

Mobile Virtual Reality what is that and how it works?

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Agenda

- 1. XR/AR/MR/MR/VR/MVR?
- 2. Mobile Hardware
- 3. SDK/Tools/Development

AR is for Augmented Reality: What is that?

REAL-TIME, MULTIPLAYER
AUGMENTED REALITY
POKEMON BATTLE!

AR is for Augmented Reality: Devices, Tools

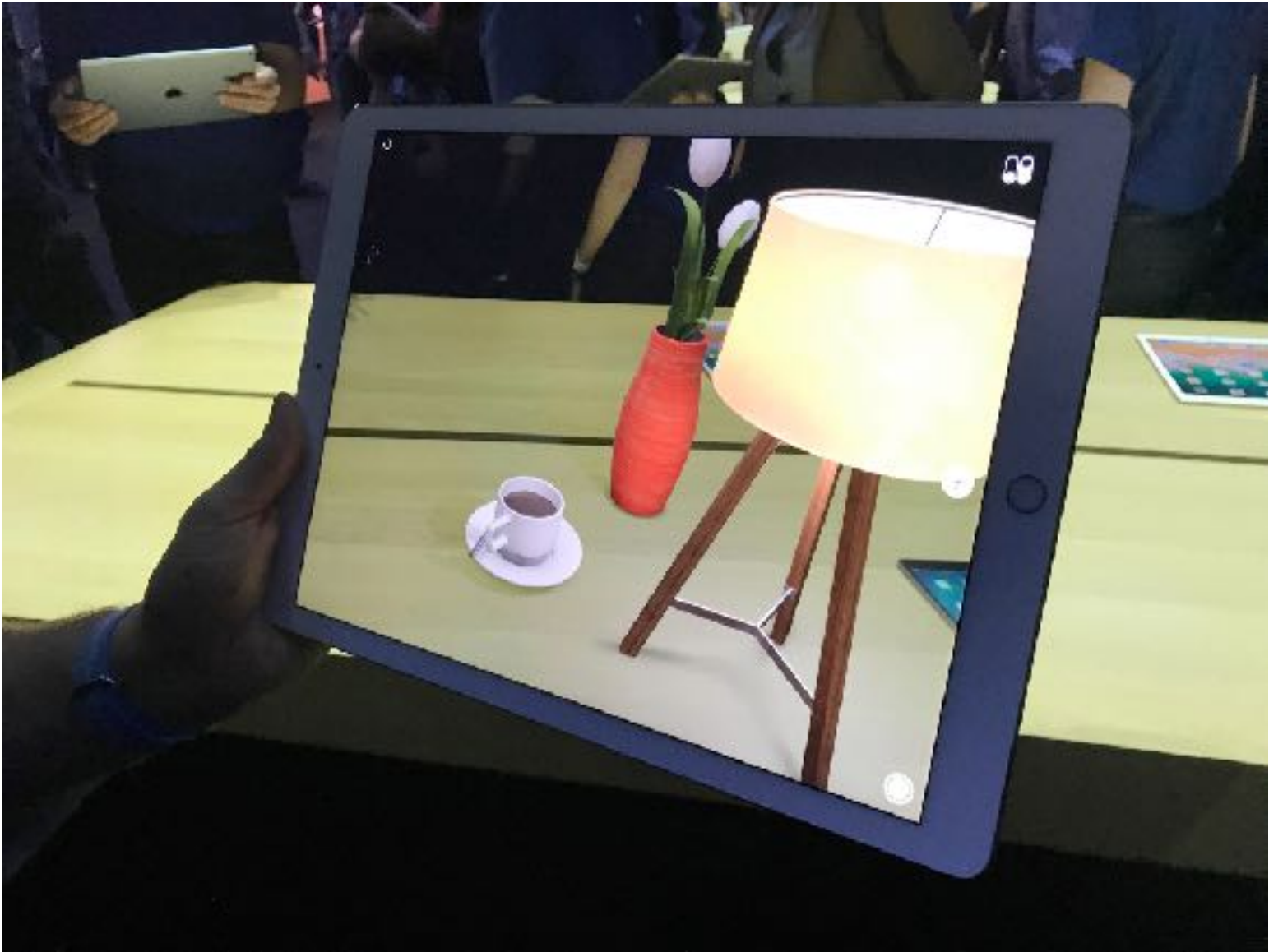


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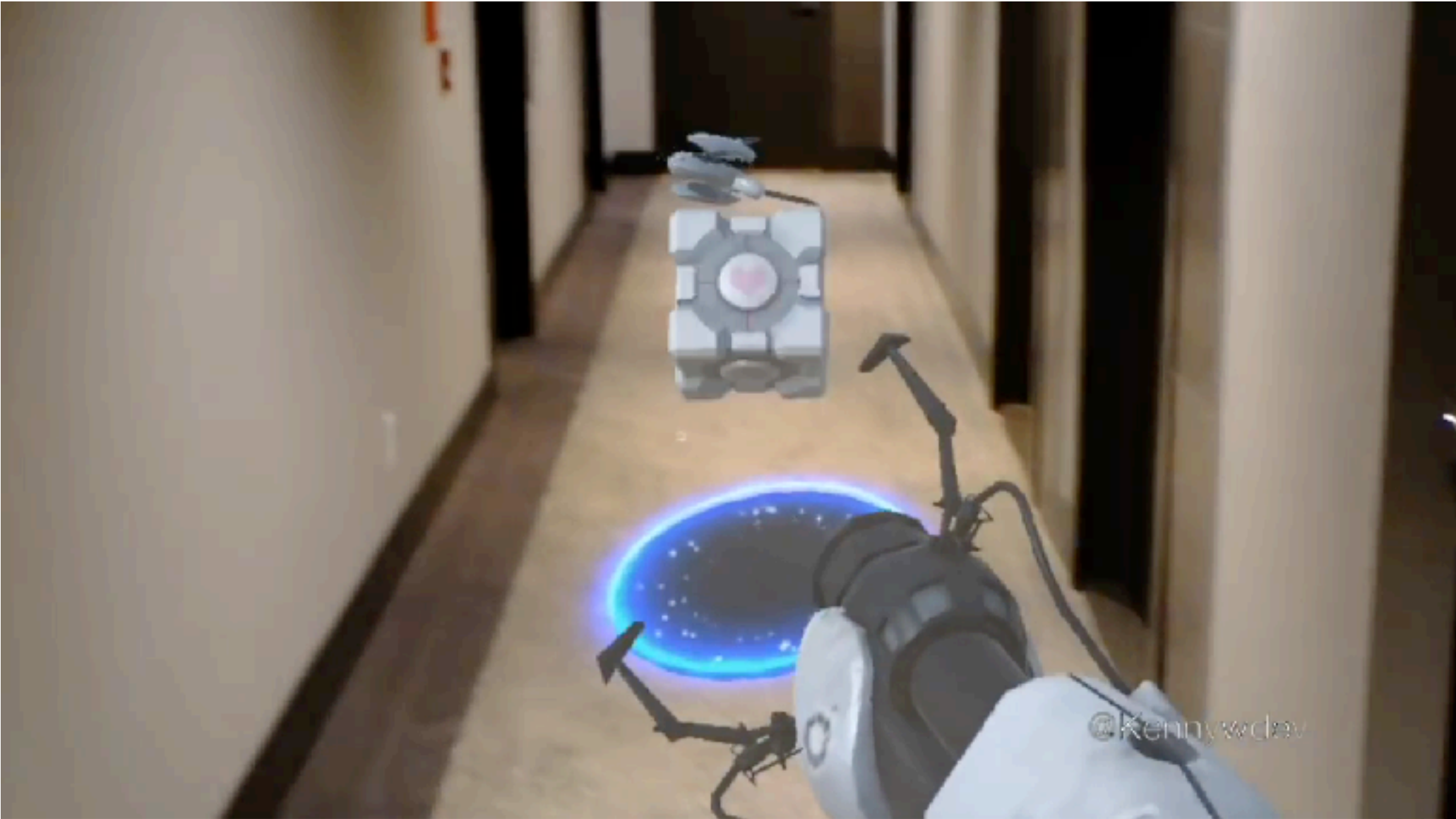
AR Tools / SDK

- Vuforia
- EasyAR
- Wikitude
- ARToolKit
- Kudan
- Maxst
- Xzimg
- NyARToolkit

AR is for Augmented Reality New Player: Apple ARKit



MR is for Mixed Reality: What is That?



@Kennywday

MR is for Mixed Reality Devices: Hololens



- CPU: Intel 32-bit (1GHz)
- OS: Microsoft Holographics
- Memory:
 - 2 GB RAM
 - 1 GB HPU RAM
- Storage: 64 GB (flash memory)
- Display: 2.3 megapixel
widescreen stereoscopic head-mounted display
- Sound: Spatial sound technology

MR is for Mixed Reality Devices: Google Project Tango

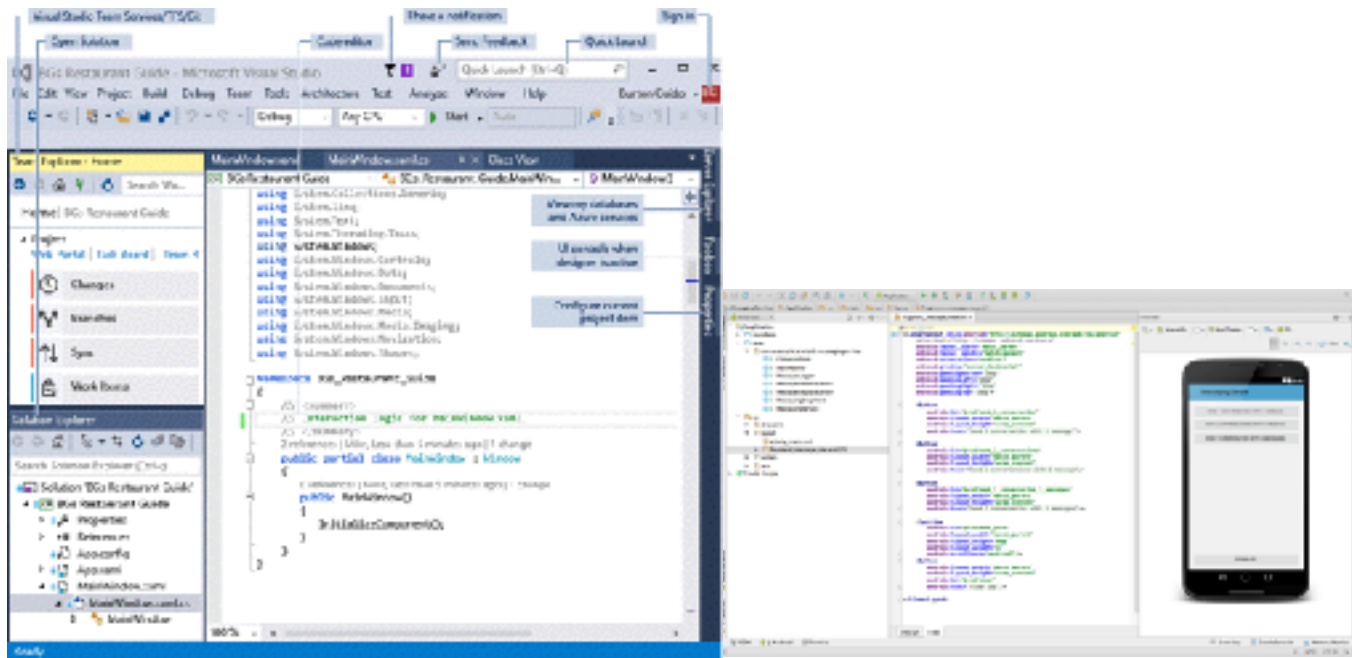


Lenovo Phab Pro

- SoC: Qualcomm® Snapdragon™ 652 processor built for Tango
- OS: Android™ 6.0, Marshmallow
- Memory: 4 GB RAM memory, 64 GB
- Display: 6..4" Quad HD (2560 x 1440) 2K IPS assertive display with 2.5D curved glass



MR is for Mixed Reality Tools

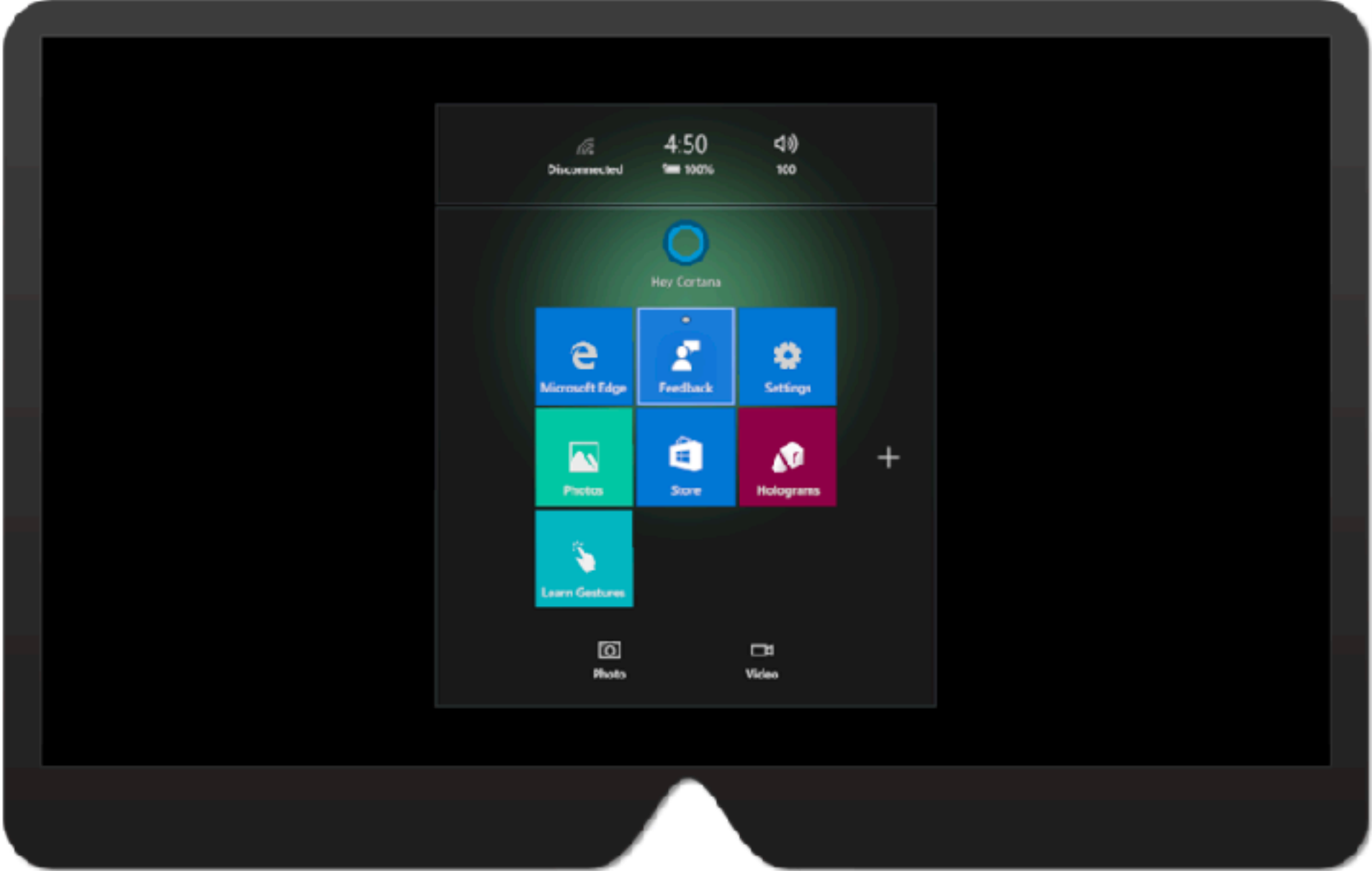


Mixed Reality Tools / SDK

- Microsoft HoloLens dev programm
- Unity HoloLens
- Google Tango SDK (android / native)
- Tango SDK for Unity



MR is for Mixed Reality Tools: Hololens Emulator



MR is for Merged Reality: What is That?



MR is for Merged Reality Devices: Intel Project Alloy



- vision processor
- 7th core processor
- ultra wide-angle fisheye lenses,
- 2 RealSense cameras, sensors, and battery.

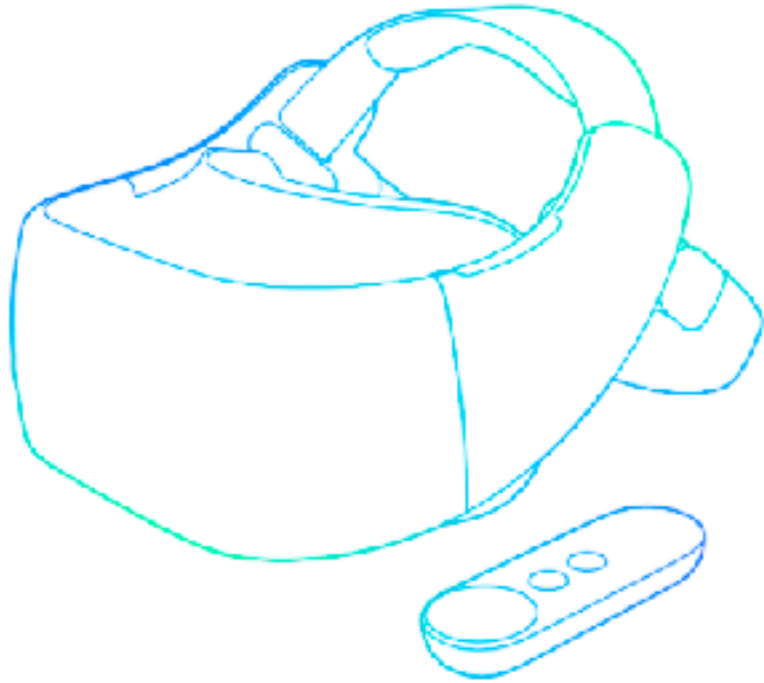
MR is for Merged Reality Devices: Intel Project Alloy



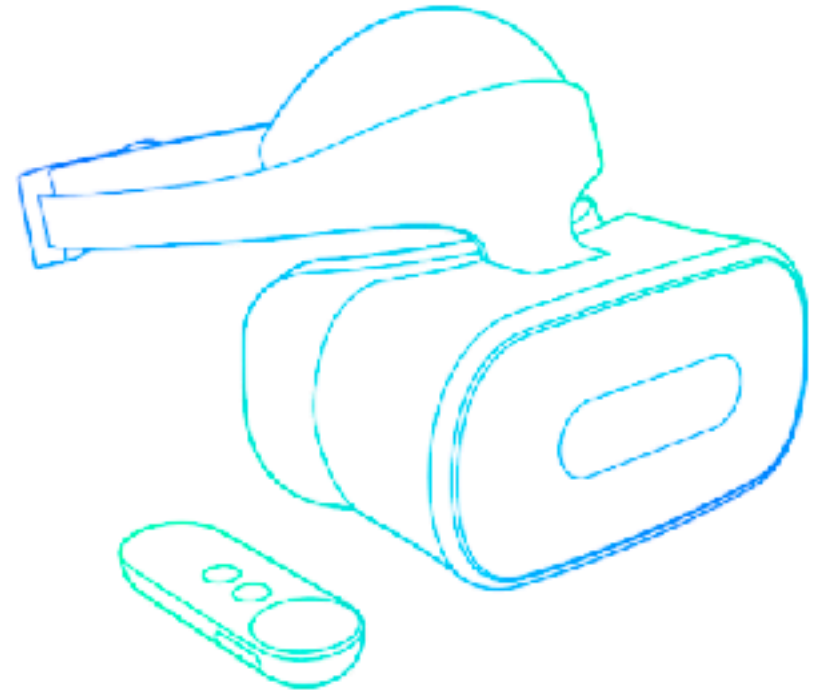
- vision processor
- 7th core processor
- ultra wide-angle fisheye lenses,
- 2 RealSense cameras, sensors, and battery.



MR is for Merged Reality Devices: Google Standalone VR

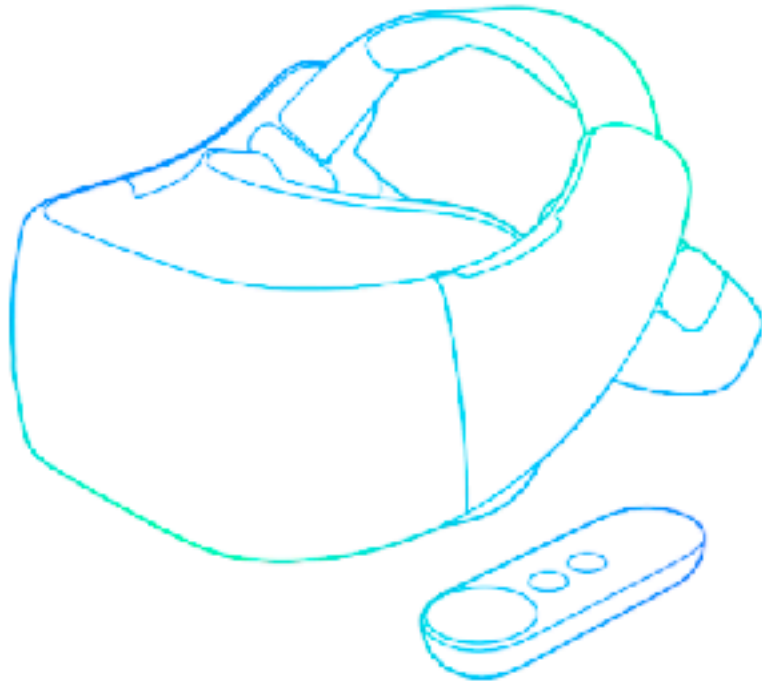


VIVE standalone headset with
Daydream

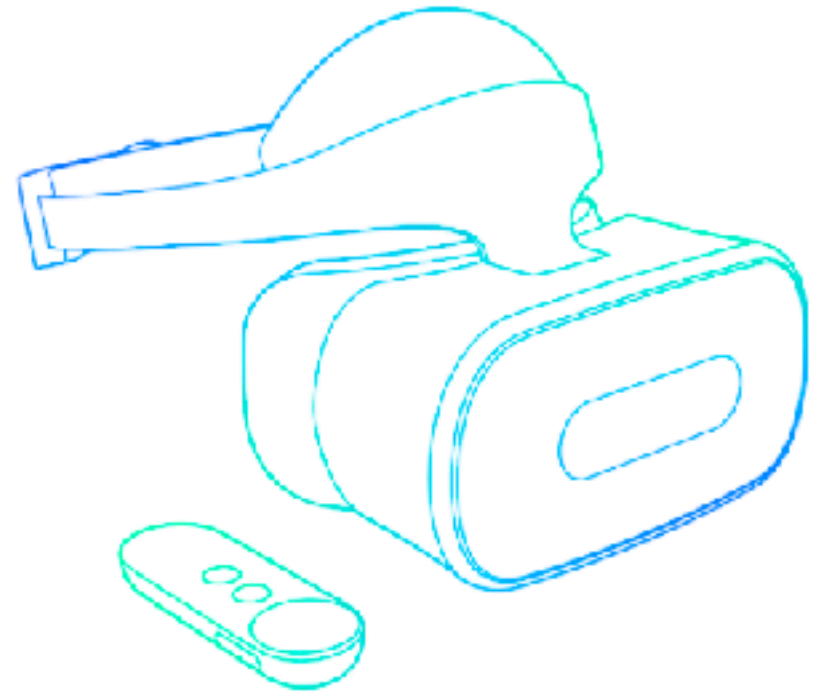


Lenovo standalone headset with
Daydream

MR is for Merged Reality Devices: Google Standalone VR



VIVE standalone headset with Daydream



Lenovo standalone headset with Daydream



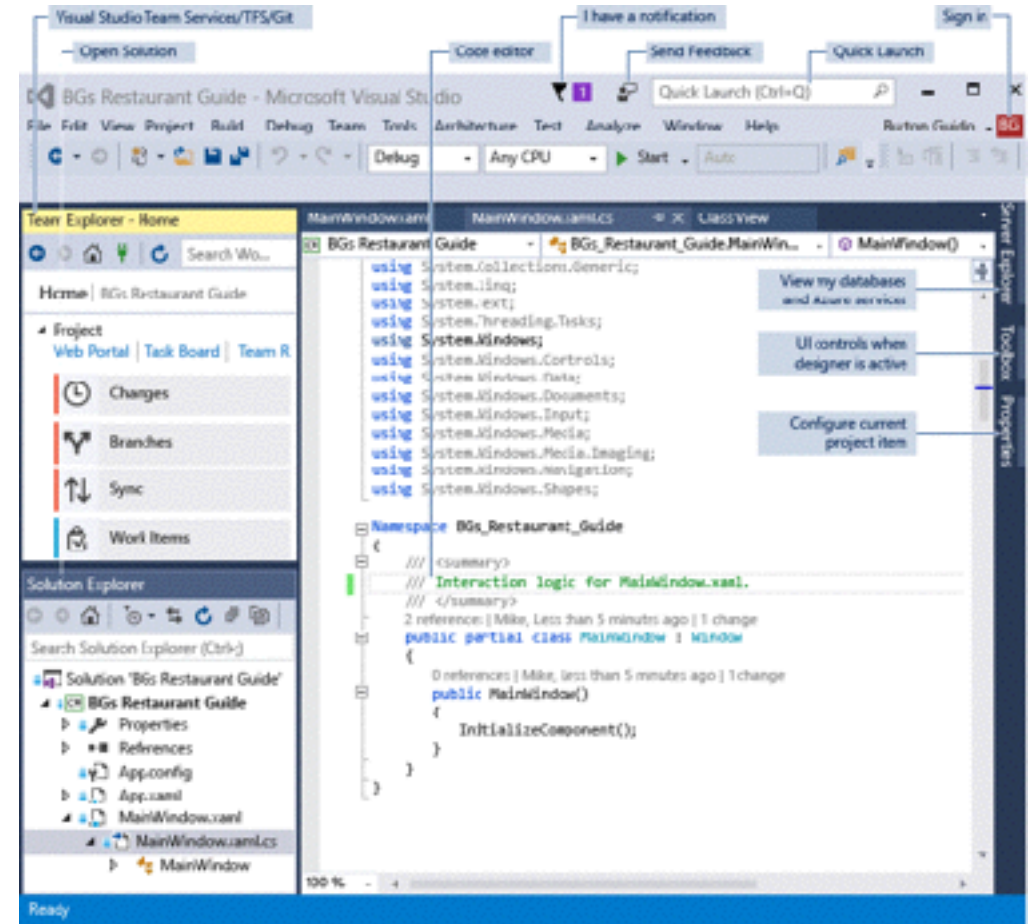
MR is for Merged Reality Devices: Google Standalone VR



MR is for Merged Reality Devices: HTC China Standalone VR



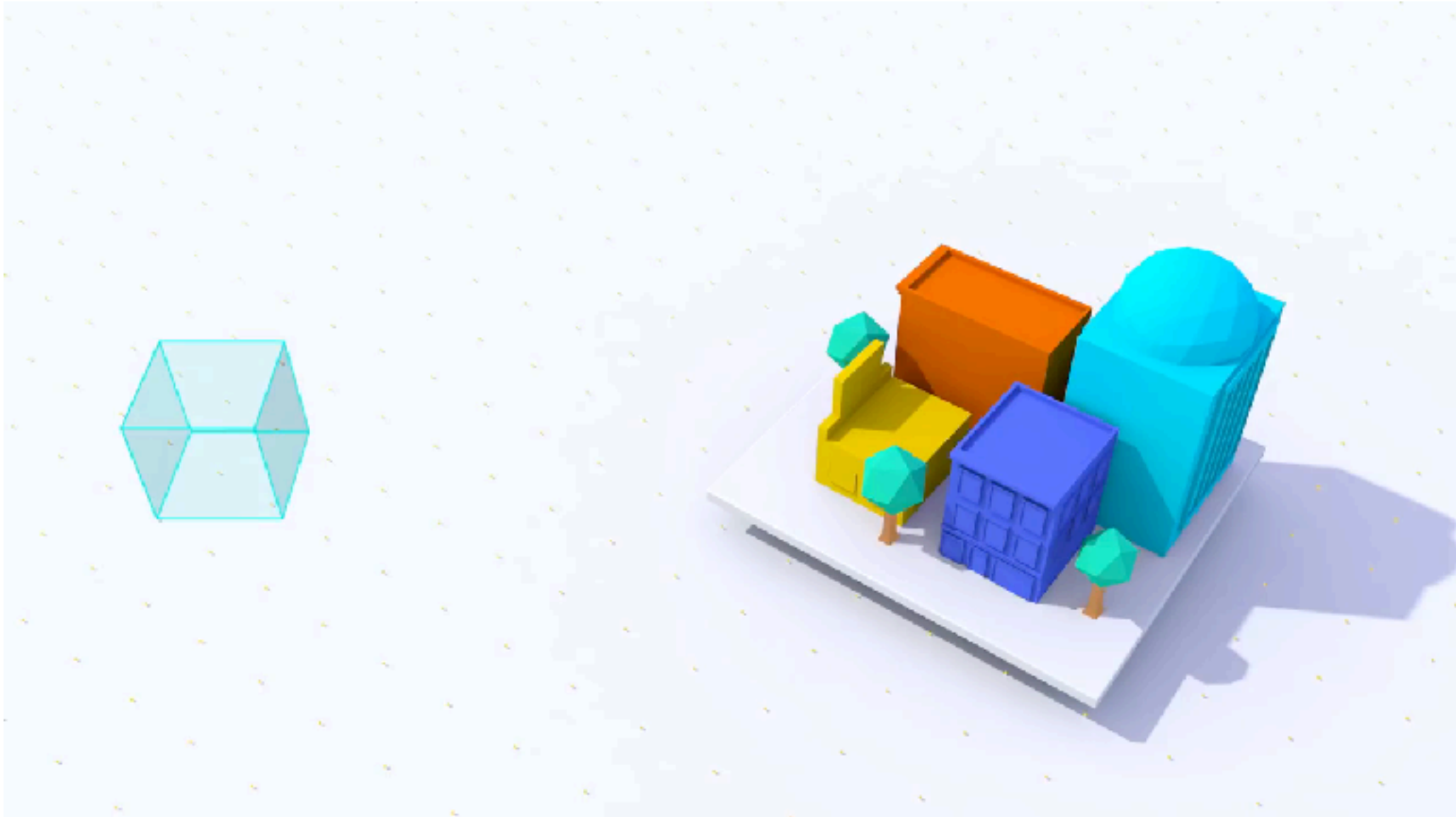
Merged Reality Tools: Unity, Unreal, Seurat ,Visual Studio?



Merged Reality Tools: Seurat

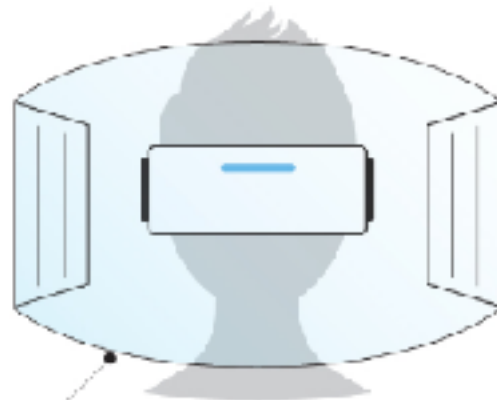
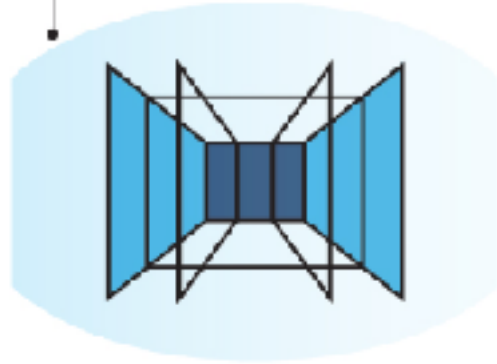


Merged Reality Tools: Seurat



VR is for Virtual Reality: Basic Graphics Characteristics

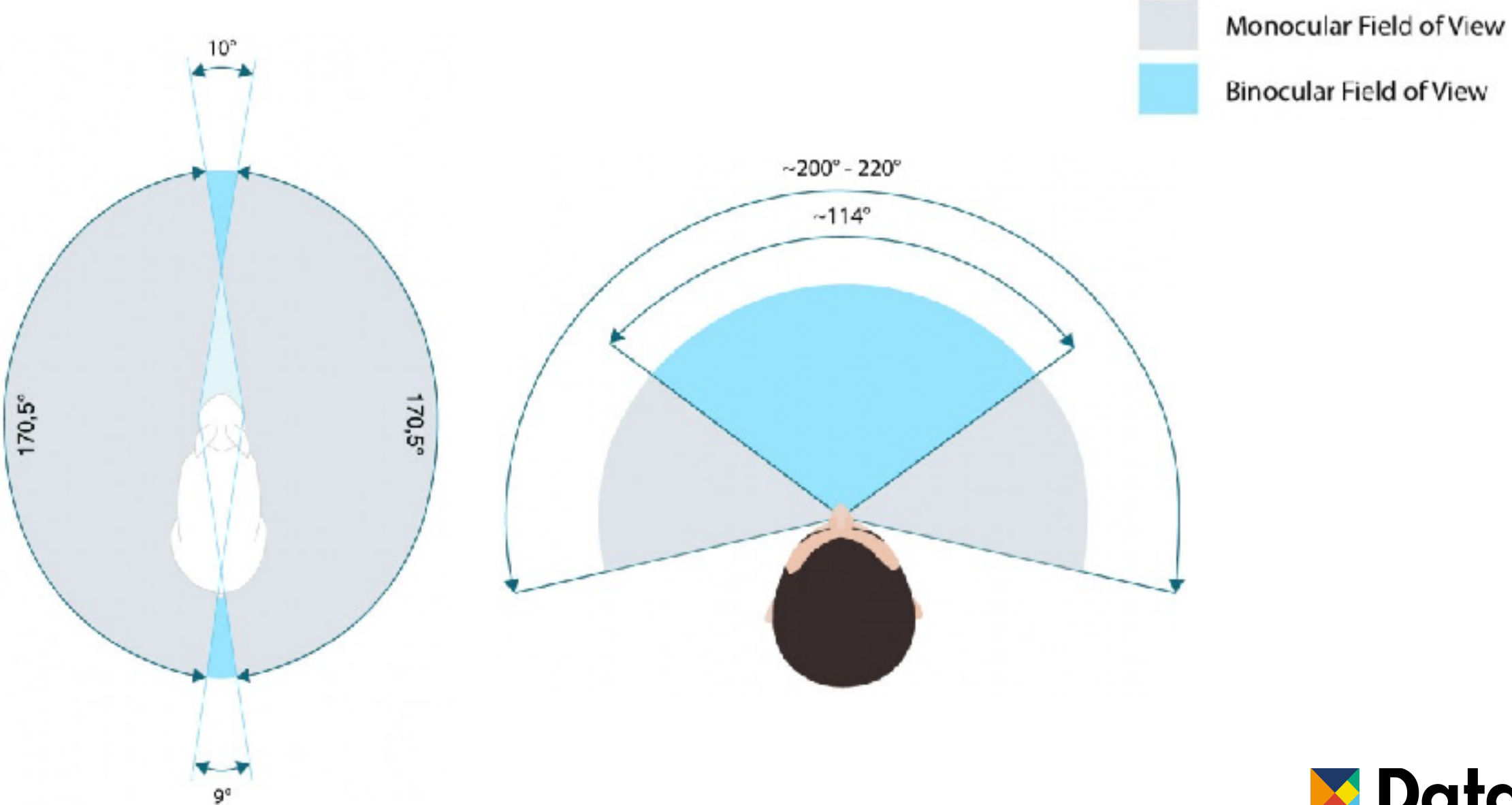
Completely digital environment



Fully enclosed, synthetic experience
with no sense of the real world.

- FOV (Field of View)
- Refresh rate
- Display Resolution
- PPI (Pixel per inch)
- Lens type
- Sensors

VR is for Virtual Reality: FOV



VR is for Virtual Reality: Oculus



- FOV: 110x113
- Refresh Rate: 90Hz
- Resolution: 1200x1080
- PPI: 447
- Sensors: Accelerometer, gyroscope, magnetometer

VR is for Virtual Reality: HTC Vive



FOV: 94Hx93V

Refresh Rate: 90Hz

Resolution: 1200x1080

PPI: 456PPi

Sensors: Accelerometer,
gyroscope, magnetometer

VR is for Virtual Reality: PS VR



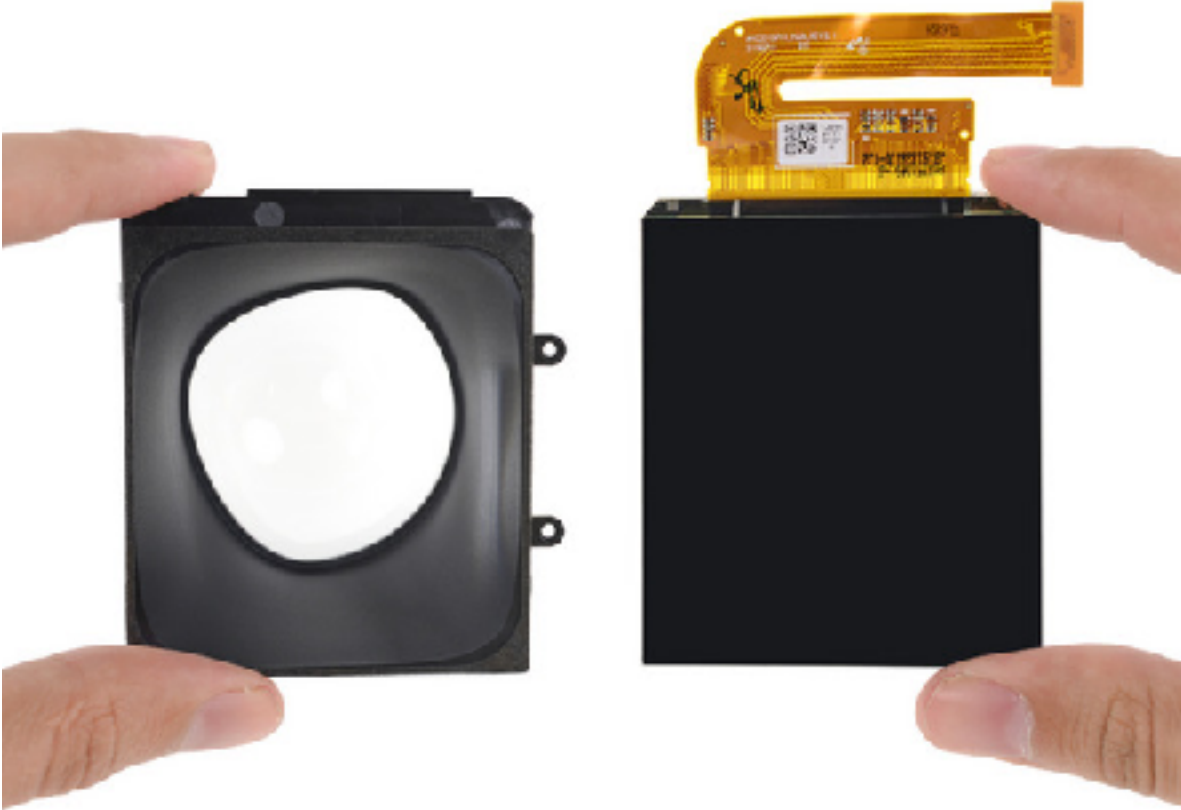
FOV: 100

Refresh Rate: 90/120Hz

Resolution: 960x1080

Sensors: Accelerometer,
gyroscope, magnetometer

VR is for Virtual Reality: Oculus Screen vs HTC Vive



VR is for Virtual Reality: PSVR Screen



Mobile VR - ?

Mobile VR - ?



Mobile VR - ?



Mobile VR - ?



Cardboard

 **DataArt**

Google cardboard world



FOV: 90-120

Refresh Rate: depends on device

Resolution: depends on phone

Sensors: Accelerometer,
gyroscope, magnetometer

Devices: Any Mobile Phone

SDK

- iOS
- Android



Google cardboard world



MVR: Google Cardboard Setup



Cardboard

Google Inc. Libraries & Demo



This app is compatible with some of your devices.

Top Developer

★★★★★ 114,931

Installed



View in iTunes

Description

Cardboard puts virtual reality on your iPhone. The Google Cardboard app helps you set up a Cardboard viewer and includes a few experiences to get you started:

[Google, Inc. Web Site](#) > [Google Cardboard Support](#) >

[...More](#)

What's New in Version 1.2

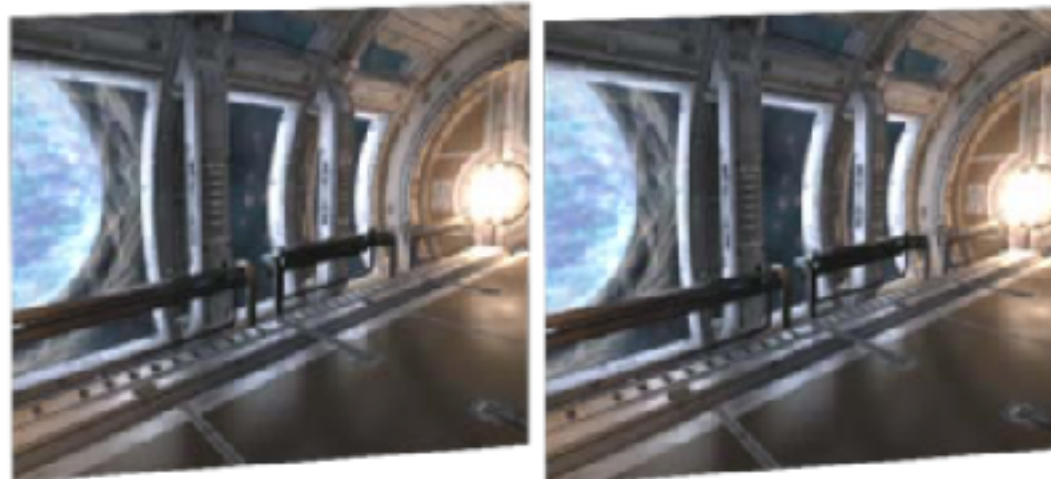
Get a taste of what's possible in VR with the brand new "Arctic Journey" demo: fly alongside Arctic terns, plant a field of flowers, relax under a sky full of stars and more.

VR Render

Head-tracked layers



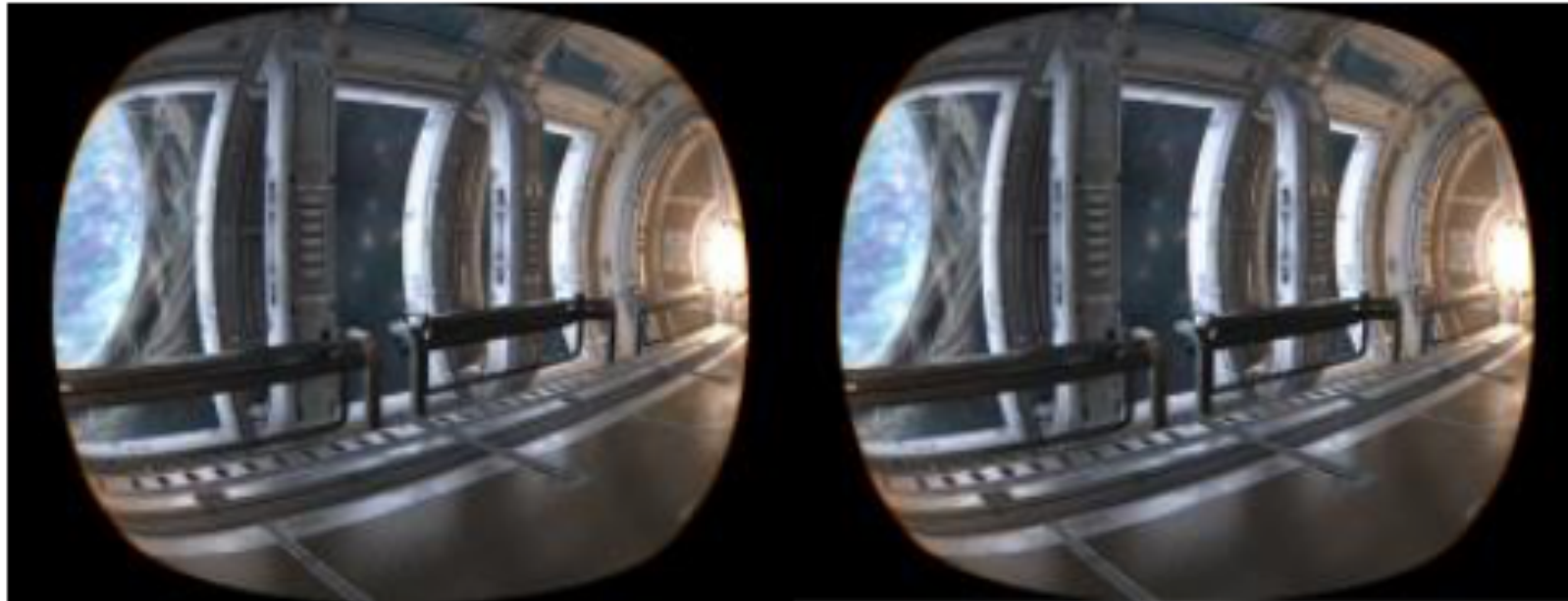
Re-project with latest head position



VR Render

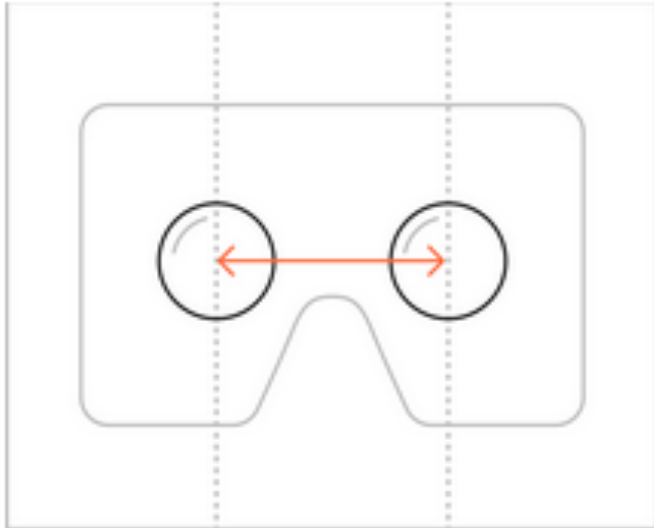
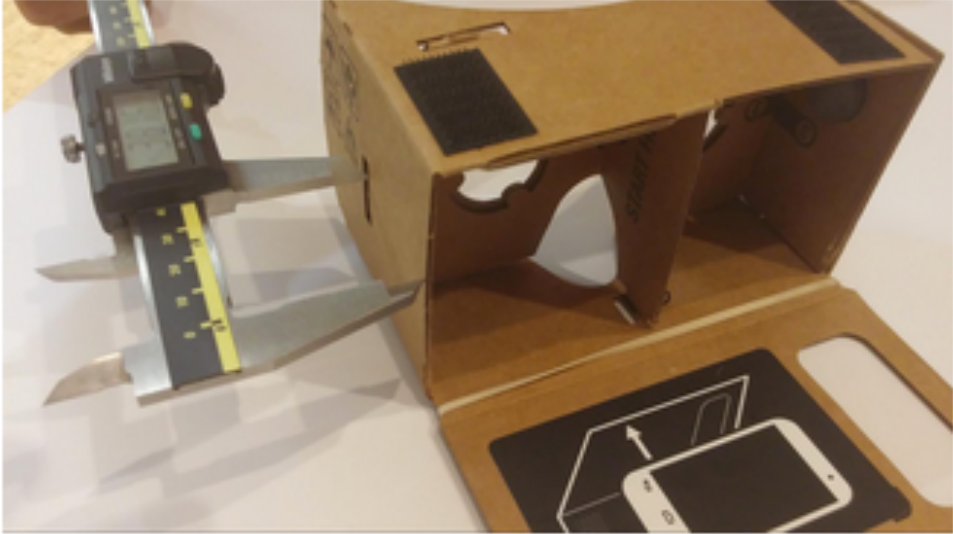
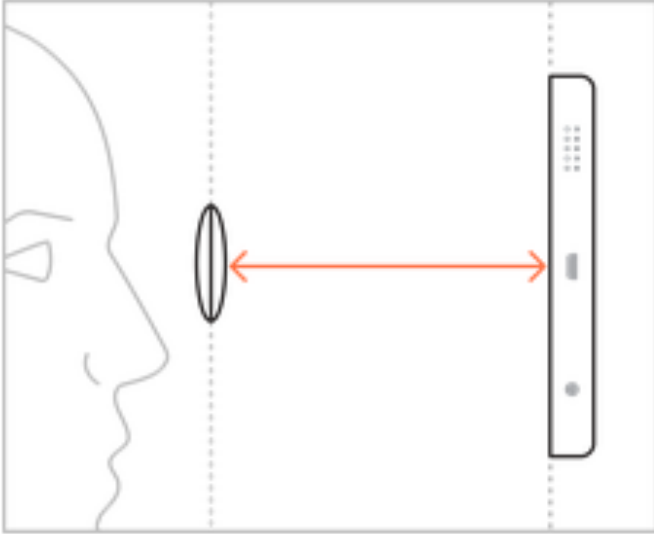


Lens correction

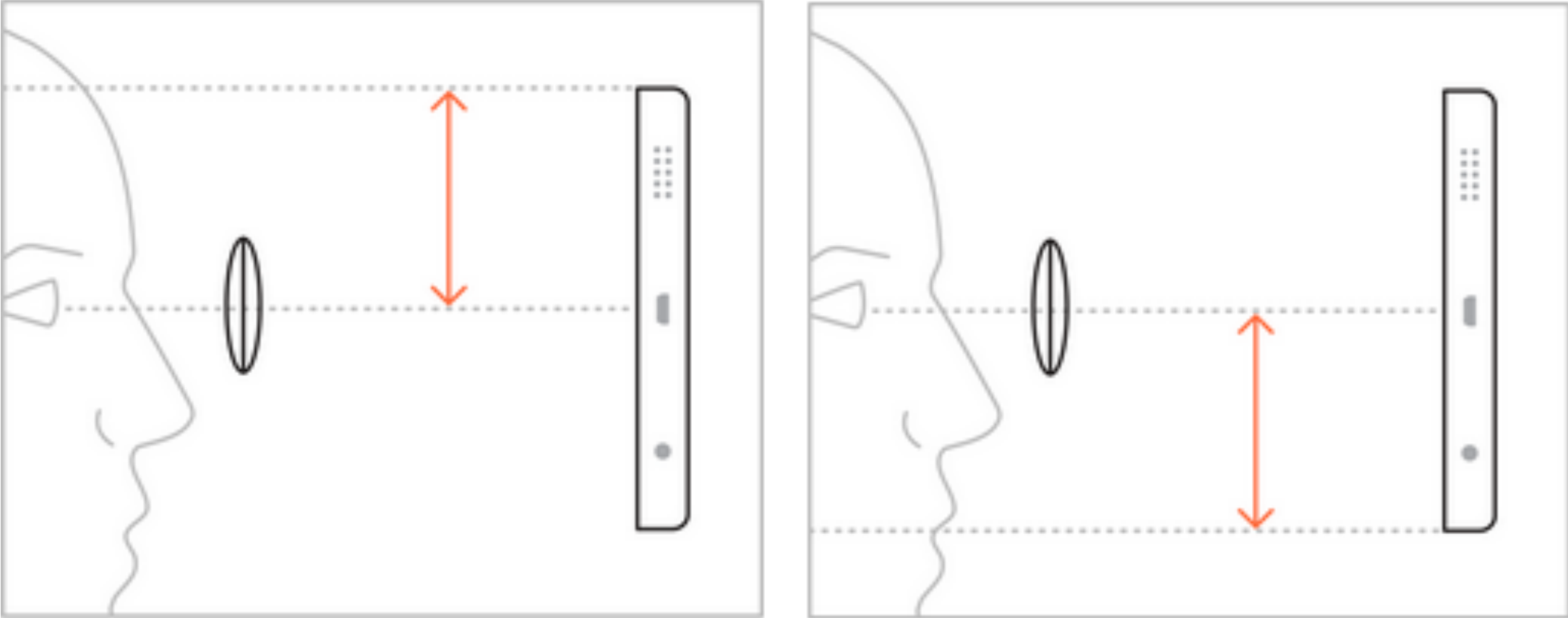


Result

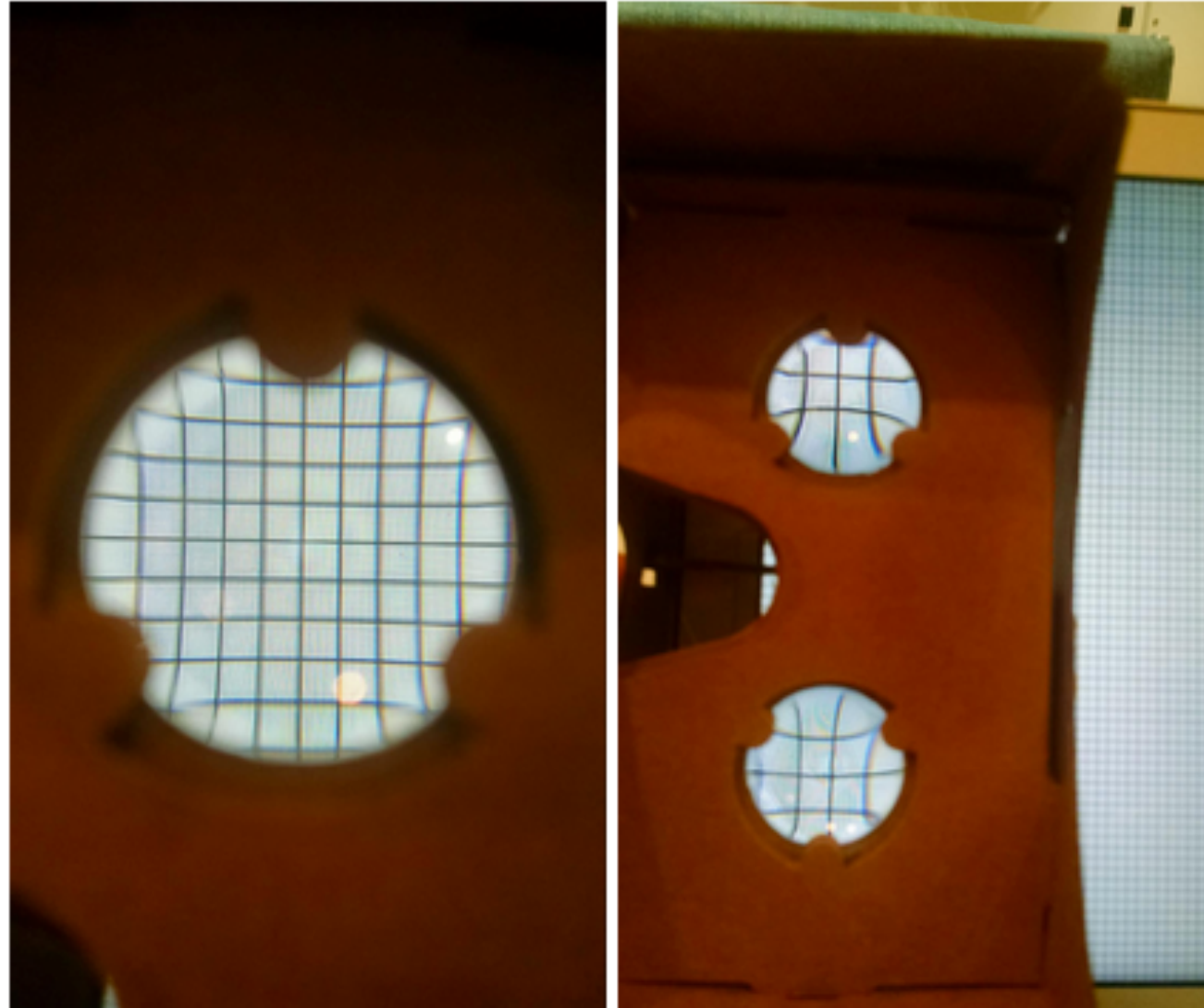
VR Render: Lens correction data



VR Render: Lens correction data



VR Render: Lens distortion data



VR Render



Frame start

One
frame in
slo-mo

Frame end



Mobile VR - Controls



DayDream

 **DataArt**

MVR is: Google Daydream View



FOV: 101

Refresh Rate: 60

Resolution: 2560x1440 /
FullHD (Both)

Sensors: Accelerometer,
gyroscope, magnetometer
Joystick

SDK

- Android

Daydream



Google Pixel / XL
Moto Z
Mate 9 Pro
ZTE Axon 7

Daydream

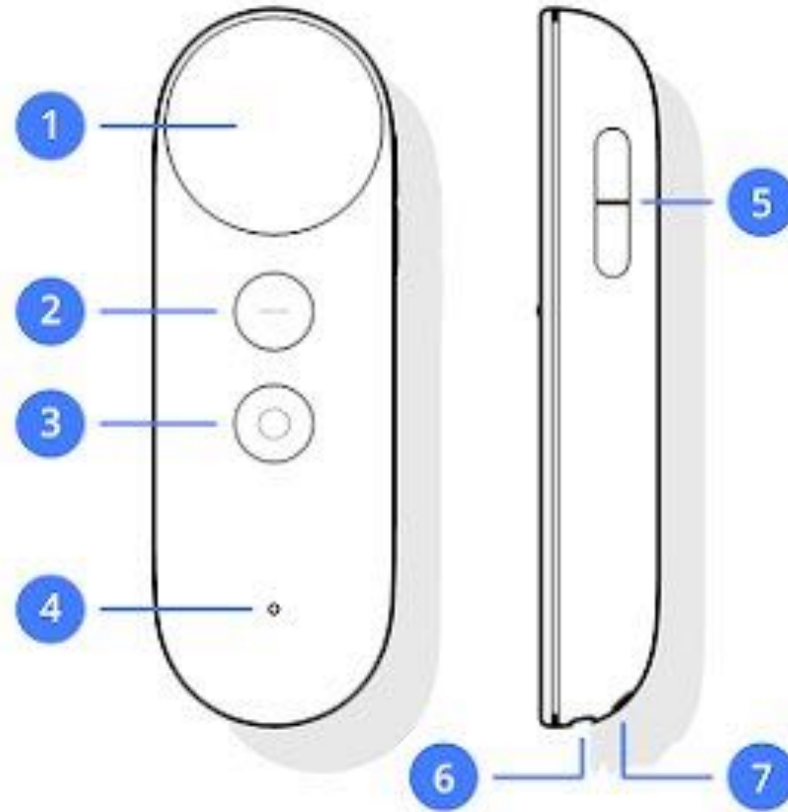


Galaxy S8 and S8+
Samsung

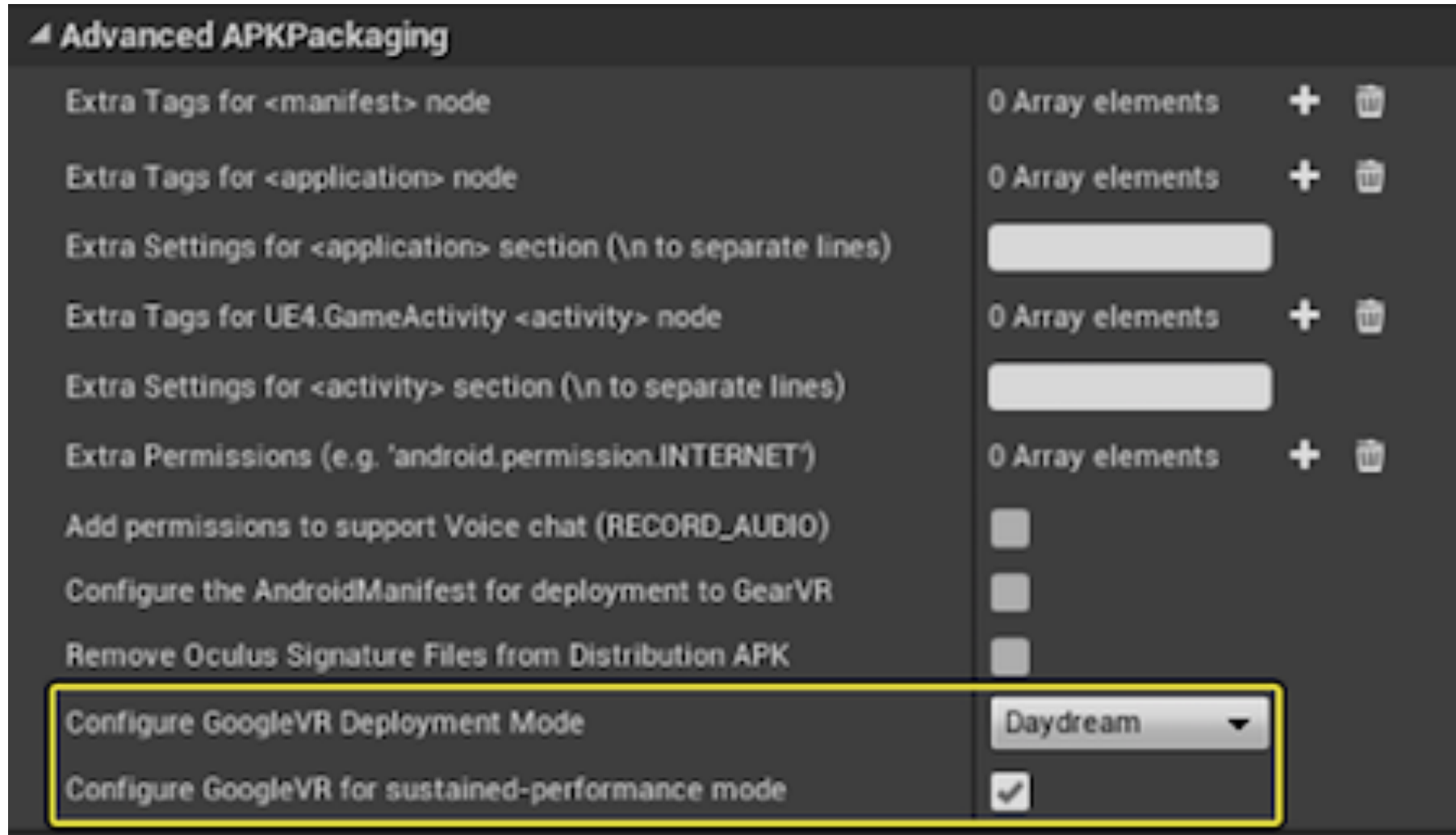


ZenFone AR
ASUS

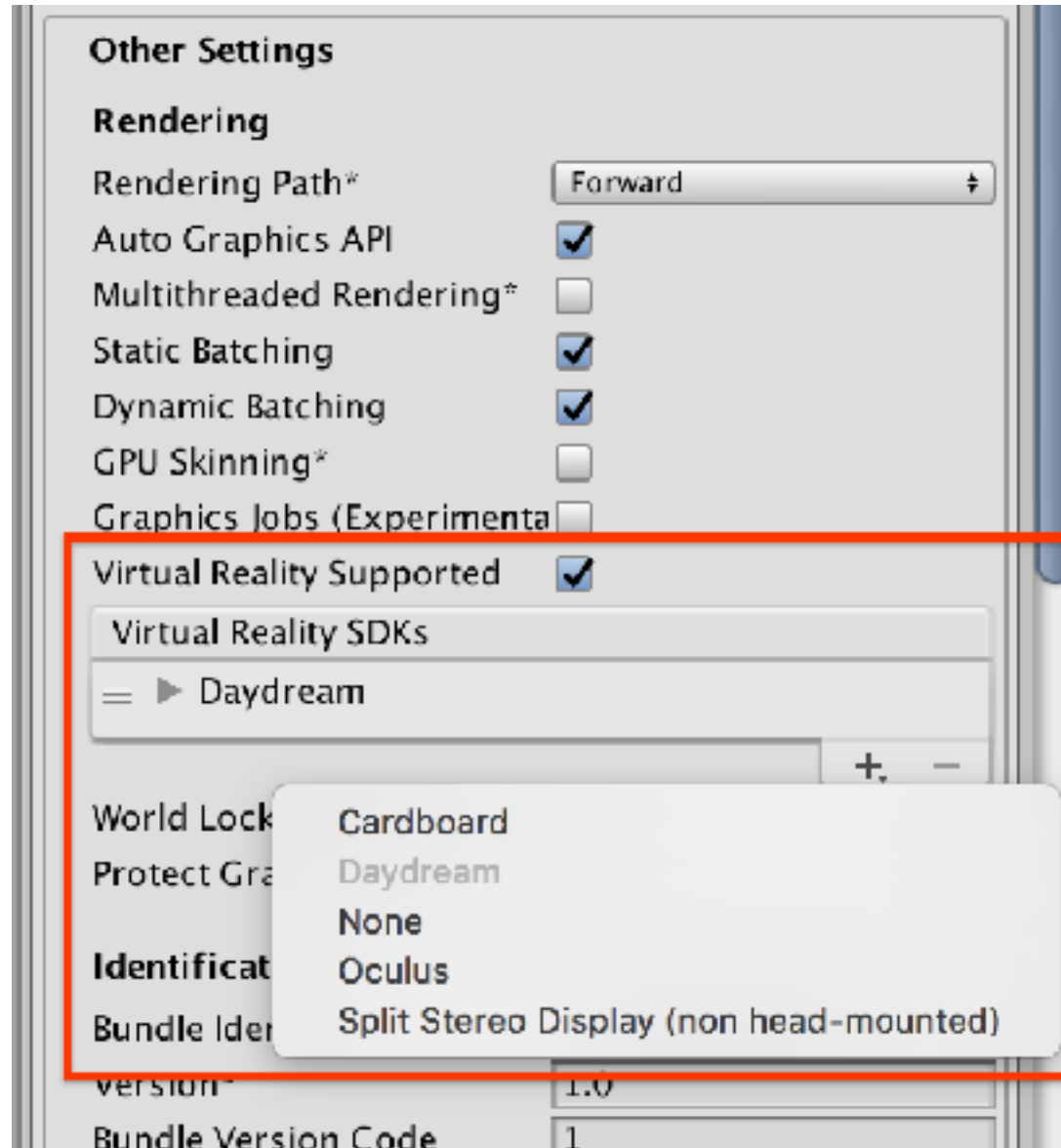
Daydream: Controller



Google Daydream Tools: Unreal (Branch)



Google Daydream Tools: Unity



Google Daydream



Samsung Gear VR powered by Oculus Rift



MVR is: Samsung Gear VR powered by Oculus Rift



FOV: 90-101
Refresh Rate: 50 - 60
Resolution: 2500x1440 (Both)
Sensors: Accelerometer,
gyroscope, magnetometer
Touch Panel
Devices: Top Samsung Phones

SDK

- Android

MVR is: Samsung Gear VR for Note



FOV: 101

Refresh Rate: depends on device

Resolution: depends on phone

Sensors: Accelerometer, gyroscope, magnetometer

Touch Panel

Devices: Samsung Notes

SDK

- Android

MVR is: Samsung Gear VR 2017



FOV: 101

Refresh Rate: depends on device

Resolution: depends on phone

Sensors: Accelerometer, gyroscope, magnetometer

Joystick

SDK

- Android

Samsung Gear VR Pre-request

Oculus Signature File (osig) Generator

Device ID:

This is not your device's serial number or IMEI.

Download File

See instructions below for how to determine your 8- to 16-digit device ID.

Samsung Gear VR: Controller



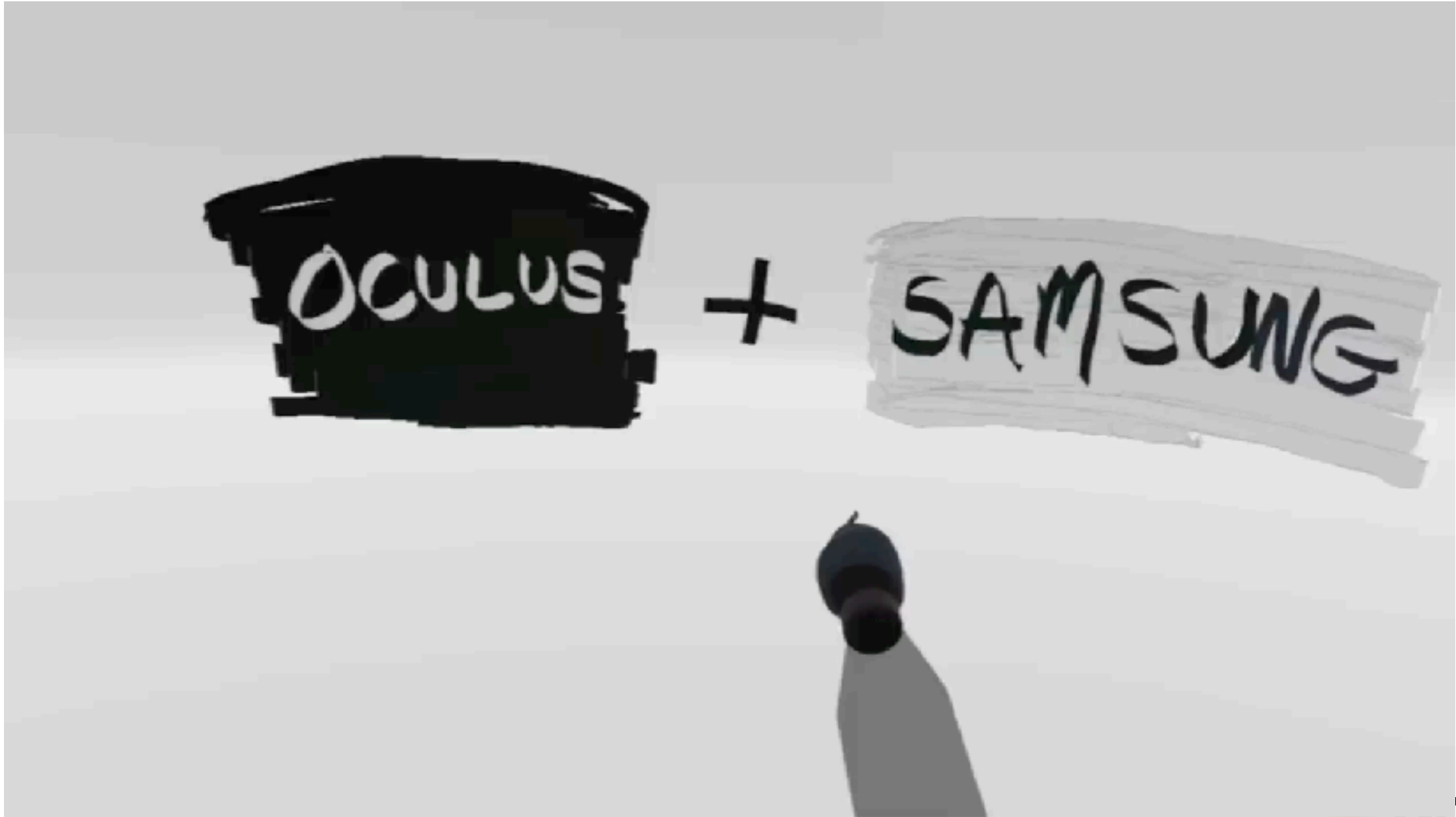
3-axis freedom of motion No depth movement
Sensors: Gyro+Accelerometer+Magnetometer,
SamplingRate @208Hz

Indicator: 3-colorLED Battery:
2xAAA Battery(1000mAh, upto40dayswhen used
on average for 2 hours a day)

BT: 4.2 Bluetooth Low Energy

Touchpad/Trigger/Back & Home Keys/Volume
Rocker

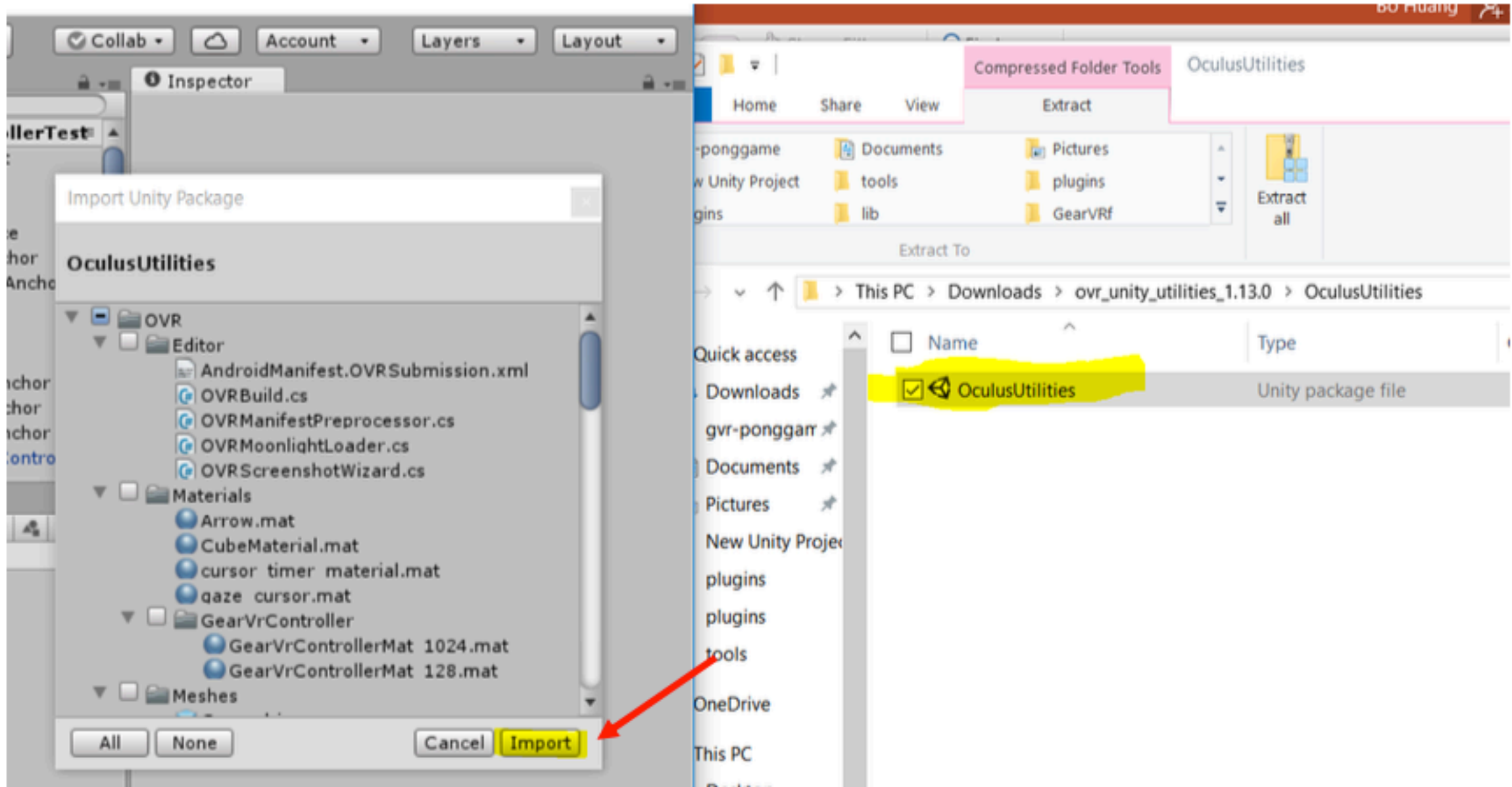
Samsung Gear VR: Sample



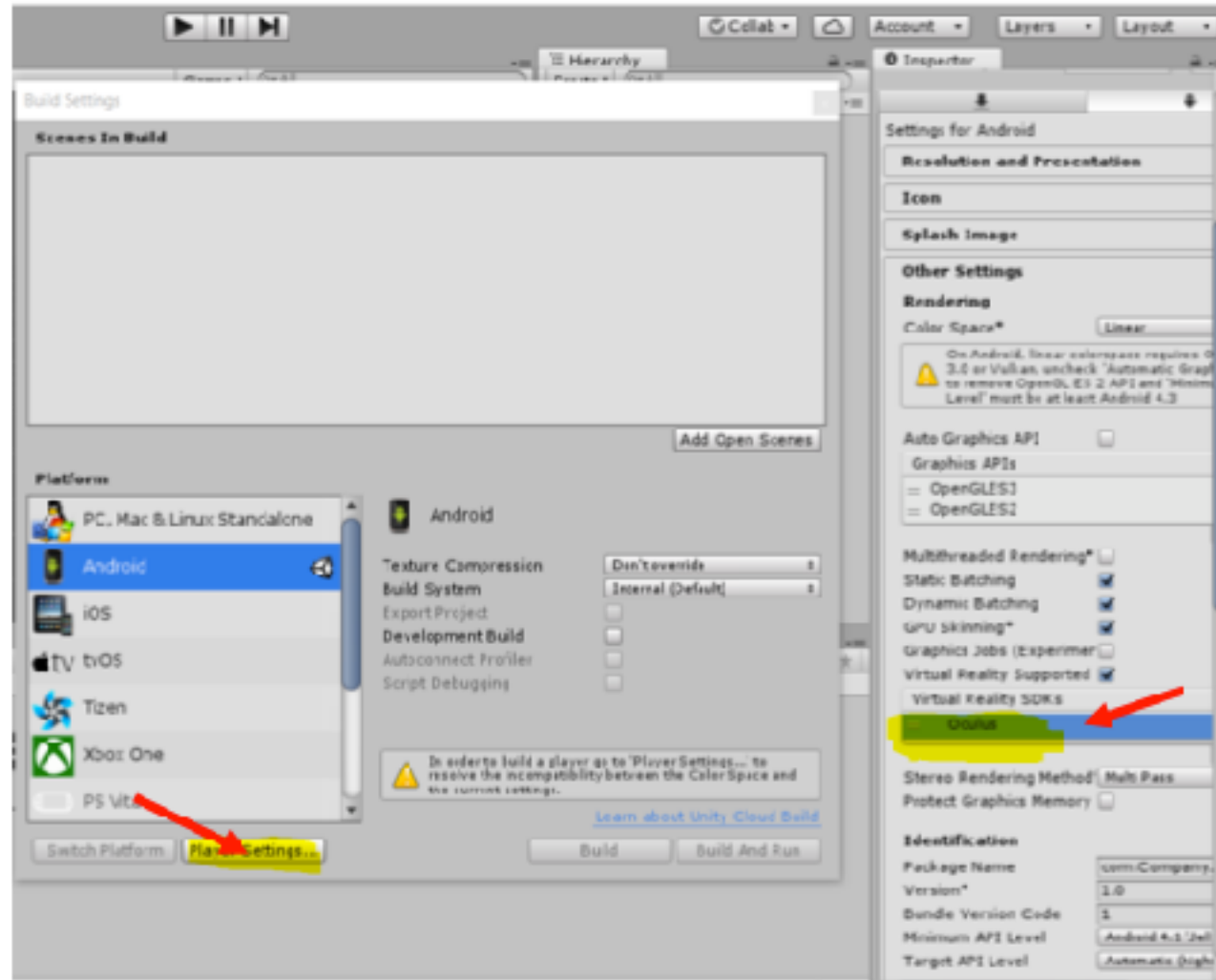
Samsung Gear VR: Tools

- Unreal Engine
- Unreal Engine Oculus Branch
- Unity + Oculus Tools
- Native Android Support
- Samsung Platform SDK
- Samsung Avatar SDK

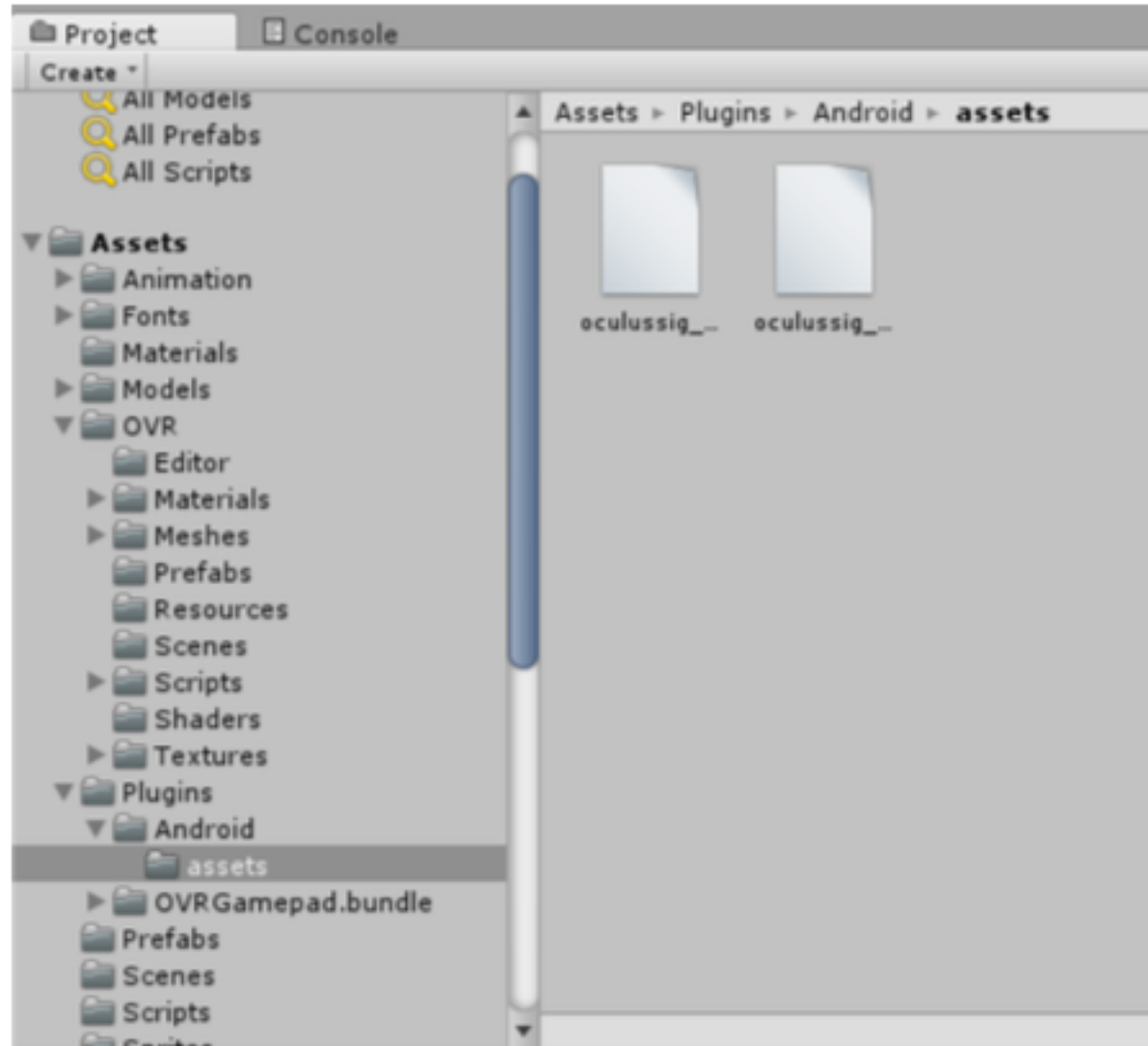
Samsung Gear VR: Unity Integration



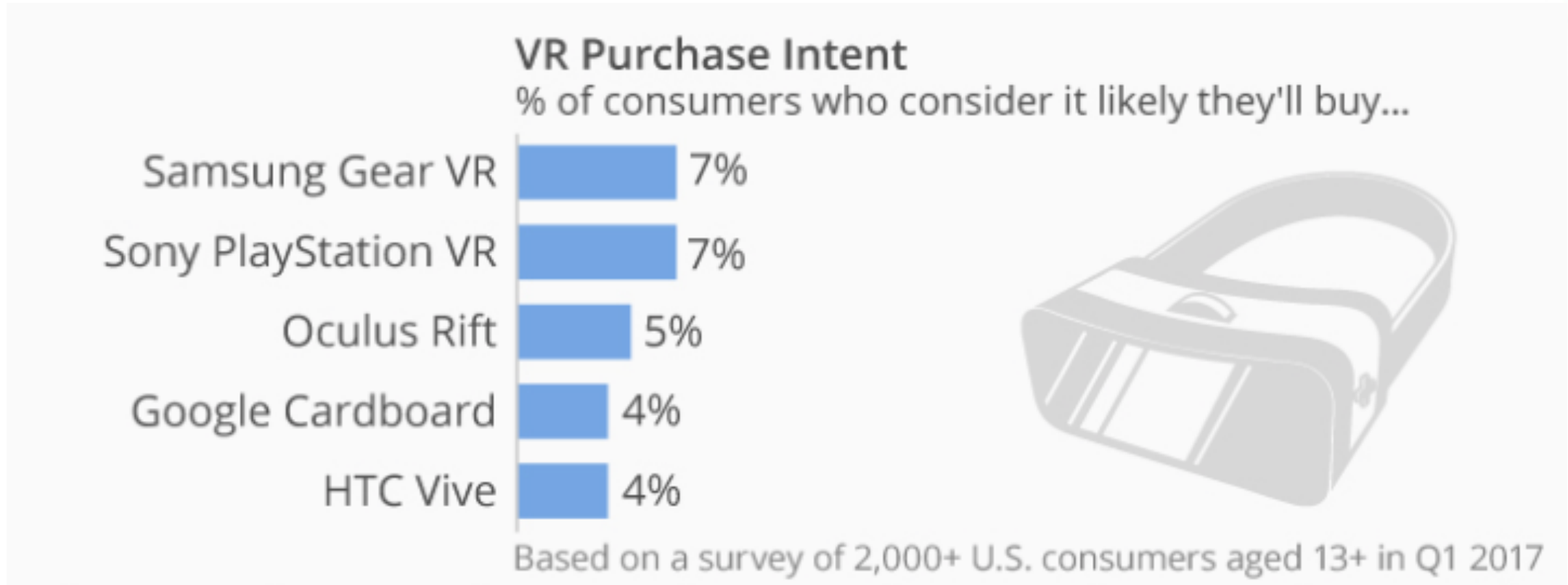
Samsung Gear VR: Unity Integration



Samsung Gear VR: Unity Integration



Mobile VR Conclusion: It's Cool



Mobile VR Conclusion: But

- You need performance!
- Performance on premium mobile is limited by capacity to dissipate heat
- Segmentation (Gear VR vs DayDream vs Cardboard phones vs DayDream Standalone VR)



Q&A ?
Thank you!

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