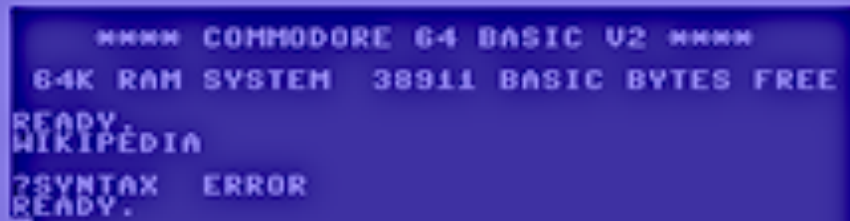




# Deep into VR testing

Noemi Ferrera  
@thetestlynx





COMMODORE 64 BASIC V2  
64K RAM SYSTEM 38911 BASIC BYTES FREE  
READY.  
WIKIPEDIA  
7SYNTAX ERROR  
READY.

[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)



[This Photo](#) by Unknown Author is licensed under [CC BY-NC-ND](#)



[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)



[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)



# Noemi Ferrera



Original from Spain



Computer scientist

-  @thetestlynx
- Blog: [noemiferrera.com](http://noemiferrera.com)
- [Github.com/thetestlynx](https://github.com/thetestlynx)
- Solution Architect  at Sauce Labs
- Before: Netease (China), Videobot, Dell, Microsoft and IBM (Ireland)

- In and out of dev/test roles
- With these languages:
  - C#
  - Python
  - Java
  - Others...

International speaker





# VR/AR/MR/XR...?

- VR – Virtual reality
- AR – Augmented reality
- MR – Mixed reality
- XR – Cross reality



[This Photo](#) by Unknown Author is licensed under [CC BY](#)





Deep into VR



1975

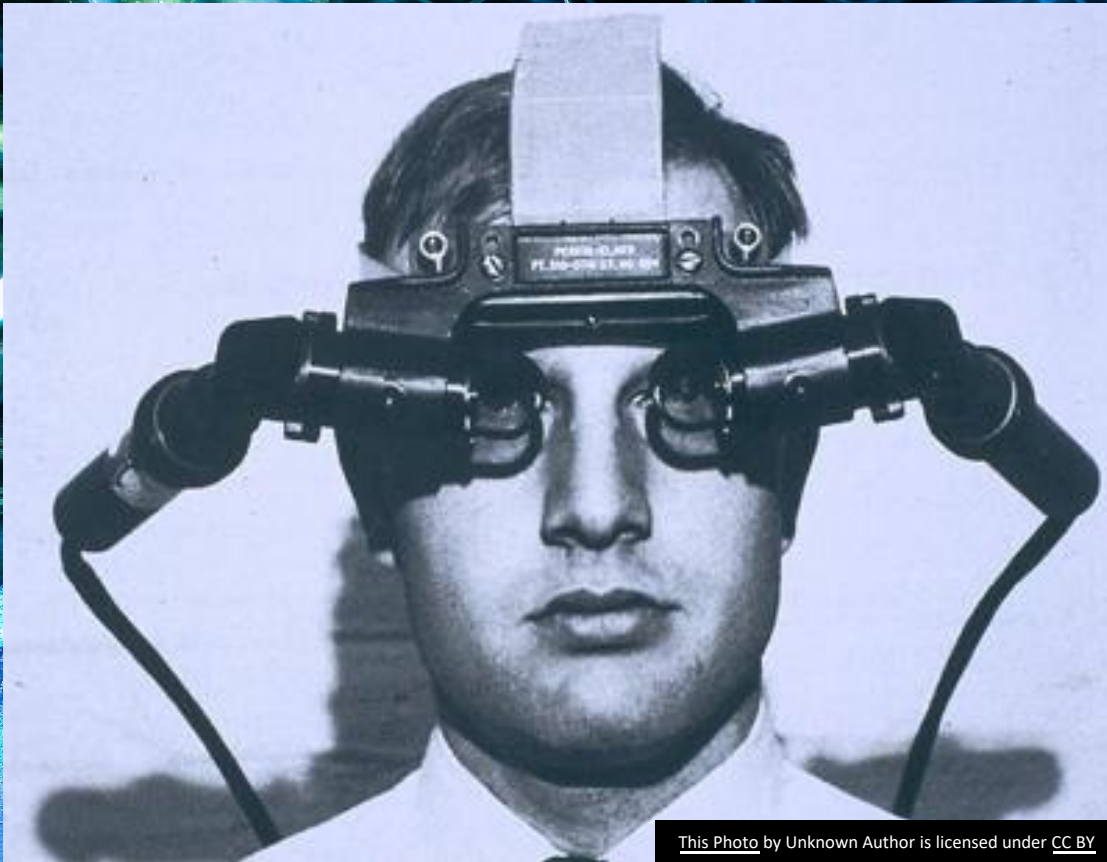


[This Photo](#) by Unknown Author is licensed under [CC BY-NC](#)





# 1968 - Damocles sword



This Photo by Unknown Author is licensed under [CC BY](#)



This Photo by Unknown Author is licensed under [CC BY-NC](#)



# SegaVR (91)



This Photo by Unknown Author is licensed under [CC BY-NC](#)

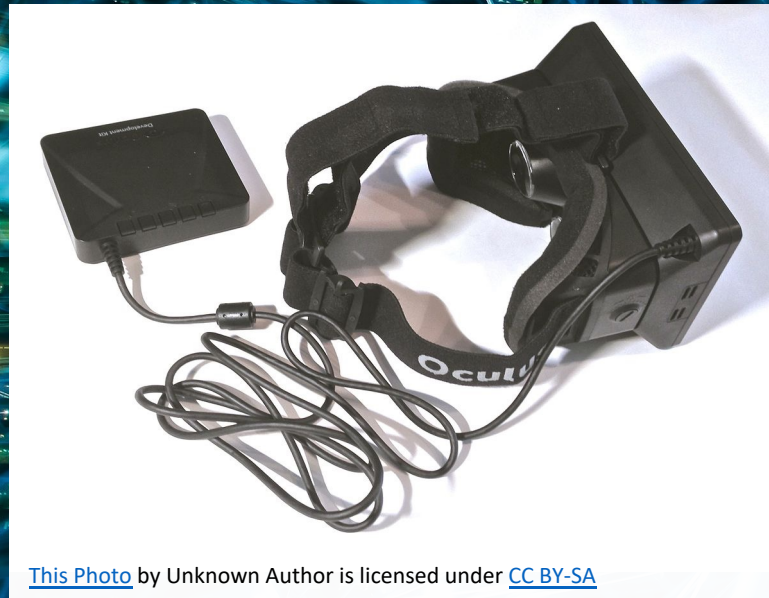
# Nintendo Virtual Boy (95)



This Photo by Unknown Author is licensed under [CC BY-NC-ND](#)



# 2010 Oculus



[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)

# 2014 Google Cardboard



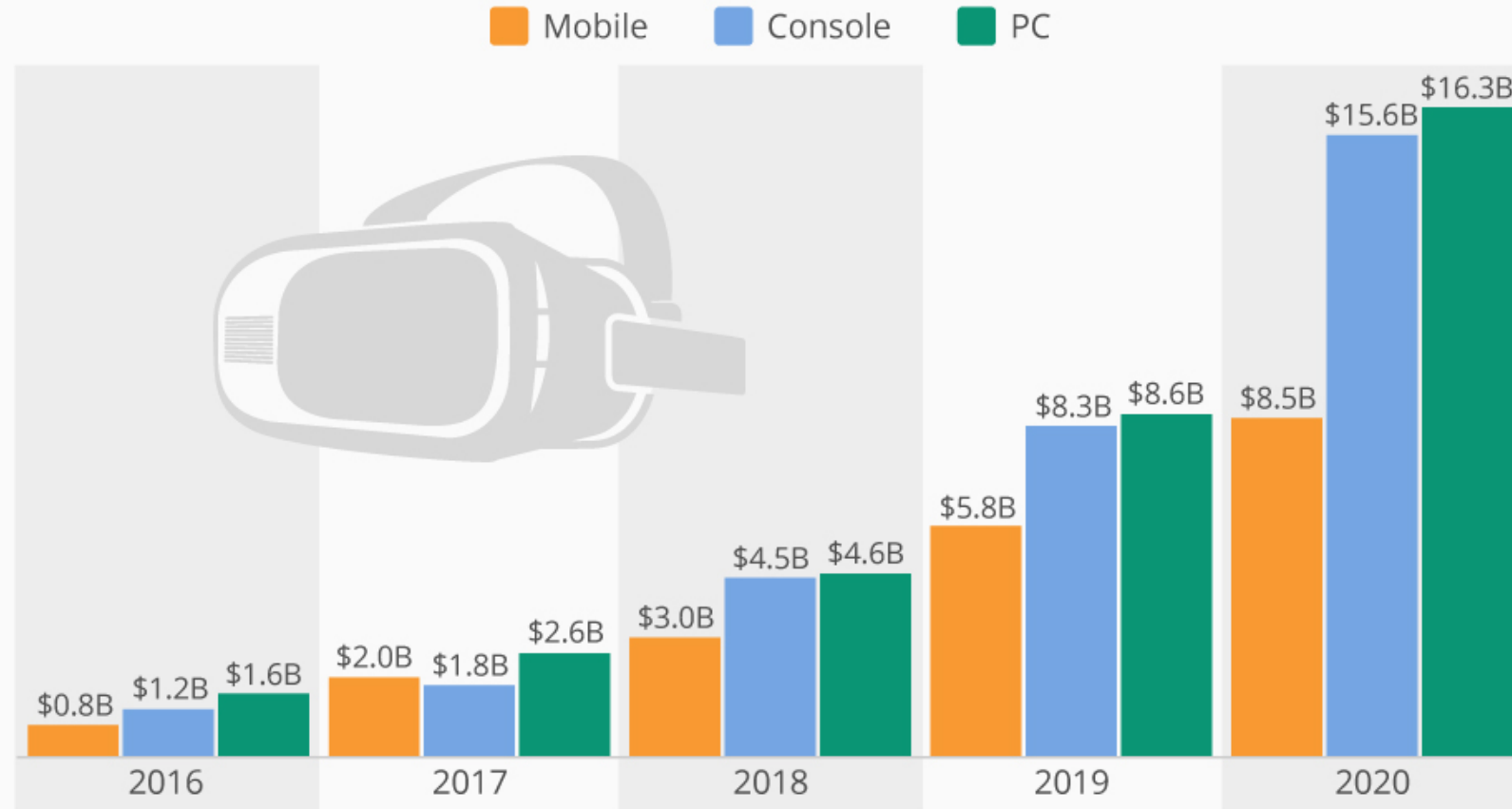
[This Photo](#) by Unknown Author is licensed under [CC BY-SA](#)



# Why?

## The Worldwide Virtual Reality Market Is Set To Be Huge

Forecasted market size of virtual reality hardware and software from 2016 to 2020, by platform



@StatistaCharts

Source: Superdata via VRFocus

statista

<https://www.statista.com/chart/6677/the-worldwide-virtual-reality-market-is-set-to-be-huge/>



# Why?



<https://venturebeat.com/2019/10/12/digi-capital-mixed-reality-investors-should-look-at-europe/>



# Why?



Photo by [Jesper Aggergaard](#) on [Unsplash](#)



Picture credit [mentatdgt](#)



# VR devices: how to choose?

- Headset VS handset
- Phone powered VS Self-powered VS PC-powered VS console-powered
- Different platforms
- Wired VS Wireless
- Resolution, tracking, technical specs



[This Photo](#) by Unknown Author is licensed under [CC BY](#)



LIKE IT OR NOT

# Moscow-area cows enjoy summer year-round with new virtual reality glasses

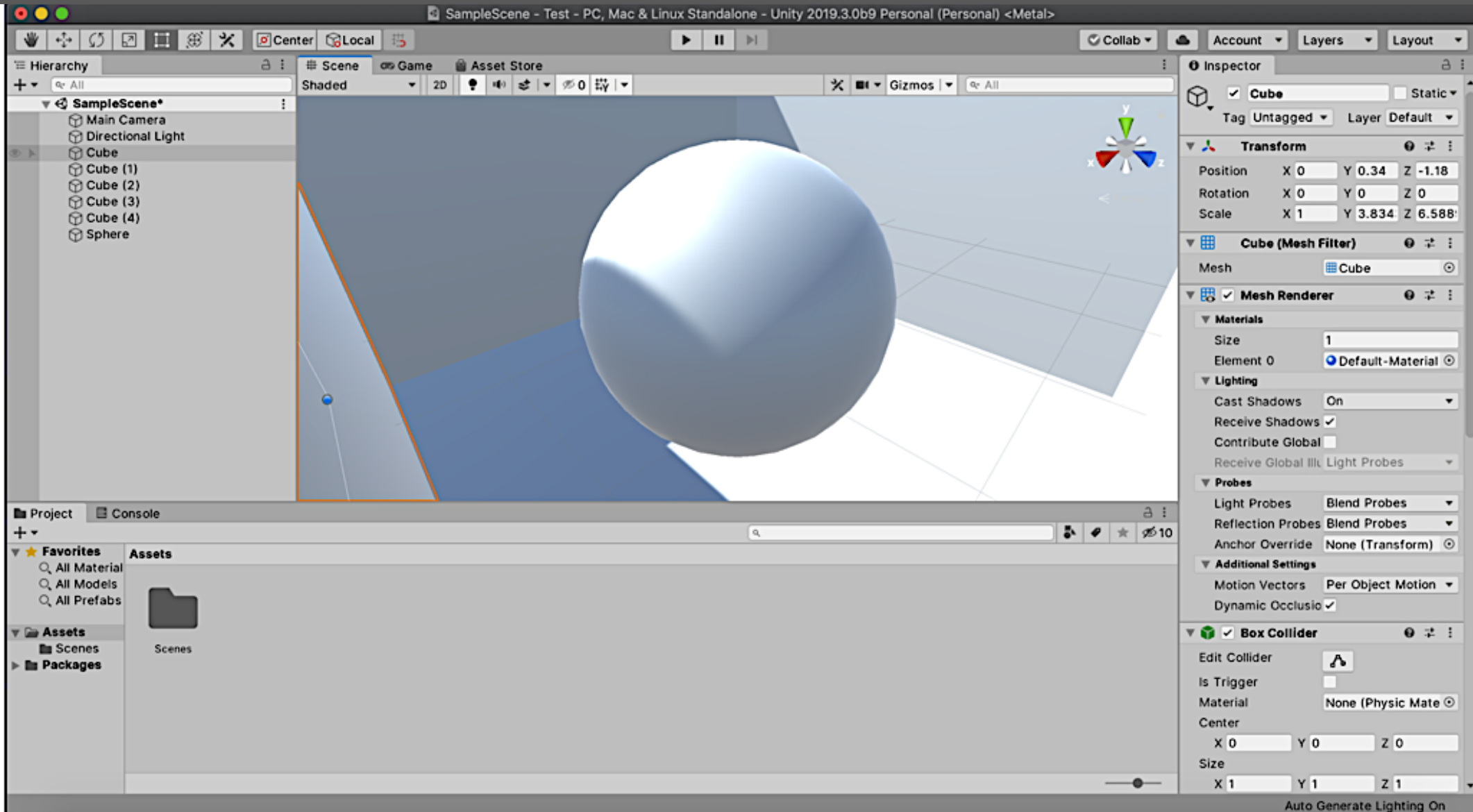
11:08 pm, November 25, 2019 · Source: Meduza



Adve

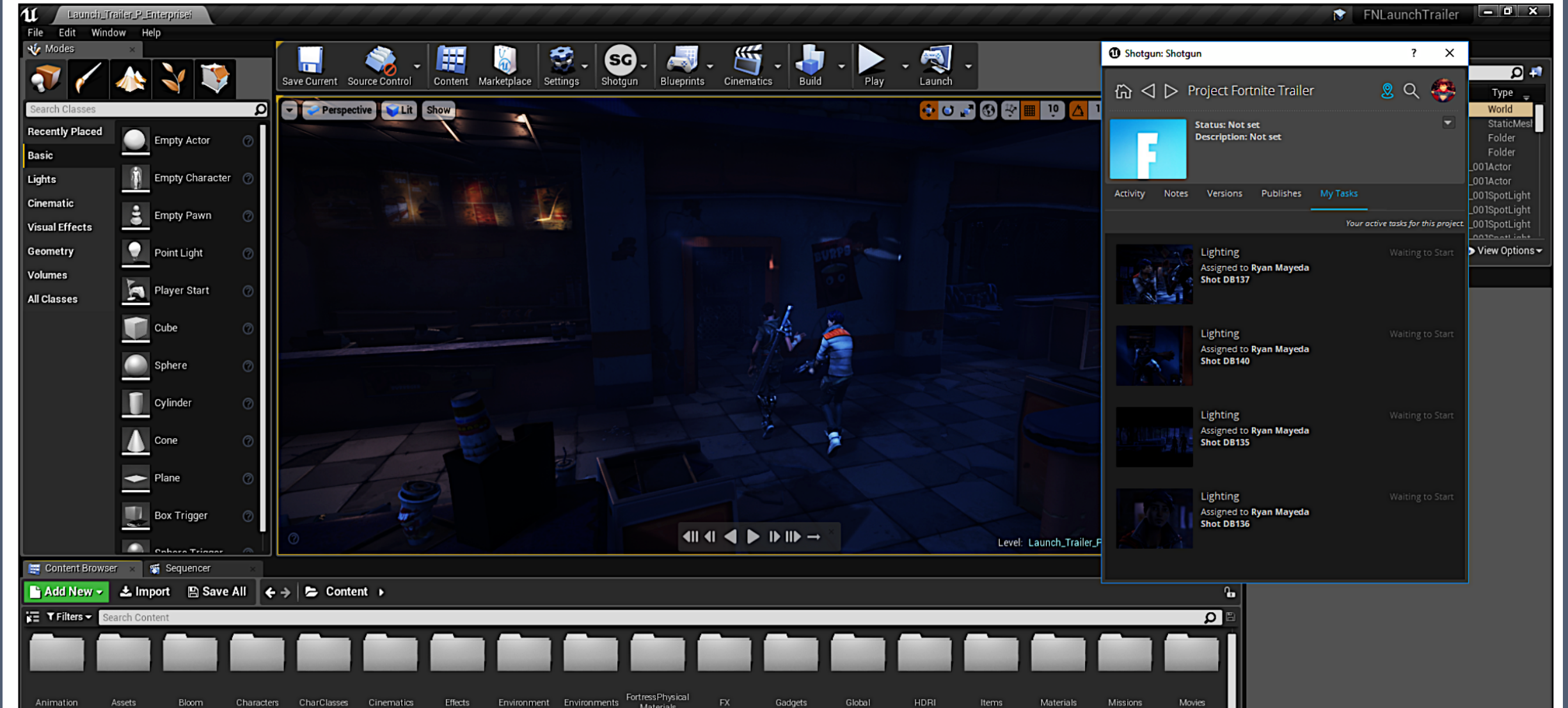


# VR platforms: Unity





# VR platforms: Unreal



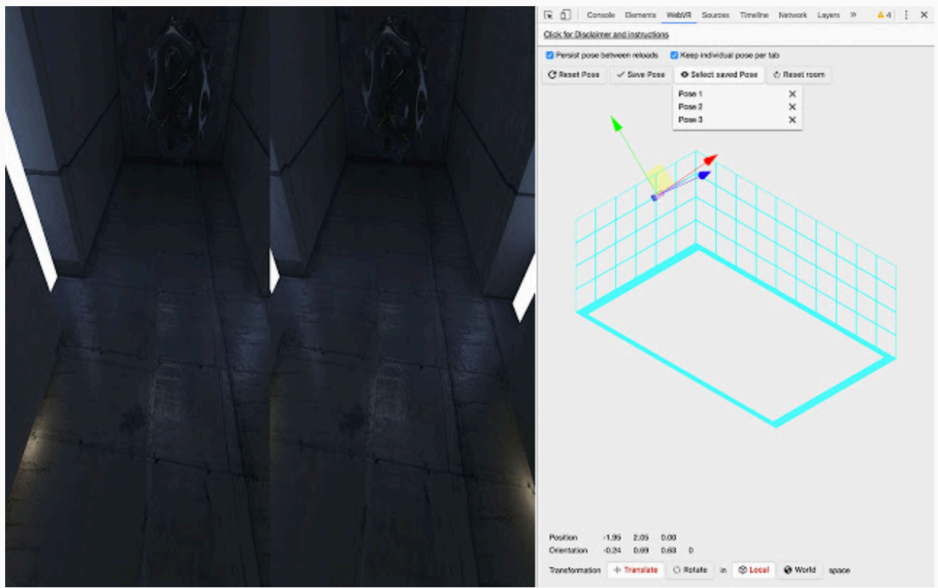
<https://www.unrealengine.com/en-US/blog/shotgun-integration-now-available-in-unreal-engine-4-20>

<https://docs.unrealengine.com/en-US/Programming/Automation/index.html>

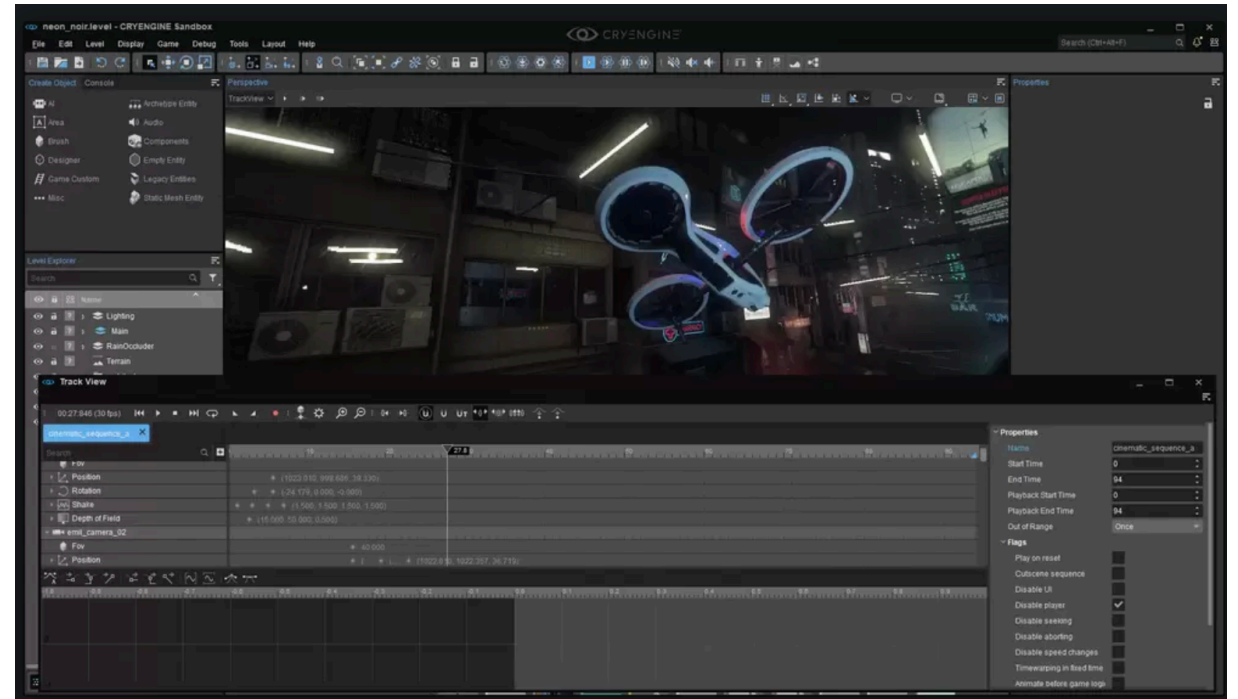


# VR platforms: Others

- CryEngine: C++, flash, action Script. Not for mobile
- Amazon Lumberyard (based on above), android
- WebVR: for websites, js



<https://webvr.info/>

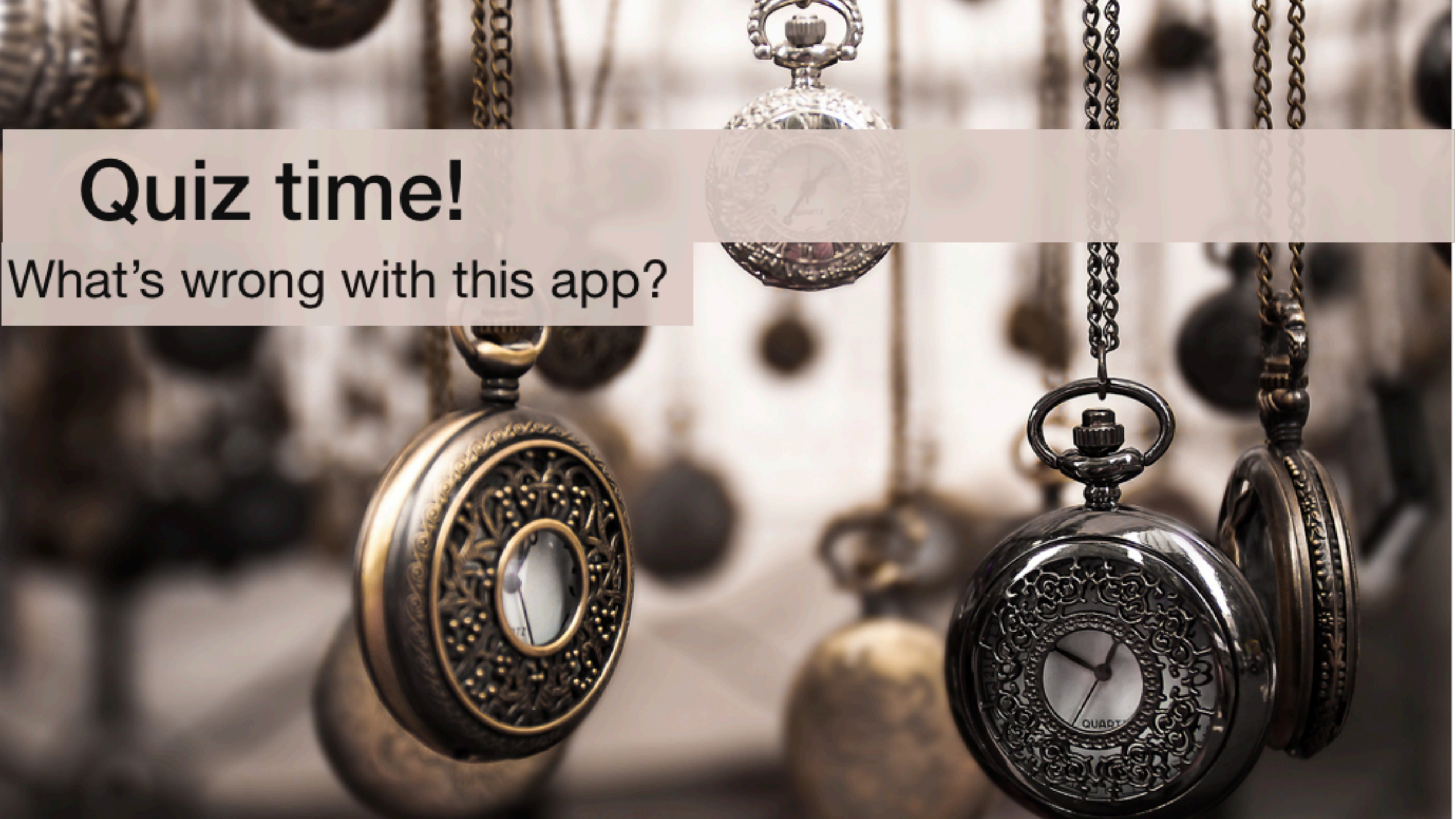


<https://www.cryengine.com/features/view/sandbox>



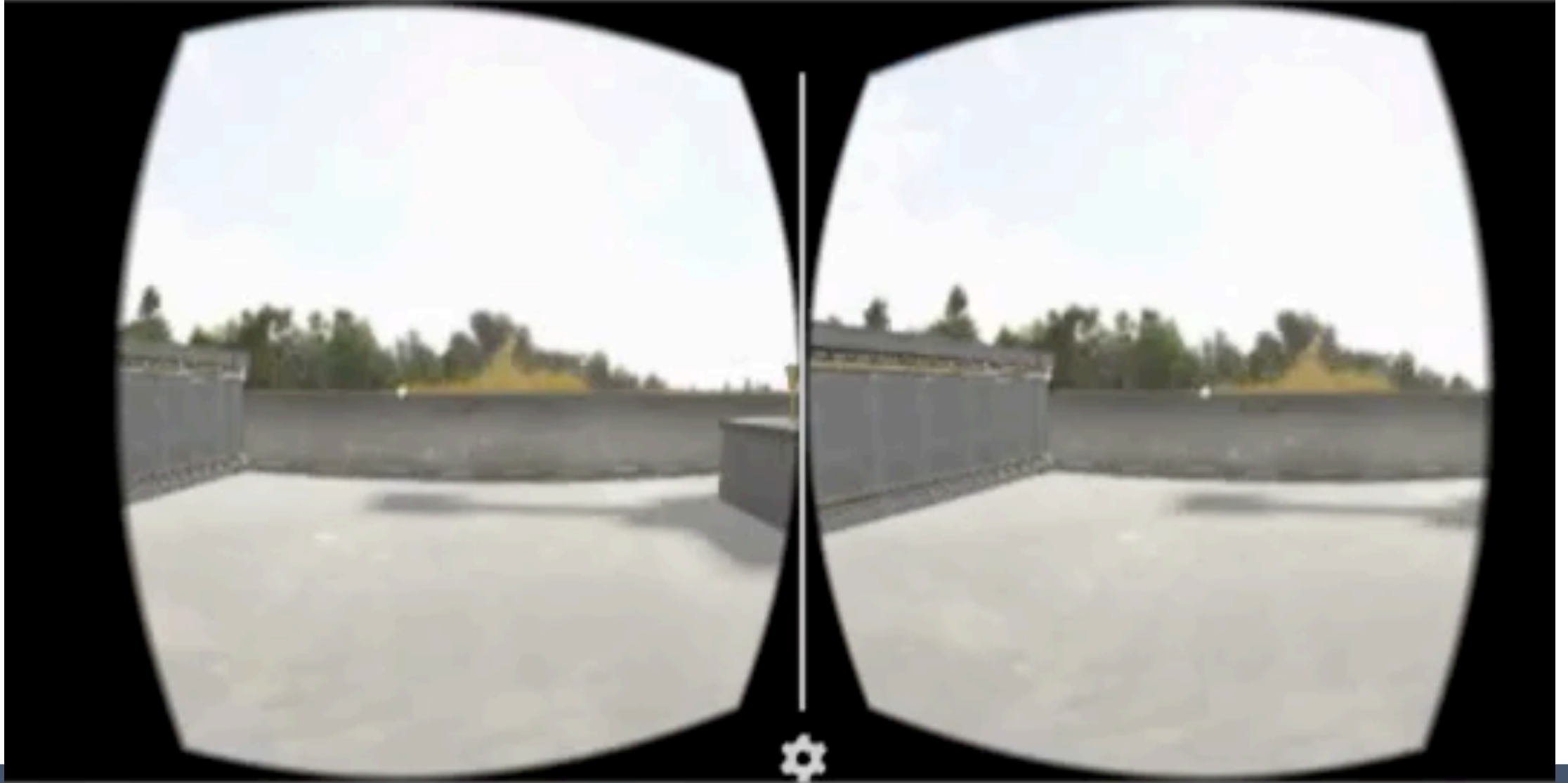
# Quiz time!

What's wrong with this app?



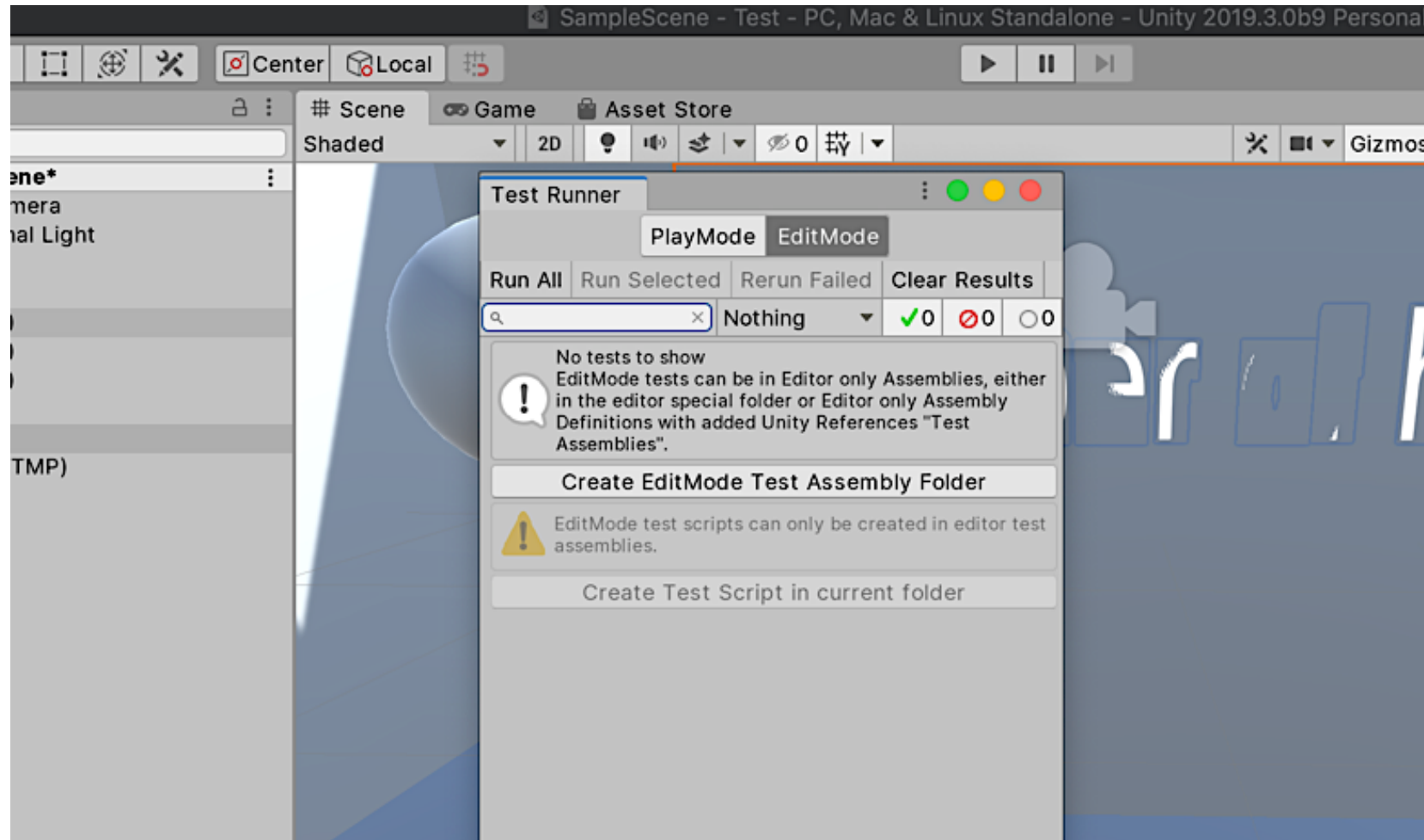


# What's wrong with this app?



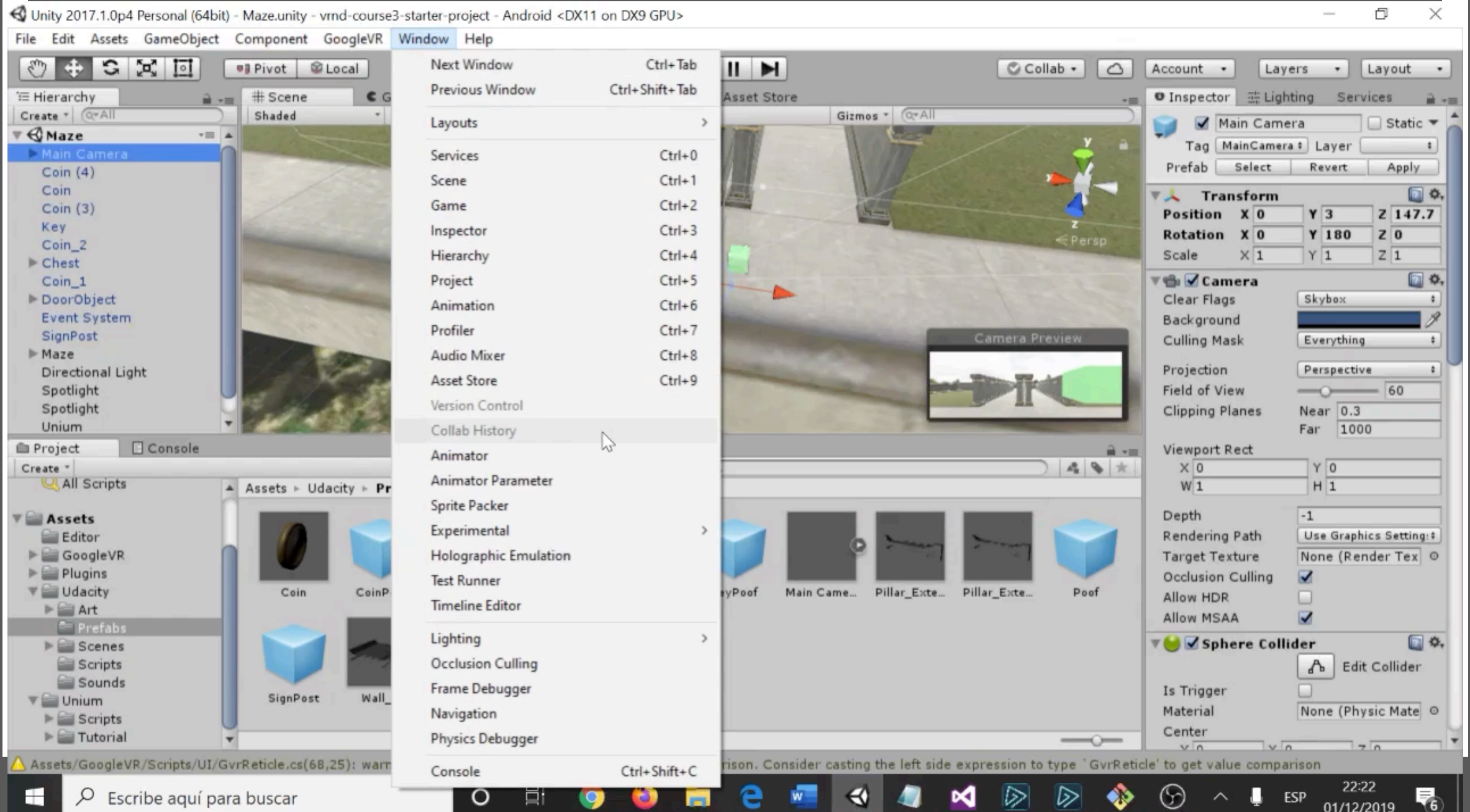


# Unit test: Test Runner



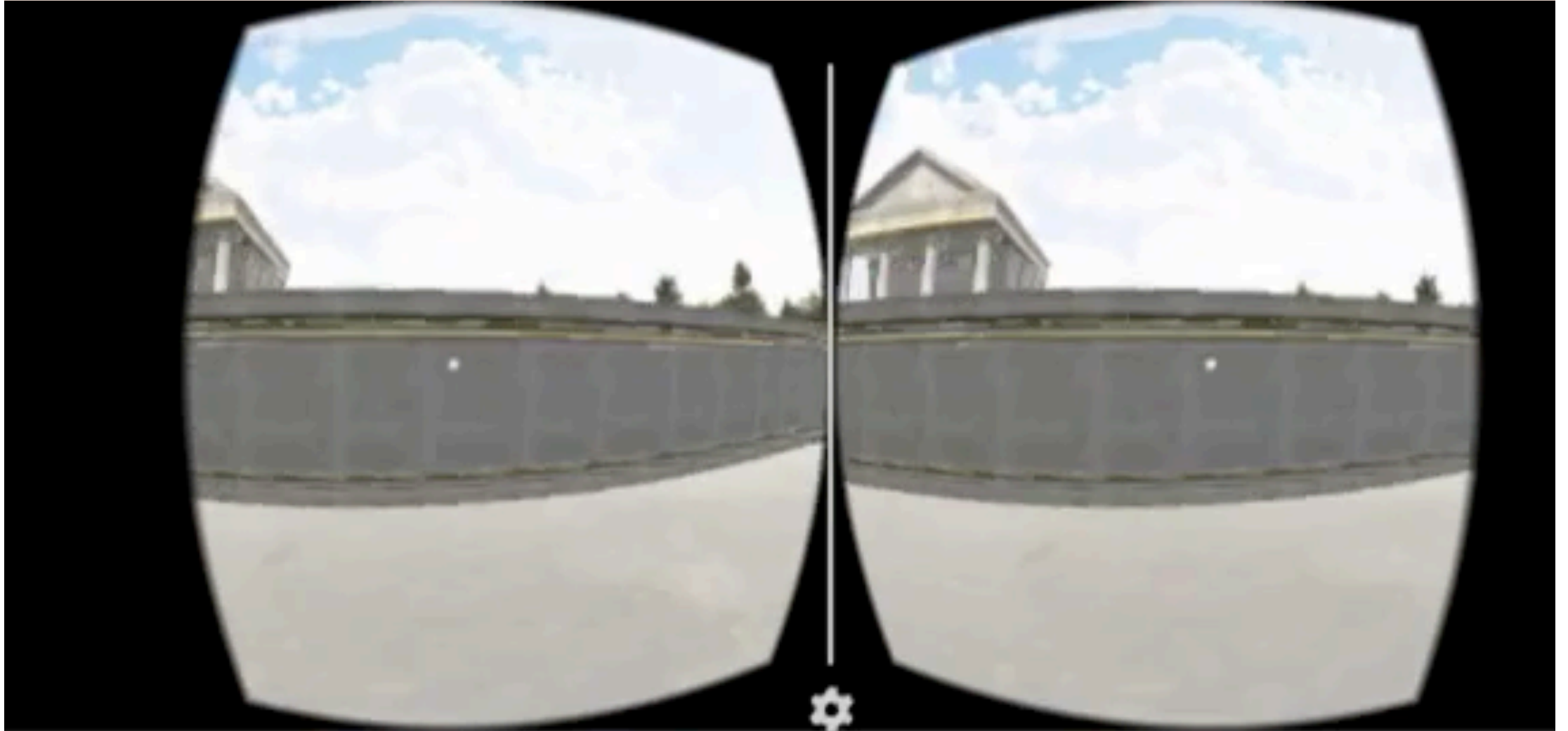


# Unit test: Test Runner





# Fixed!





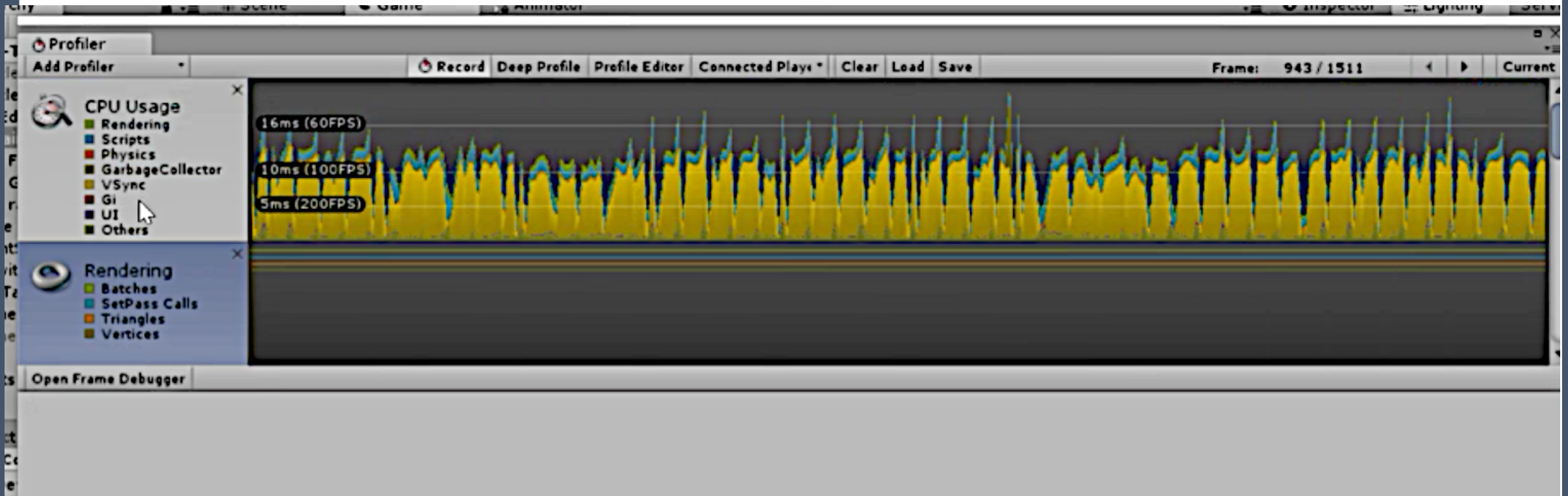
# What's wrong with this app?



Hand simulator played by Markiplier (+ friends) <https://www.youtube.com/watch?v=M7qy2FBs7bw>



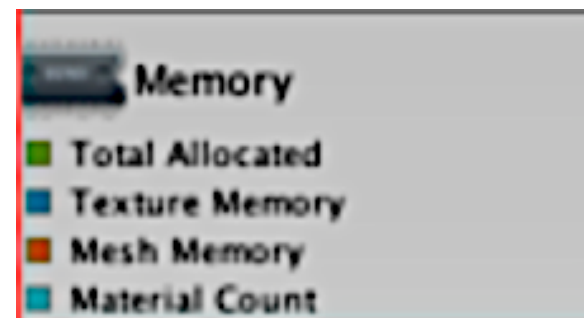
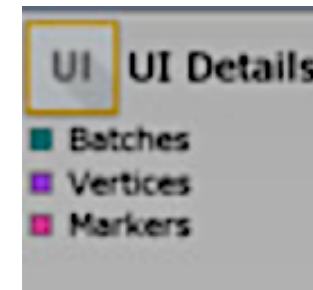
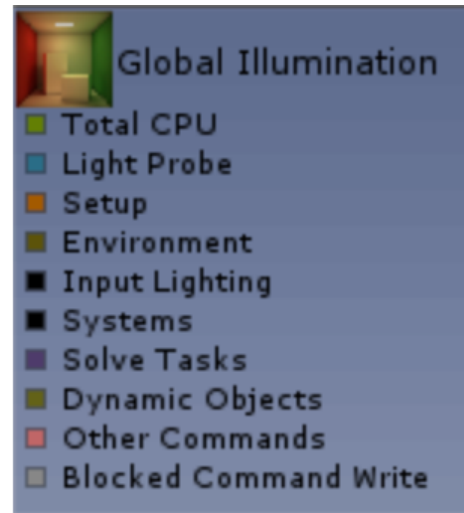
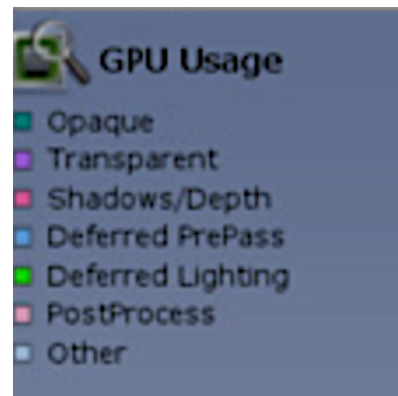
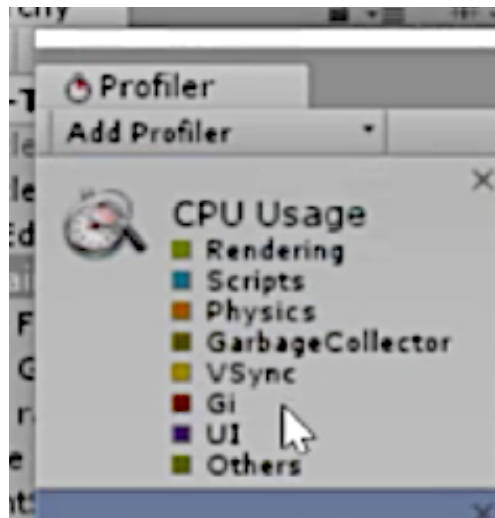
# Performance tests: profiler tool





# Performance tests: profiler tool

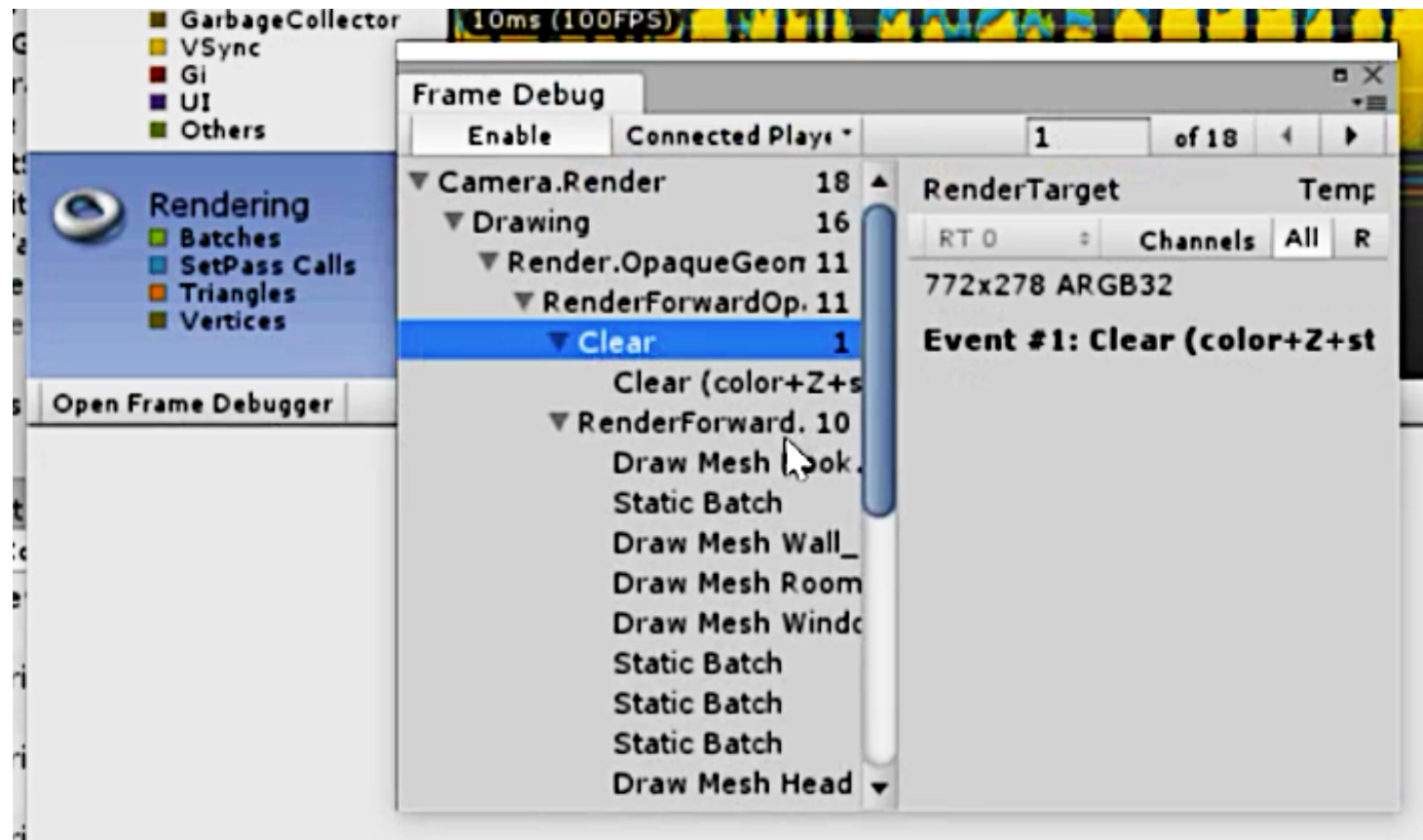
## Profiler modules





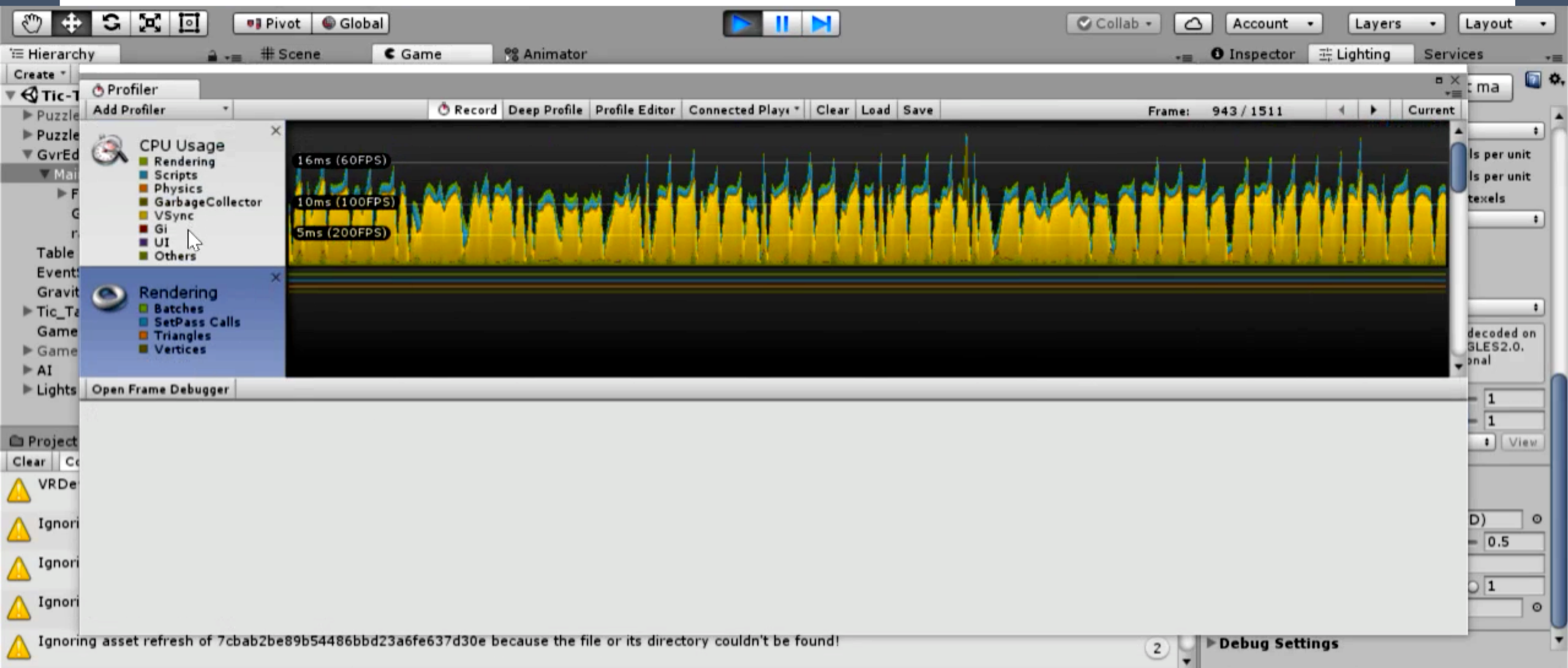
# Performance tests: profiler tool

## Frame debugger

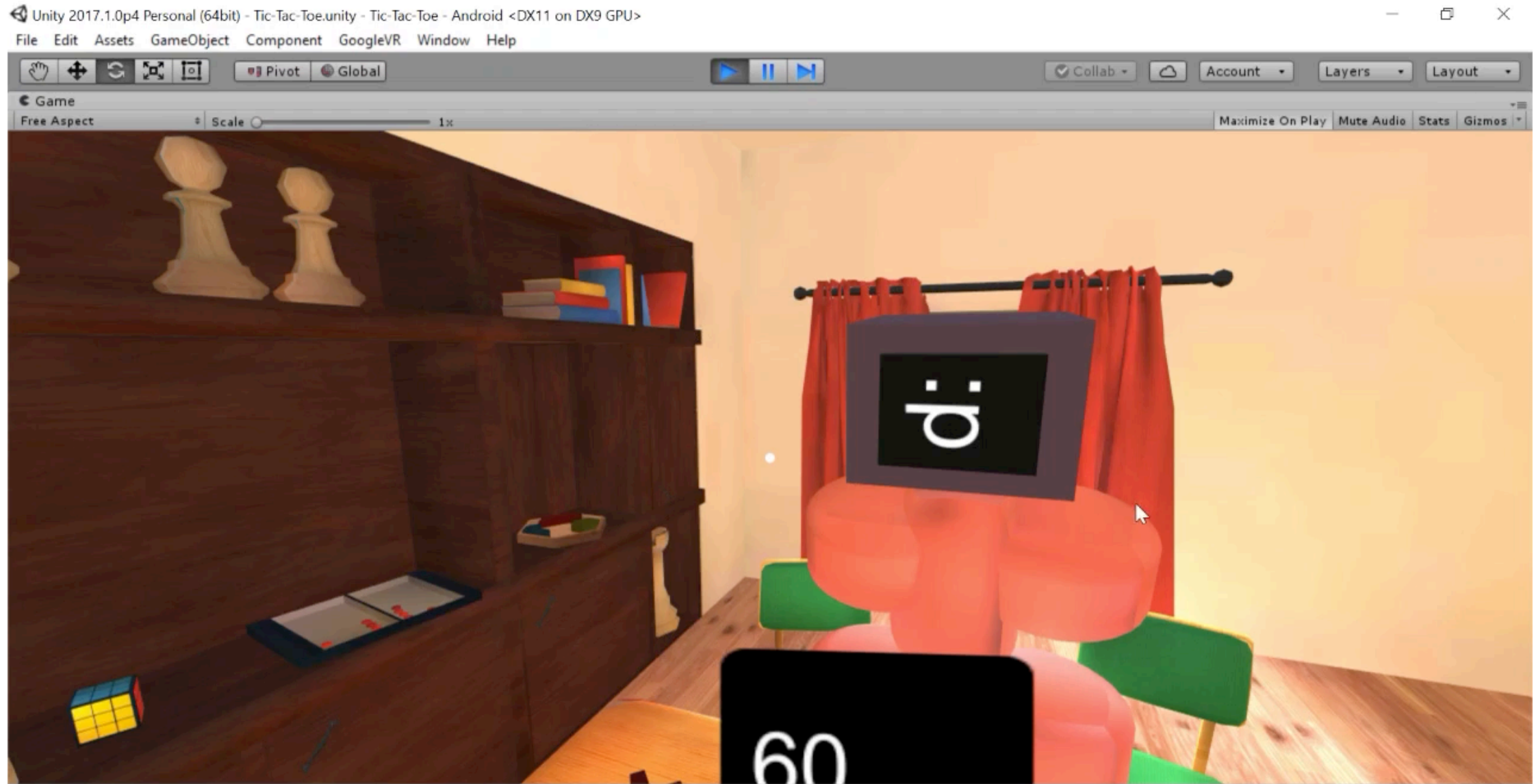




# Performance tests: profiler tool



# Fixed!





# Performance tests:

- Some variables more important for VR (3D)
  - Scale, colours and sounds
  - Quality of material and lights
  - GPU
  - Motion sickness



[This Photo](#) by Unknown Author is licensed under [CC BY-NC](#)

# What's wrong with this app?



Hand simulator played by Markiplier (+ friends) <https://www.youtube.com/watch?v=M7qy2FBs7bw>

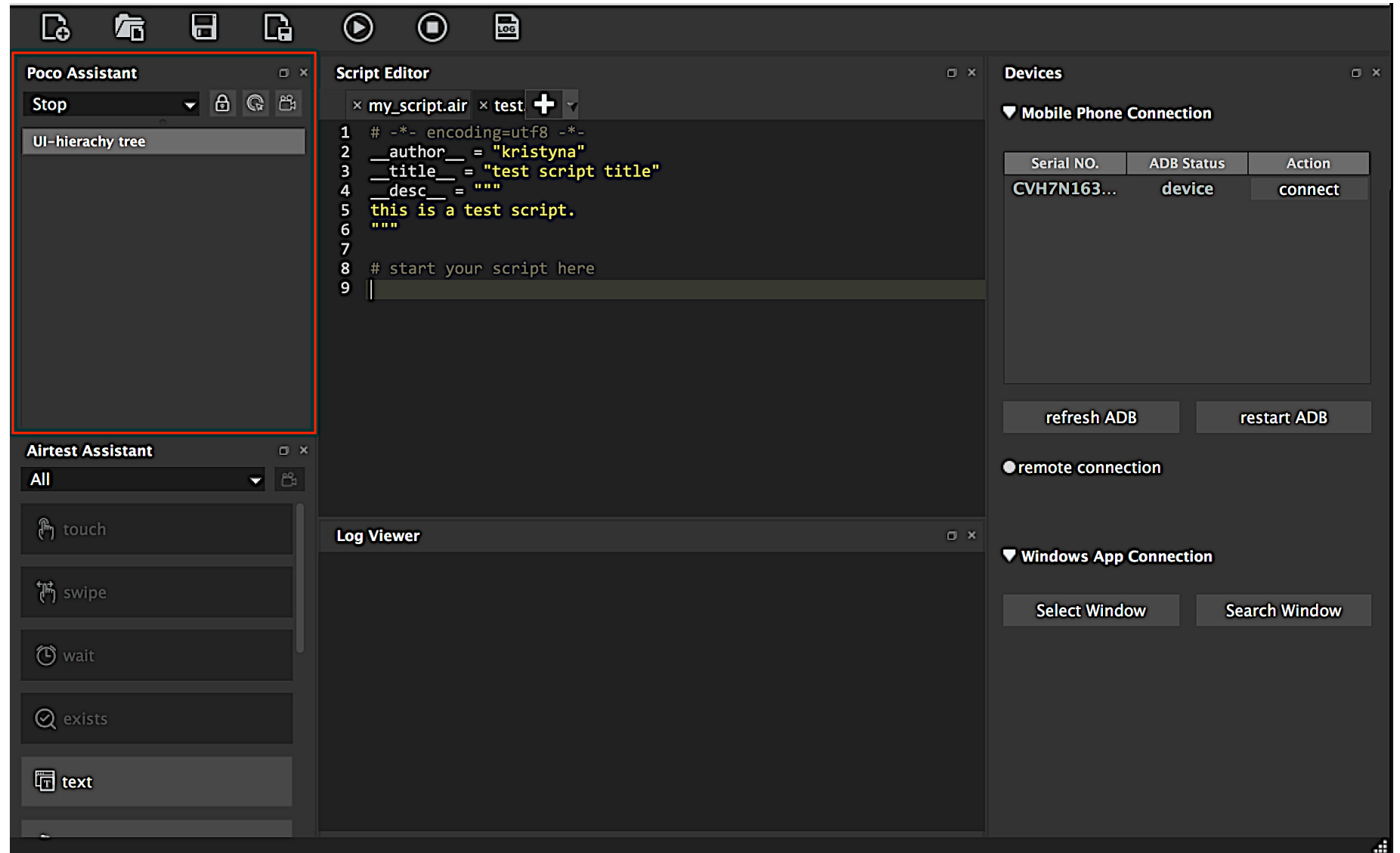


# Automation: POCO (airtest project / netease)

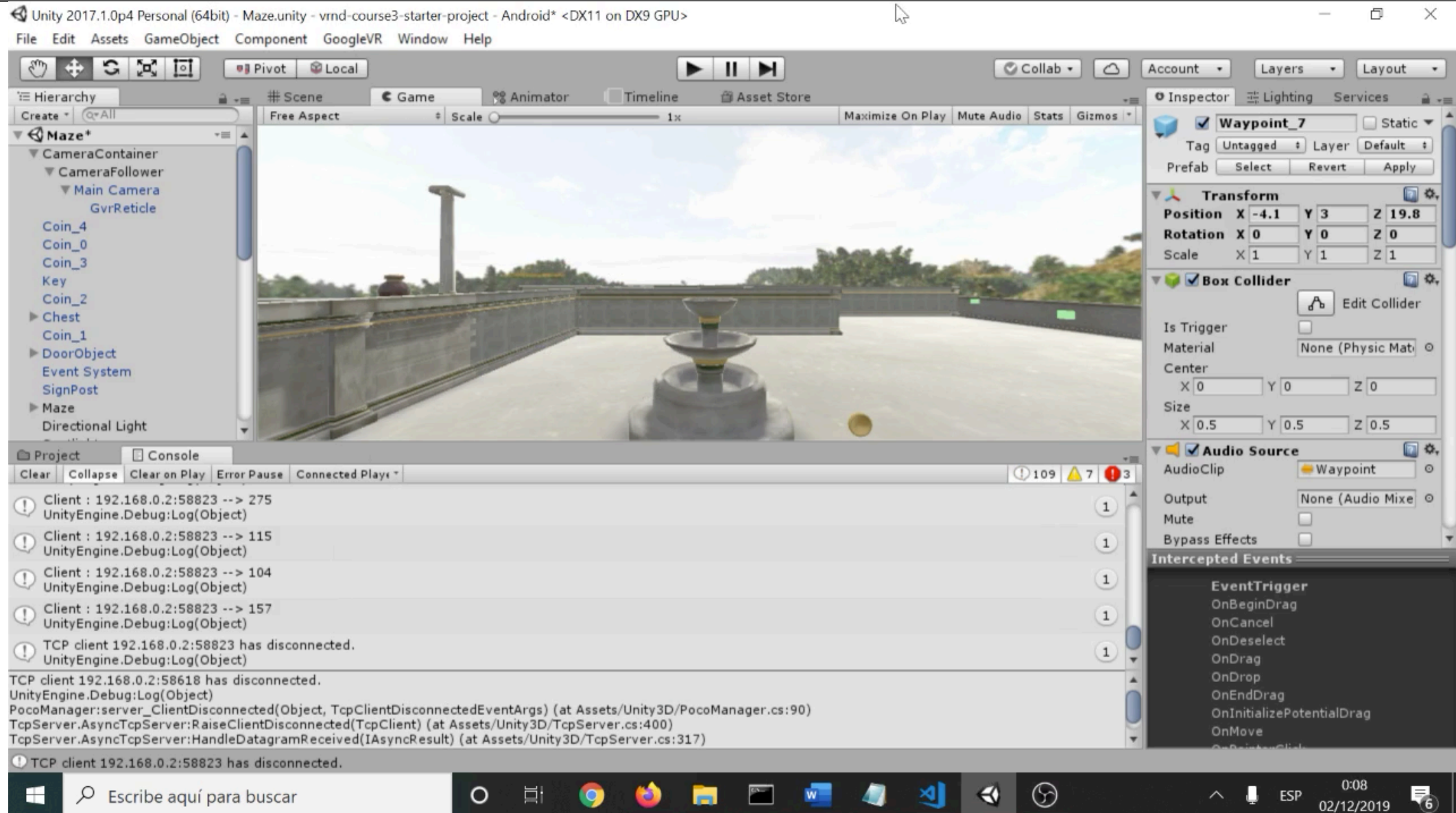
For cardboard VR support

[https://poco.readthedocs.io/en/latest/source/doc/unity3d\\_vr.html](https://poco.readthedocs.io/en/latest/source/doc/unity3d_vr.html)

<https://github.com/AirtestProject/Poco-SDK>



# Automation: PocoUI in action





# Automation: Unium

file:///D:/dev/unity/unium/Dev/examples/sockets.html

Unium Socket Explorer

Message Composer

URL

ws://localhost:8342/ws

Message

```
{  
  "q" : "/about"  
}
```

This will be sent to the server

Examples

About (basic request, no id)

Send

Disconnect

Connect

Debug Output

Clear

```
Connecting to ws://localhost:8342/ws  
Connected to the game  
send: {"q":"/about"}  
recv: {"data":{"Unium":"1.0","Unity":"2017.1.0b8","Mono":"2.0.50727.1433"}}
```

2/4

# Automation: Unium in action

Unity 2017.1.0p4 Personal (64bit) - Maze.unity - vrnd-course3-starter-project - Android <DX11 on DX9 GPU>

File Edit Assets GameObject Component GoogleVR Window Help

Hand Rotate Translate Scale Pivot Local Play Pause Stop Collab Account Layers Layout

Hierarchy

- Create ▾ All
- Waypoint\_0
- Waypoint\_13
  - Cube (0)
- Waypoint\_1
- Waypoint\_9
- Waypoint\_15
- Waypoint\_8
- Waypoint\_7
- Waypoint (6)
- Waypoint (5)
- Waypoint (4)
- Waypoint
- Waypoint (3)
- Waypoint (2)
- Waypoint
- Waypoint (1)
- Waypoint (15)
- Waypoint

Scene Game Animator Timeline Asset Store

Open in Browser English USD

BLACK FRIDAY ENDS TODAY • MOST POPULAR ASSETS 50% OFF

unity Asset Store NF

Filter Sort

Menu Search My Favorite My Cart

Project Console

Create ▾

Assets

- Editor
- GoogleVR
- Plugins
- Udacity
  - Art
  - Prefabs
  - Scenes
  - Scripts
  - Sounds
- Unium
  - Scripts
  - Tutorial

Assets ▸ Unium

Scripts Tutorial LICENSE tutorial unium

Inspector Lighting Services

3D Sound Settings

Event Trigger (Script)

Pointer Enter (BaseEventData)

Runtime C# Waypoint.Enter

Wayp

Pointer Exit (BaseEventData)

Runtime C# Waypoint.Exit

Wayp

Pointer Click (BaseEventData)

Runtime C# Waypoint.Click

Wayp

Add New Event Type

Waypoint (Script)

Script Waypoint

Intercepted Events

EventTrigger

- OnBeginDrag
- OnCancel
- OnDeselect
- OnDrag
- OnDrop
- OnEndDrag
- OnInitializePotentialDrag
- OnMove
- OnPointerClick

AssetBundle None

Lighting data asset 'LightingData' is incompatible with the current Unity version. Please use Generate Lighting to rebuild the lighting data. Realtime Global Illumination cannot be used until the lighting data is rebuilt.

Escribe aquí para buscar

22:43 01/12/2019



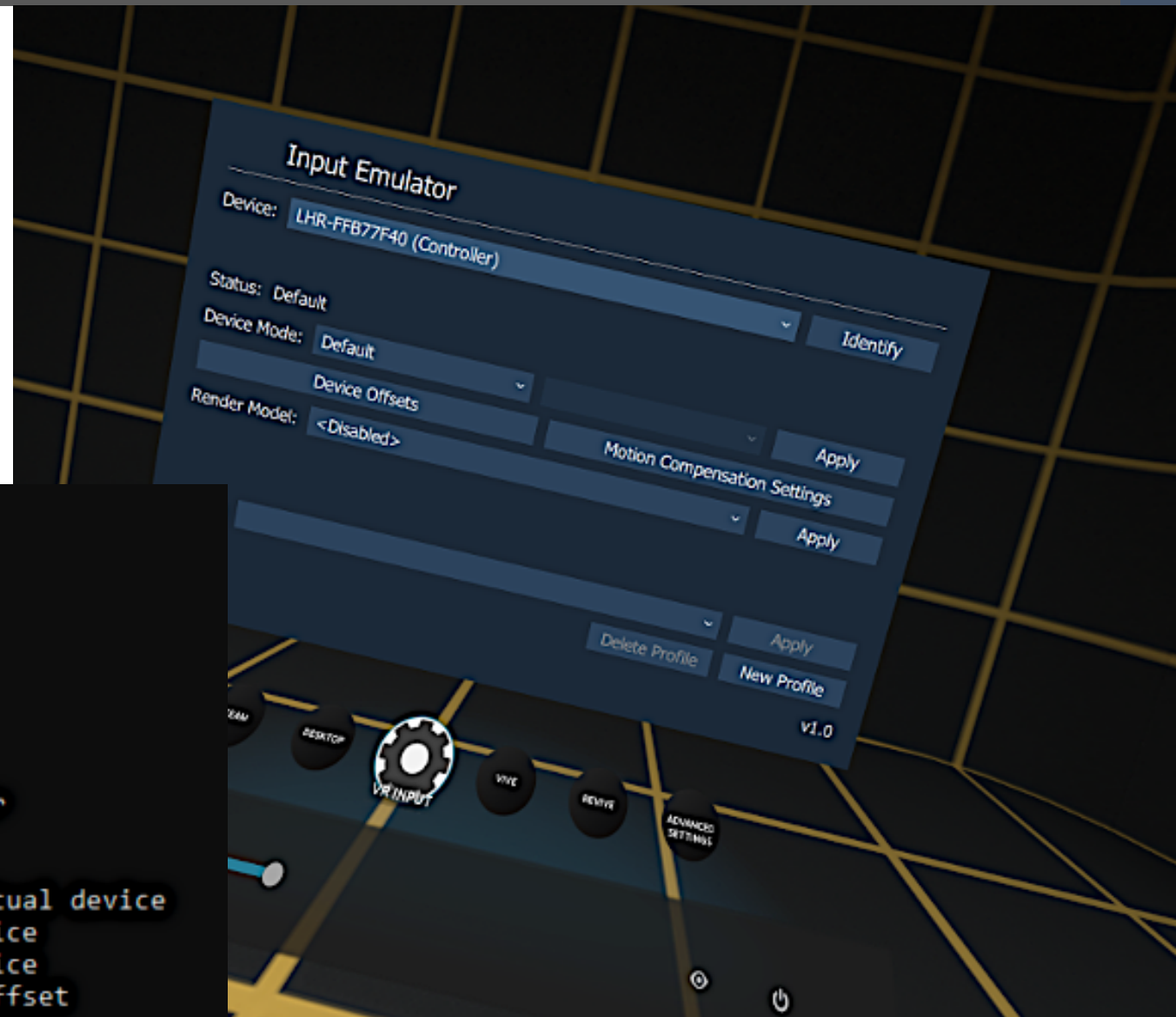
# Automation: OpenVR-InputEmulator

Emulate devices

<https://github.com/matzman666/OpenVR-InputEmulator/>

available commands (enter "<command> help" for help):

listdevices	Lists all openvr devices
buttonevent	Sends button event
axisevent	Sends axis event
proximitysensor	Sends proximity sensor event
getdeviceproperty	Returns a device property
listvirtual	Lists all virtual devices
addcontroller	Creates a new virtual controller
publishdevice	Adds a virtual controller to openvr
setdeviceproperty	Sets a device property
removedeviceproperty	Removes a device property
setdeviceconnection	Sets the connection state of a virtual device
setdeviceposition	Sets the position of a virtual device
setdevicerotation	Sets the rotation of a virtual device
devicetranslationoffset	Configure the device translation offset
devicerotationoffset	Configure the device rotation offset
benchmarkipc	ipc benchmarks



# Automation: Conclusions

- 2 types of automation: hardware and software
- Platform dependent
- Tools to be discovered
- VR objects rotation not as straight forward (quaternions)



# What's wrong with this app?



<https://www.youtube.com/watch?v=bv7l8nMV914>

# Other type of testing: conclusions

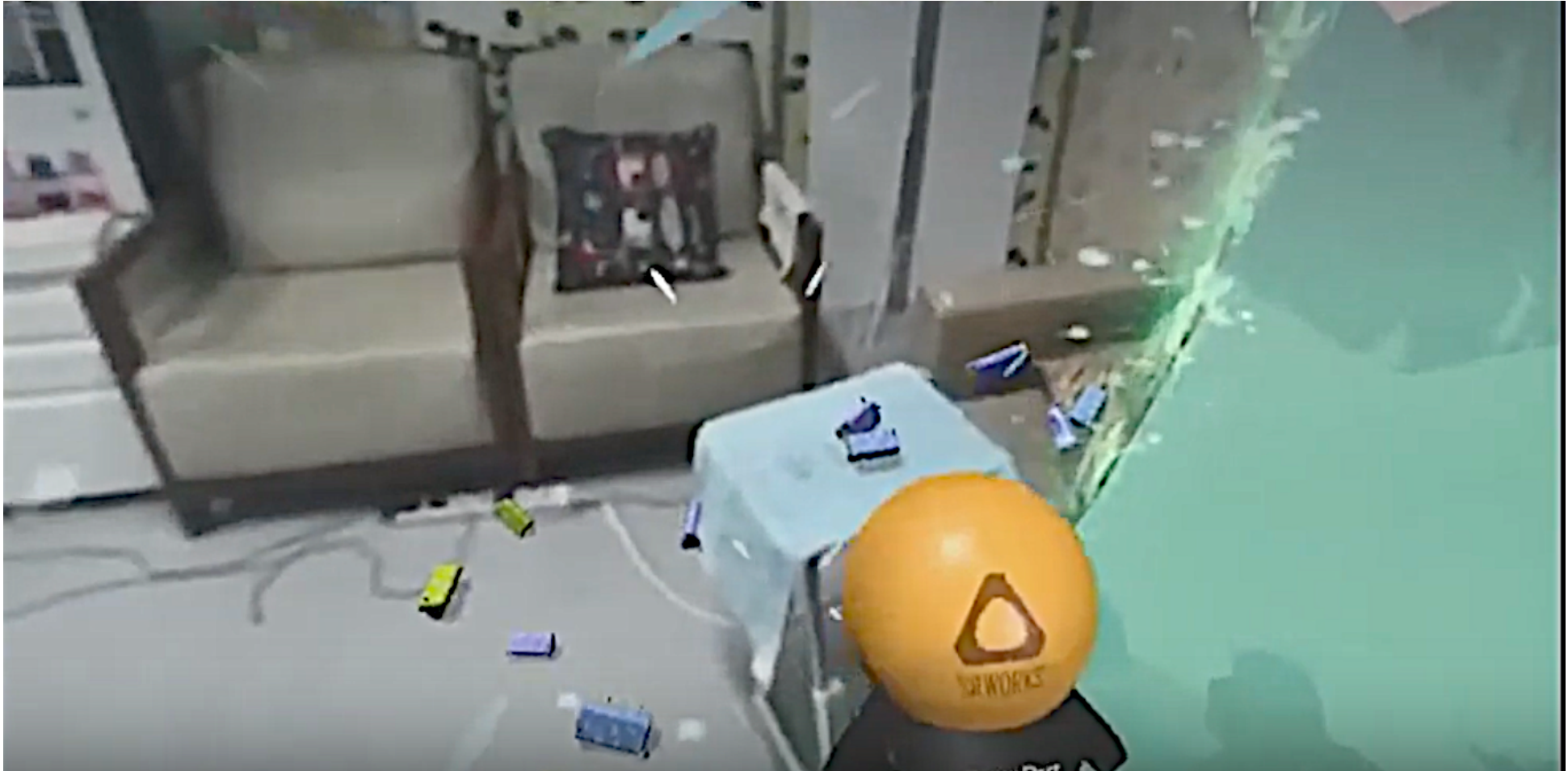
VR has some restrictions that we should take into account

- Accessibility testing
- Usability testing
- Cloud testing
- Security testing
- Localization testing
- Real world dangers
- Virtual assaults



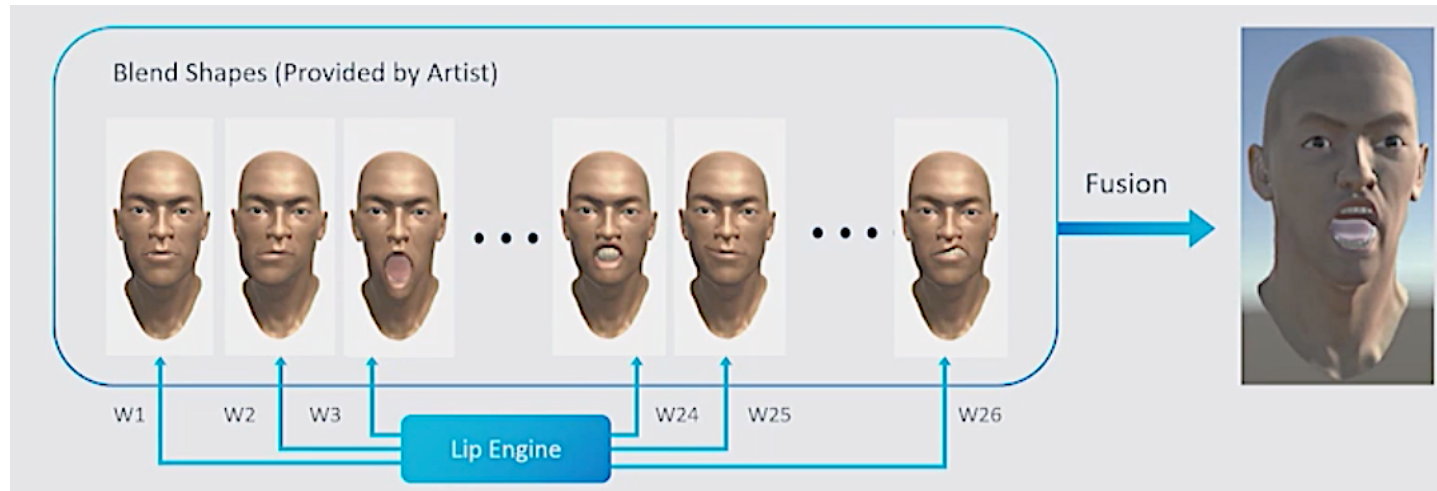
# The future of VR

- MR (AR mixing with VR)



# The future of VR

- Trackers (eyes, lips, expressions, heart, legs... )



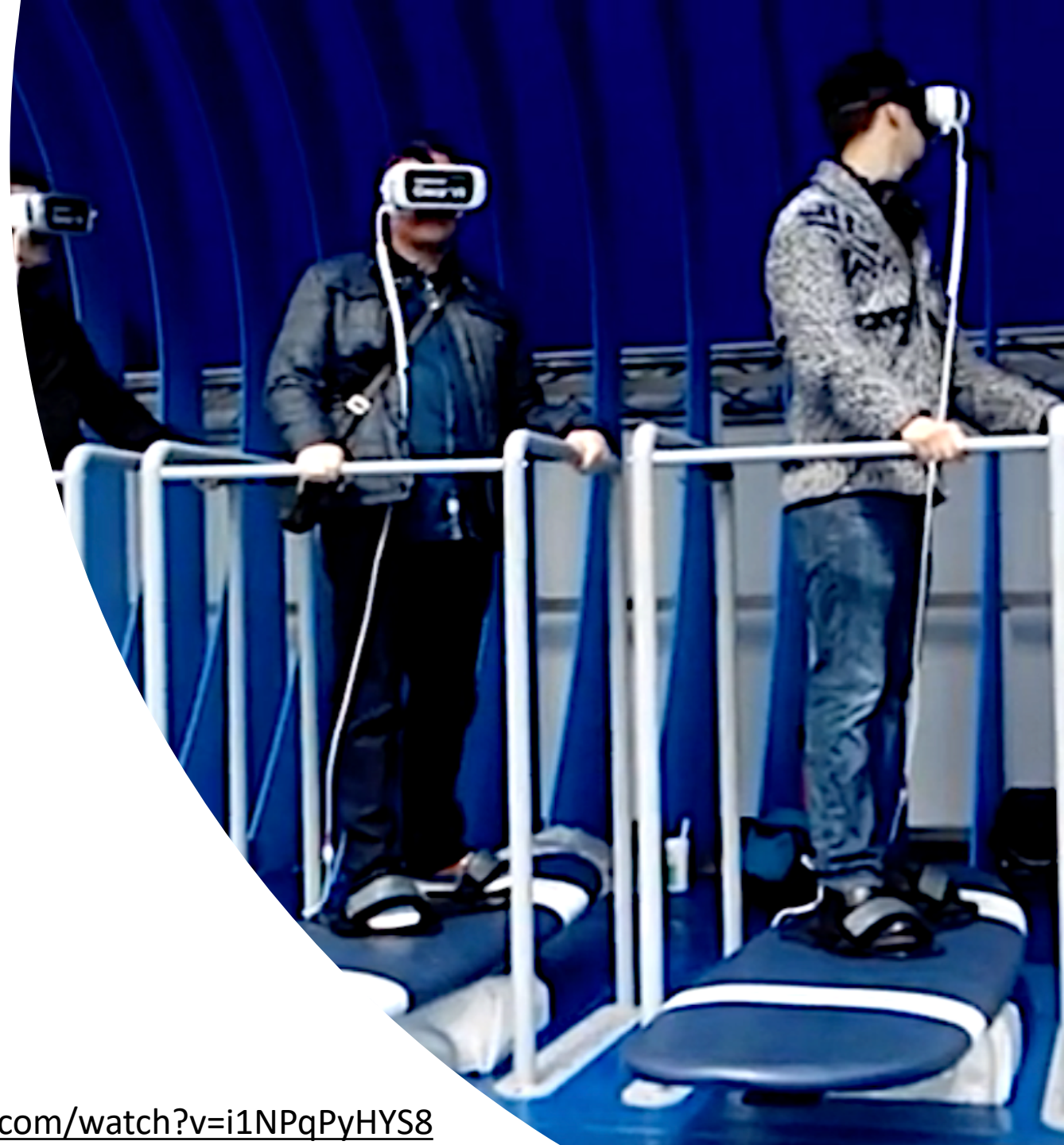
<https://www.youtube.com/watch?v=lpXdHjzbauU>



# The future of VR

---

- Platforms (running/walking/surfing/snowboard...)
- <https://www.youtube.com/watch?v=6Jb3W1QZVaE> (2017)
- <https://www.youtube.com/watch?v=qh2UdRKNqH4> (2016)
- <https://www.youtube.com/watch?v=i1NPqPyHYS8> (2016)
- Better position detection on the headsets + detection of the environment



<https://www.youtube.com/watch?v=i1NPqPyHYS8>

# The future of Virtual reality - conclusions

---

- Wireless
- Smaller devices
- More than just hands and head (sensory, trackers...)
- XR : bringing digital objects to real world and real world to digital objects



Photo by [Lucrezia Carnelos](#) on [Unsplash](#)



# How to get started in VR?

- Events / meetings
- Watch videos / reviews
- Games / apps
- Courses
- Play with it!



[This Photo](#) by Unknown Author is licensed under [CC BY-SA-NC](#)





# Thank you!

---

Noemi Ferrera

- @thetestlynx
- Blog: [noemiferrera.com](https://noemiferrera.com)
- Github.com/thetestlynx



# VR devices: single

Daydream view <https://arvr.google.com/daydream/>



Google Daydream View - VR Headset (Slate)

★★★★☆ ~ 239

\$49<sup>99</sup> ~~\$59.95~~

More Buying Choices

\$34.42 (19 used & new offers)



Oculus Go Standalone Virtual Reality Headset - 32GB

May 1, 2018 | by Oculus

★★★★☆ ~ 1,687

Oculus

\$199<sup>00</sup>

Ships to Germany

More Buying Choices

\$168.00 (19 used & new offers)



Lenovo Mirage Solo with Daydream, Standalone VR Headset, 5.5" QHD Display, Smartly Designed Mobile VR Headset

May 5, 2018 | by Lenovo

★★★★☆ ~ 76

Android

\$299<sup>89</sup> ~~\$399.99~~

Ships to Germany

More Buying Choices

\$198.49 (21 used & new offers)

# VR devices: with handset



**Available now**

**\$39.99** MSRP\*

**Buy now** ▶

For the first time ever, you and your family can try making, playing, and discovering together with Nintendo Labo through a value-priced Starter Set. Combine DIY fun with simple, shareable VR, plus a new programming tool you can use to make your own quick play VR games and experiences! Feel your creations come to life as you and your family blast through an alien invasion, test your skills at competitive hippo feeding, and go wherever else your imagination takes you.

**Expansion Sets** ▶



Fantasy Violence



**Oculus Quest All-in-one VR Gaming Headset – 64GB**

ESRB Rating: Rating Pending | May 21, 2019 | by Oculus

★★★★☆ ~ 878

**Oculus**

**\$399<sup>00</sup>**

**Ships to Germany**

**Oculus Rift S PC-Powered VR Gaming Headset**

May 21, 2019 | by Oculus

★★★★☆ ~ 966

**Windows**

**\$399<sup>00</sup>**

**Ships to Germany**

**More Buying Choices**

**\$379.05** (13 used & new offers)



**HTC Vive Cosmos - PC**

Oct 3, 2019 | by HTC

★★★★☆ ~ 1,942

**Windows**

**More Buying Choices**

**\$526.39** (47 used & new offers)

