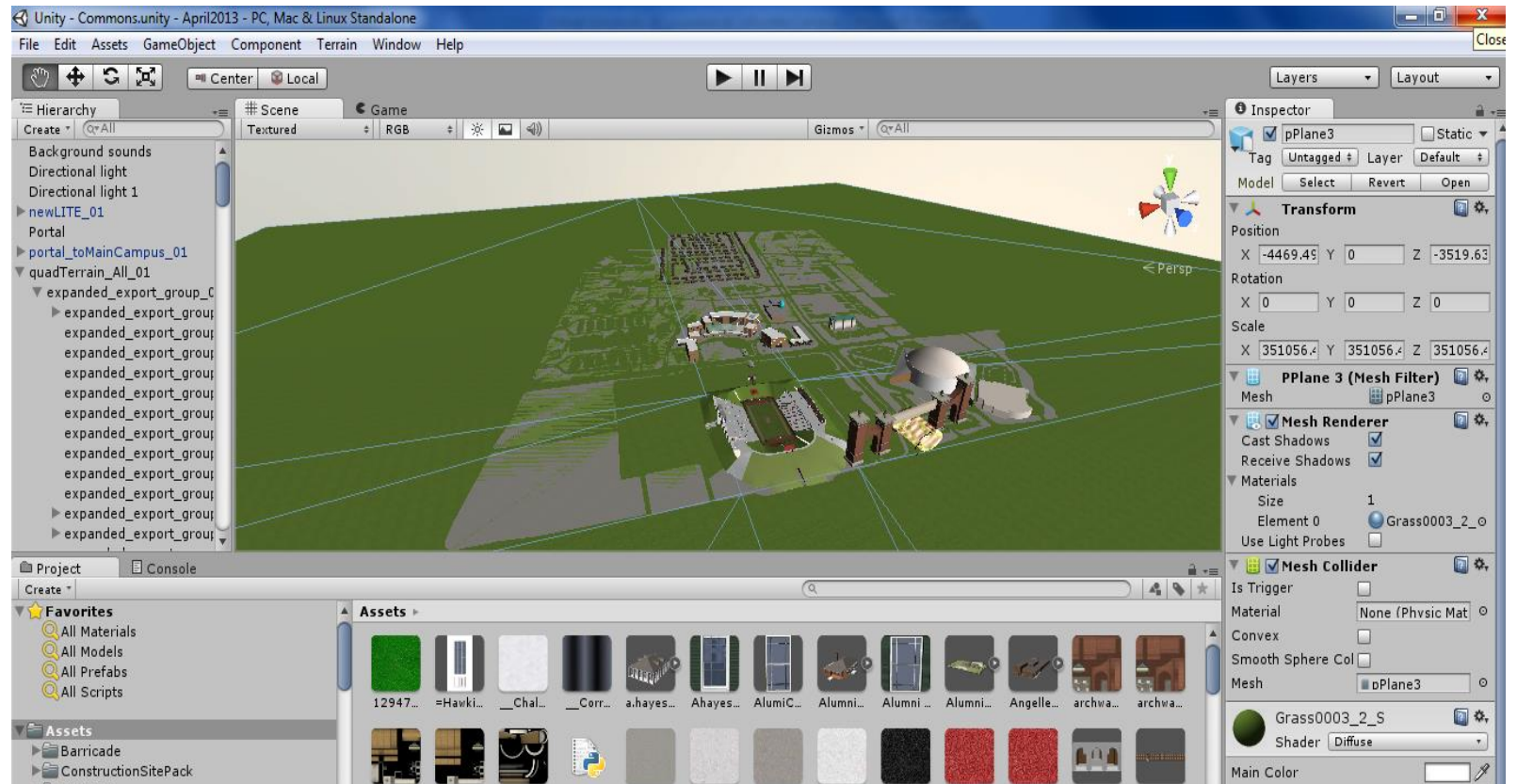


- In 2015, Vuforia was bought by PTC.



# Vuforia is not alone

- **Vuforia** usually works with **Unity3D**
- **Unity3D** is a tool for video game, visualizations, and interactive media development.





# The main components in Vuforia

- ARCamera:
  - Accessing to the camera
- ImageTarget
  - Responsible for image recognition
- Directional light
  - Responsible for lighting
- 3D Models
  - Virtual objects which will be shown in AR application

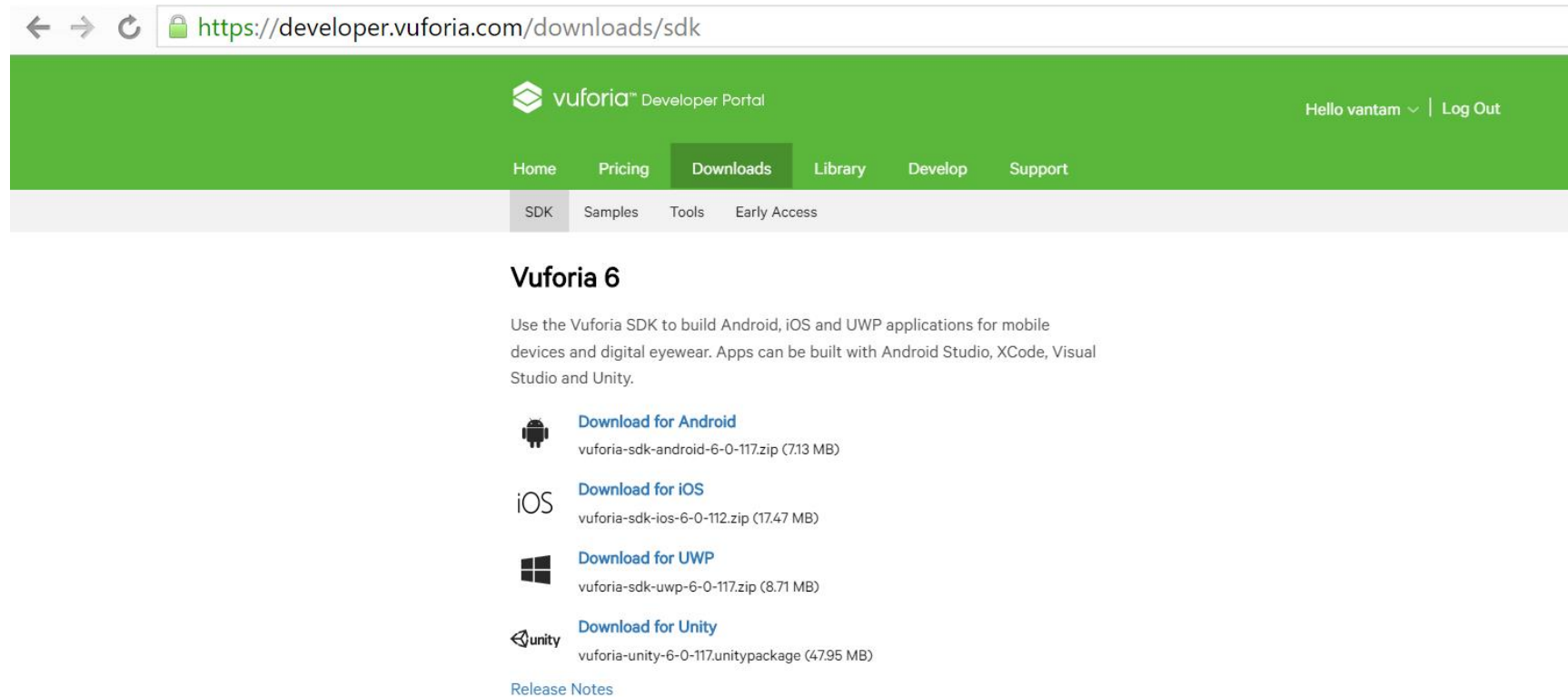
# How to develop AR applications with Vuforia

## What we need

- 1.Laptop/computer
- 2.Vuforia SDK
- 3.Unity3D
- 4.Android device
- 5.Vuforia Dev Account
- 6.Sample target image (marker)
- 7.3D Models

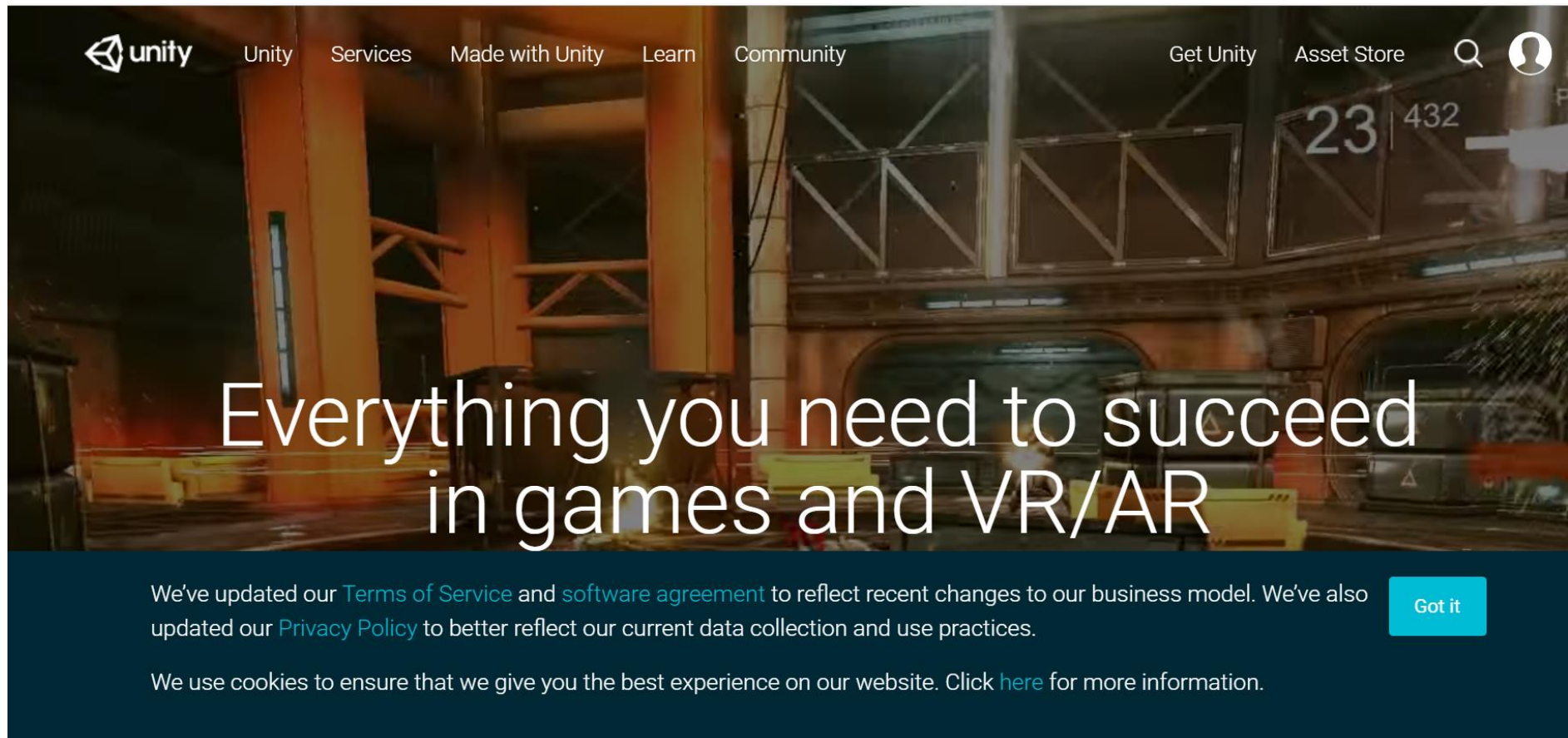
# Vuforia SDK

- <https://developer.vuforia.com/downloads/sdk>



# Unity3D

- <https://unity3d.com/>





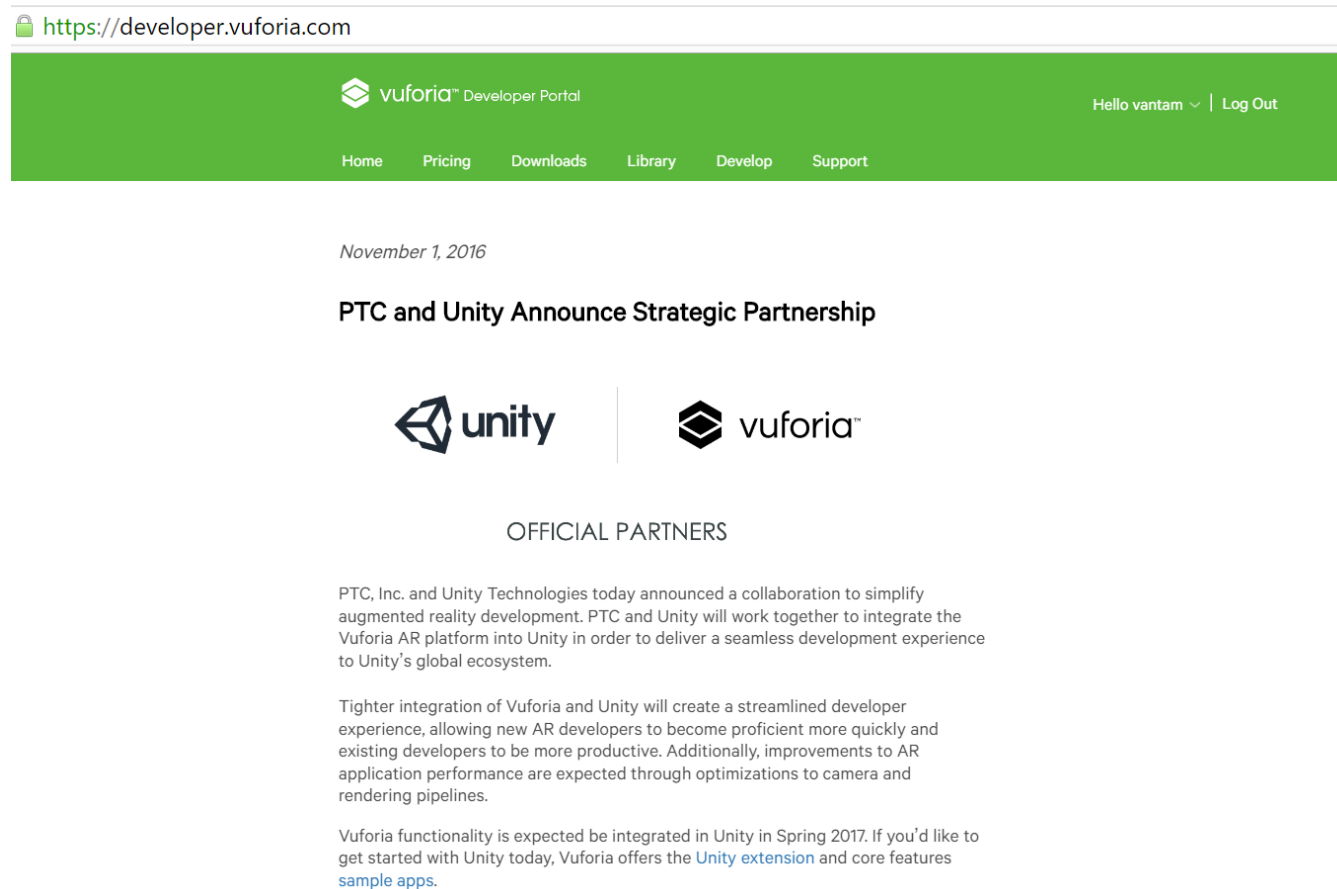
# Mobile devices

- Only Android devices are used in this class.



# Vuforia dev account

- <https://developer.vuforia.com/>



The screenshot shows the Vuforia Developer Portal website. The browser address bar displays <https://developer.vuforia.com/>. The website has a green header with the Vuforia logo and "vuforia™ Developer Portal" on the left, and a user greeting "Hello vantam" with a dropdown arrow and a "Log Out" link on the right. Below the header is a navigation menu with links: Home, Pricing, Downloads, Library, Develop, and Support. The main content area features a date "November 1, 2016" followed by the headline "PTC and Unity Announce Strategic Partnership". Below the headline are the logos for Unity and Vuforia, separated by a vertical line. Underneath the logos is the text "OFFICIAL PARTNERS". The body text of the announcement reads: "PTC, Inc. and Unity Technologies today announced a collaboration to simplify augmented reality development. PTC and Unity will work together to integrate the Vuforia AR platform into Unity in order to deliver a seamless development experience to Unity's global ecosystem." This is followed by a paragraph: "Tighter integration of Vuforia and Unity will create a streamlined developer experience, allowing new AR developers to become proficient more quickly and existing developers to be more productive. Additionally, improvements to AR application performance are expected through optimizations to camera and rendering pipelines." The final paragraph states: "Vuforia functionality is expected be integrated in Unity in Spring 2017. If you'd like to get started with Unity today, Vuforia offers the [Unity extension](#) and core features [sample apps](#)."

<https://developer.vuforia.com/>



vuforia™ Developer Portal

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November 1, 2016

**PTC and Unity Announce Strategic Partnership**

OFFICIAL PARTNERS

PTC, Inc. and Unity Technologies today announced a collaboration to simplify augmented reality development. PTC and Unity will work together to integrate the Vuforia AR platform into Unity in order to deliver a seamless development experience to Unity's global ecosystem.

Tighter integration of Vuforia and Unity will create a streamlined developer experience, allowing new AR developers to become proficient more quickly and existing developers to be more productive. Additionally, improvements to AR application performance are expected through optimizations to camera and rendering pipelines.

Vuforia functionality is expected be integrated in Unity in Spring 2017. If you'd like to get started with Unity today, Vuforia offers the [Unity extension](#) and core features [sample apps](#).

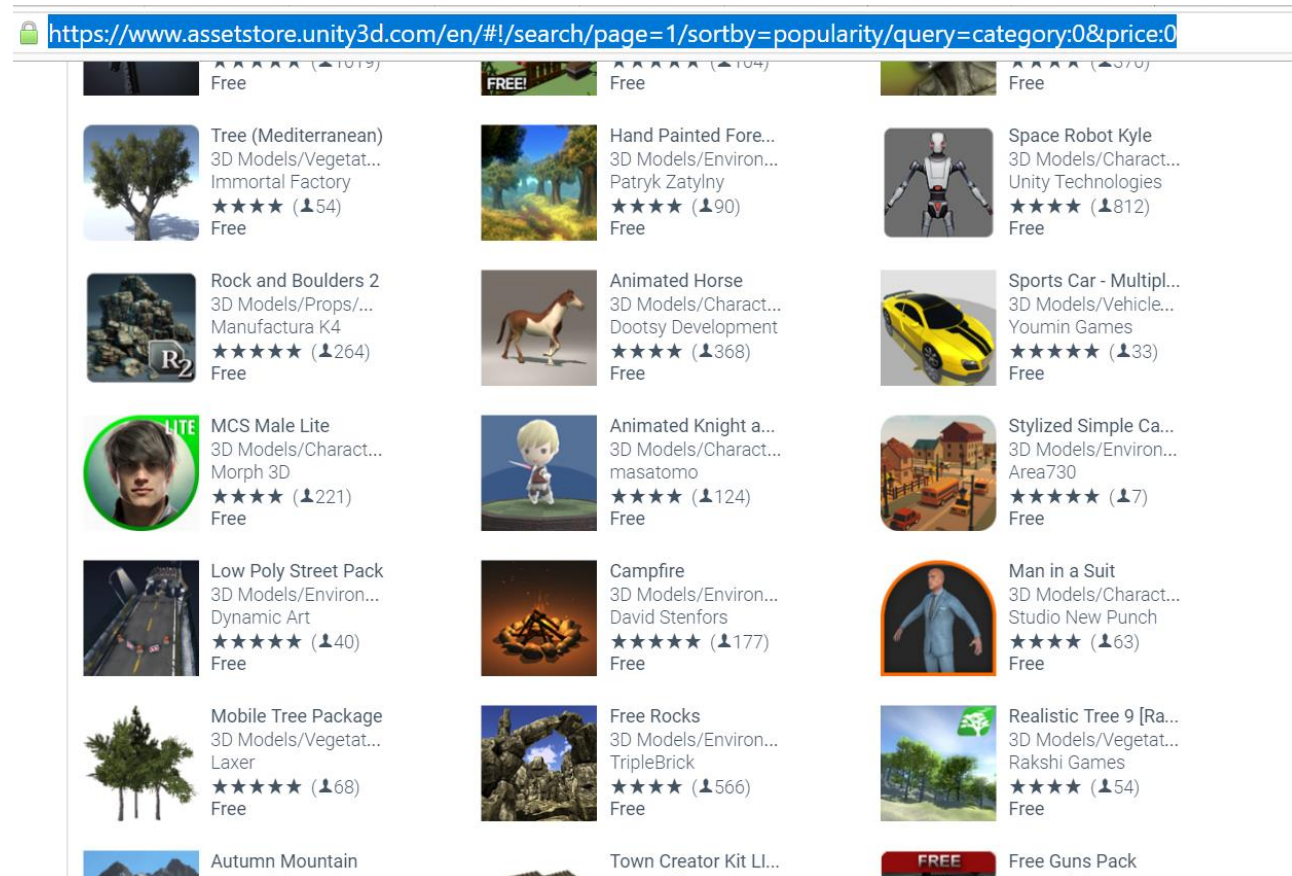
# Target images





# 3D models

- Can get them at <https://www.assetstore.unity3d.com/>
- Normally in fbx format





# 3D models have texture



# 3D models may have animation

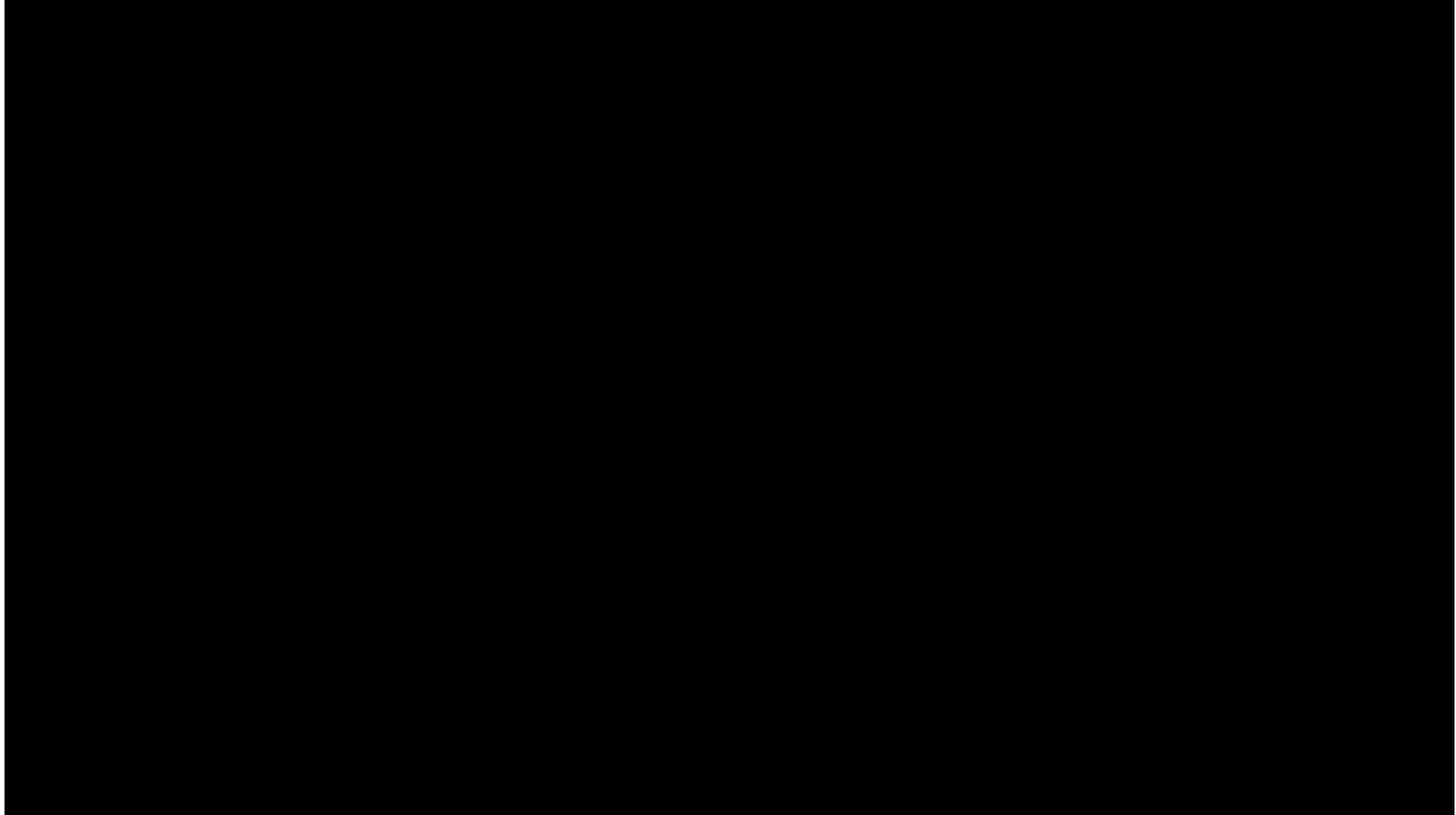


# Example

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



# Example





# Future of AR

## Google Glass

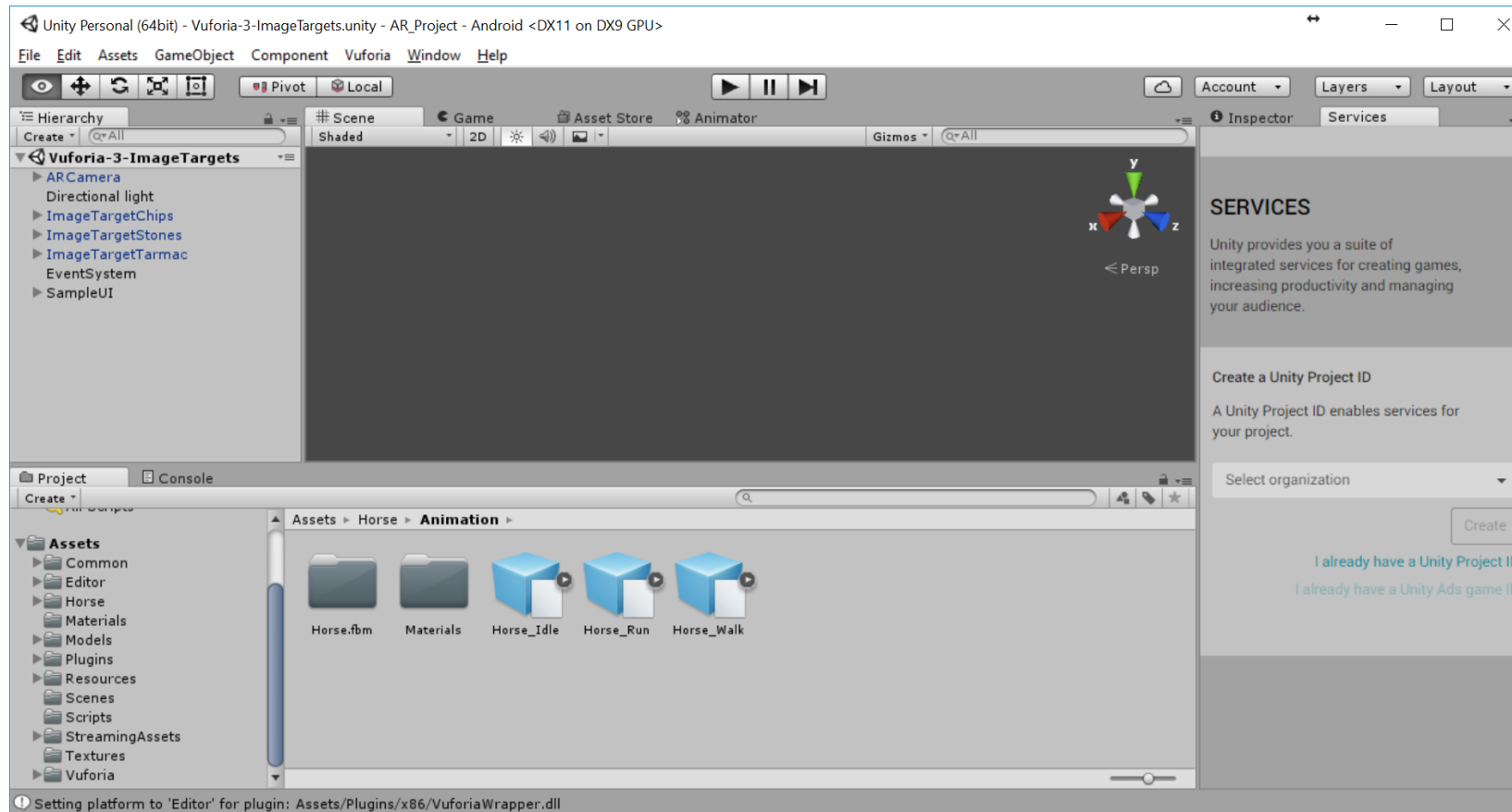


## 3D Marker



# For the next class

- Please install Unity3D (<https://unity3d.com/>)



# For the next class

- Download Android SDK
- **[https://dl.google.com/android/android-sdk\\_r24.4.1-windows.zip](https://dl.google.com/android/android-sdk_r24.4.1-windows.zip)**



# Q&A