



AR/VR簡介與教學應用

陳士農

2020.05.13

大綱

Part 1 : AR/VR簡介

Part 2 : AR/VR教學應用

Part 1 : AR/VR簡介

大綱

- 先看個預告影片
- 新世代人機介面
 - VR、AR、MR
- 虛擬實境(Virtual Reality, VR)
 - 3D電腦動畫與虛擬實境
- 擴增實境(Augmented Reality, AR)
- 再看個影片
- 導入AR/VR應用的盲點

先看個預告影片 (1/3)

一級玩家電影預告

先看個預告影片 (2/3)

刀劍神域劇場版序列爭戰預告



MUUSE 木棉花
代理發行

先看個預告影片 (3/3)

阿爾罕布拉宮的回憶預告

NETFLIX



新世代人機介面 (1/4)

Virtual Reality



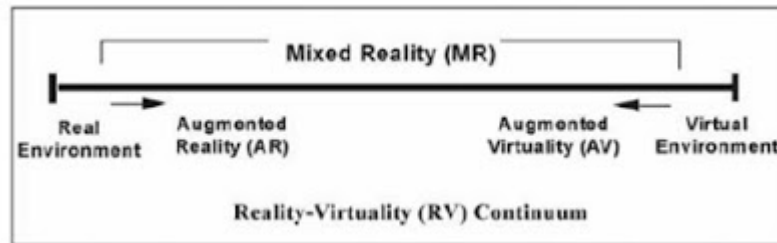
Augmented Reality

Mixed Reality

新世代人機介面 (2/4)

- Azuma將擴增實境(AR)定義為是一種虛擬實境(VR)的變化，**虛擬實境**旨在讓使用者完全的融入電腦所創造出的**虛擬環境**中，當使用者在**虛擬實境**中，無法看到其週遭的**現實環境**；然而**擴增實境**可以讓使用者看到**現實環境**以及**重疊在現實環境中的虛擬物體**，因此，擴增實境是增進了現實，而不是完全的取代現實，其研究中，提出擴增實境有三項必需的屬性：一是結合真實與虛擬、二是即時性的互動、三是必需在三度空間內[1]。
- Milgram則將現實環境與虛擬環境視為一封閉的集合，如圖所示，圖的左邊代表純粹的現實環境，而圖的右邊代表純粹的虛擬環境，那麼在兩端點間的區域則表示現實環境與虛擬環境中的物件同時的呈現，並以混合實境(Mixed Reality, MR)類別來表示這個區域。因此可以了解**擴增實境**是被歸類在**現實與虛擬之間**，屬於**混合實境**類別下的一個類別[2]。

新世代人機介面 (3/4)



- [1] Azuma, R., A Survey of Augmented Reality. Presence: Teleoperators and Virtual Environments, pp. 355-385, 1997.
- [2] Milgram, P., Takemura, H., Utsumi A., and Kishino F., Augmented Reality: A Class of Displays on the Reality-Virtuality Continuum. SPIE Vol. 2351-34, Telemanipulator and Telepresence Technologies, 1994.

新世代人機介面_(4/4)

- 虛擬實境企圖取代真實的世界；
- 而擴增實境卻是在實境上擴增資訊。

虛擬實境(Virtual Reality) (1/14)

- 必須是由電腦所產生
- 必須是一個3D的立體空間
- 使用者可以依個人意志自由的在這個空間中遊走
- 可以和這個空間裡的物件產生互動
- 未來的人機界面

虛擬實境(Virtual Reality) (2/14)

- 3D電腦動畫

- 在動畫軟體裡設定每一個人物的造型，透過關鍵畫格(Key Frame)的設定，流暢的產生不同動作間的過程畫格，最後再錄製成連續的動畫。
- 被動的觀看影像，而無法自由的改變觀看的視角或是劇情的發展。

- 虛擬實境

- 同樣利用3D動畫軟體製作場景或是物件，利用虛擬實境編輯軟體進行不同物件屬性的設定，亦即是使用者可以與場景產生的互動模式。
- 可以主動探索觀看，創造屬於自己的劇情。

虛擬實境(Virtual Reality) (3/14)

CRT頭盔顯示器



Fakespace公司的
BOOM顯示器



Fakespace公司的
FS2顯示器



Kaiser Electro-Optics公司的
頭戴式顯示器

虛擬實境(Virtual Reality) (4/14)

LCD頭盔顯示器



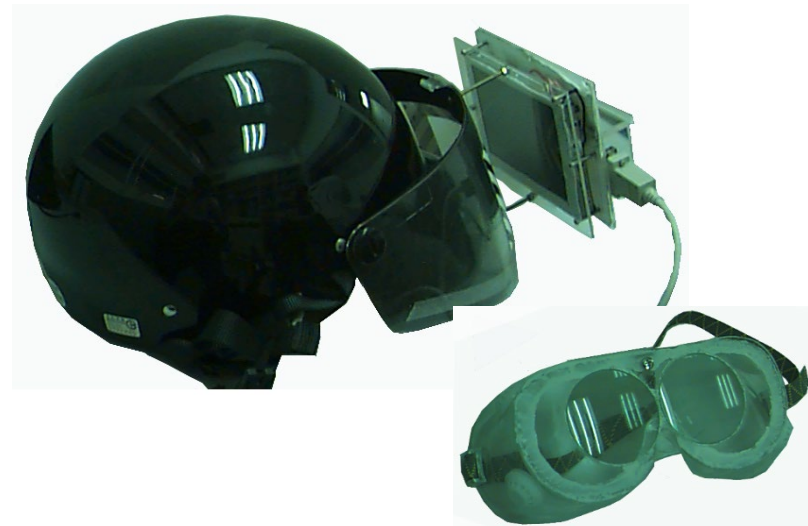
5DT的HMD 800

i-glasses™



VIDEO 3D Pro

i-glasses顯示器



虛擬實境(Virtual Reality) (5/14)

光學式追蹤器



MotionStar
光學式追蹤器



LaserBIRD
光學式追蹤器

虛擬實境(Virtual Reality) (6/14)

資料手套



5DT Data Glove Ultra 14



5DT Data Glove 5



Pinch Glove

虛擬實境(Virtual Reality) (7/14)

觸感回饋



Immersion公司的
CyberTouch

虛擬實境(Virtual Reality) (8/14)

力感回饋



Force Dimension公司的
3-DOF OMEGA

Immersion公司的
CyberForce



虛擬實境(Virtual Reality) (9/14)

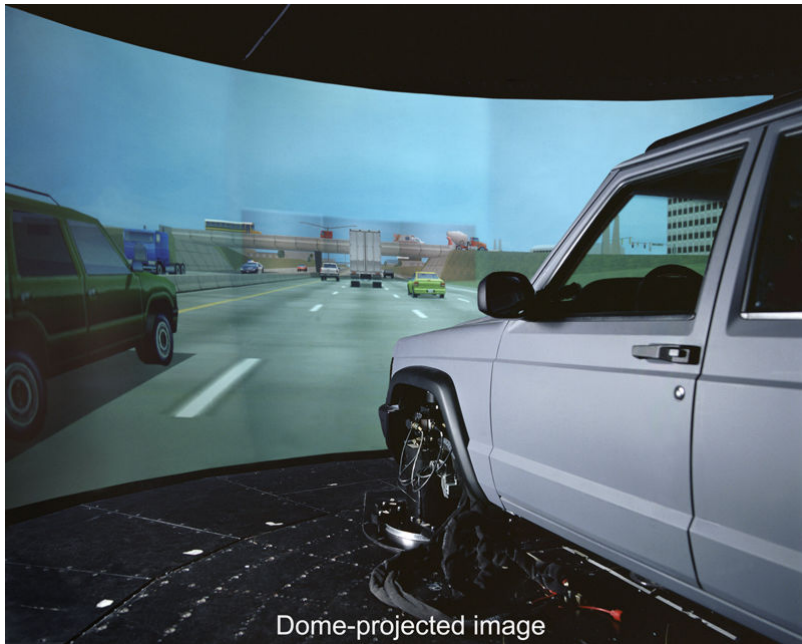
3D音效產生器



AuSIM公司的3DVX

虛擬實境(Virtual Reality) (10/14)

虛擬實境的應用



Dome-projected image

駕駛模擬內部實景



NADS x-y motion base

駕駛模擬器外觀

虛擬實境(Virtual Reality) (11/14)

一級玩家電影裡的VR裝置

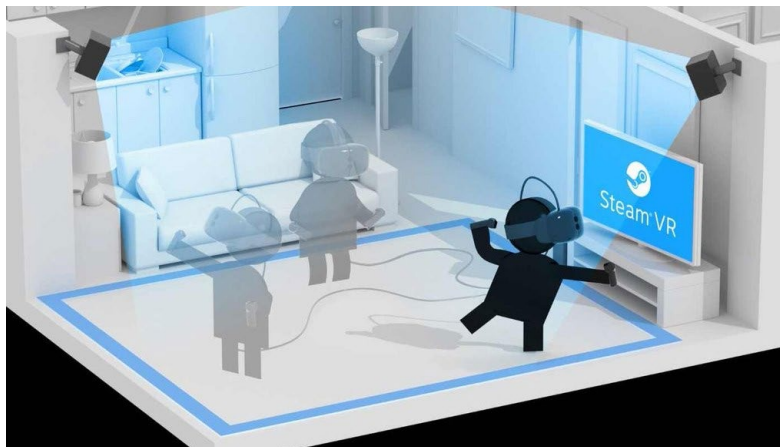


虛擬實境(Virtual Reality) (12/14)

現在的VR裝置



HTC VIVE Pro



Hardlight Suit VR



Cyberith Virtualizer

虛擬實境(Virtual Reality) (13/14)

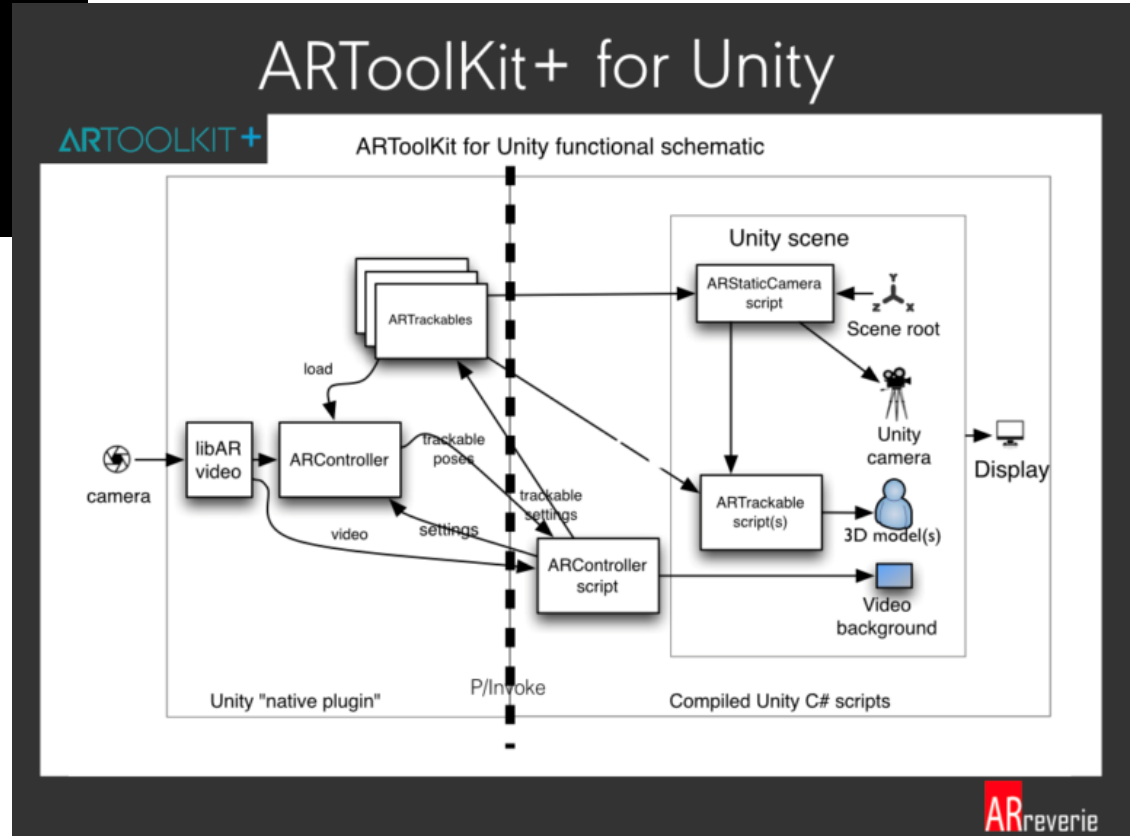
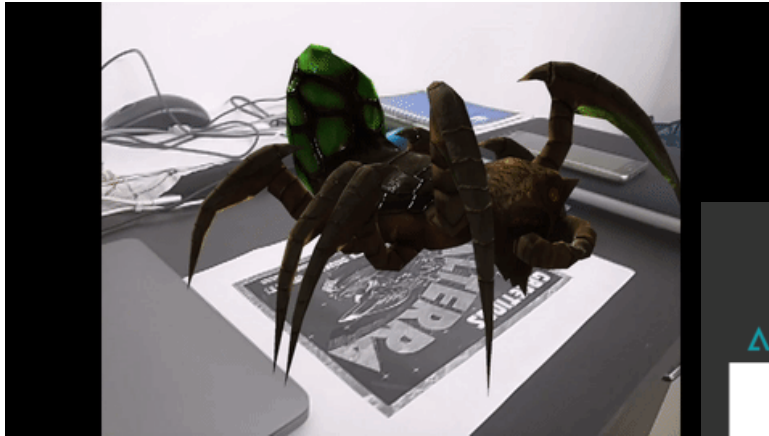
Battlefield 4 in VR - Cyberith Virtualizer + Oculus Rift

虛擬實境(Virtual Reality) (14/14)

Skyrim in VR - Cyberith Virtualizer + Oculus Rift + Wii Remote



擴增實境(Augmented Reality) (1/5)

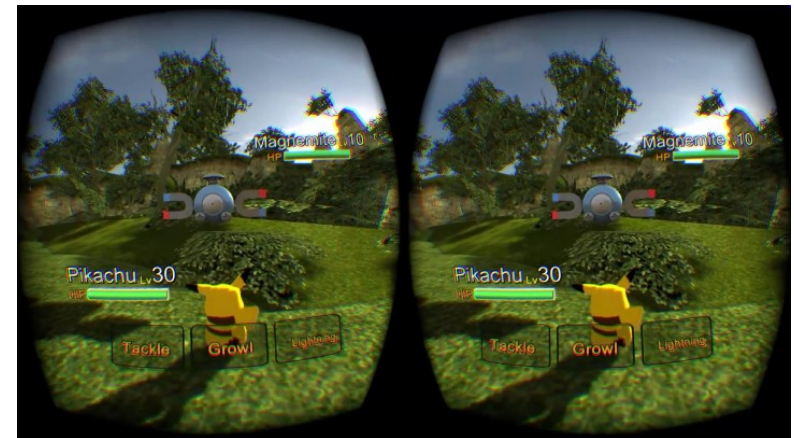


擴增實境(Augmented Reality) (2/5)

Pokemon AR



Pokemon VR



擴增實境(Augmented Reality) (3/5)

阿爾罕布拉宮的回憶裡的AR裝置



刀劍神域劇場版序列爭戰裡的AR裝置



擴增實境(Augmented Reality) (4/5)

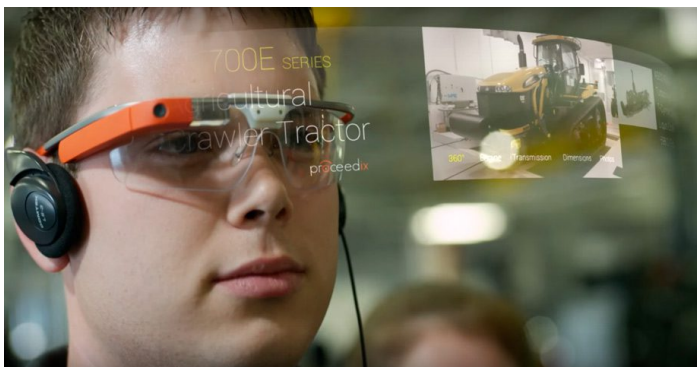
現在的AR裝置



Google Glass Enterprise Edition 2



Epson Moverio BT-300



擴增實境(Augmented Reality) (5/5)

AR擴增實境外廣告



再看個影片 (1/4)

Microsoft HoloLens 2 Introduction Video

再看個影片 (2/4)

Microsoft HoloLens - Mixed Reality in the Modern Workplace

再看個影片 (3/4)

Virtual Studio + VR



再看個影片 (4/4)

Virtual Studio + SteamVR + HTC VIVE Pro



導入AR/VR應用的盲點

- 為AR/VR而AR/VR
- 導入AR/VR應該很簡單
- 重硬體、輕軟體，預算與目標差距過大
- 內容的質感才是AR/VR的難處



用最方便的方式應用AR/VR

Part 2 : AR/VR教學應用

大綱

- 平台簡介
 - EON Reality
 - Unity
- 應用分析與線上資源
- 推行方式
- 教學應用案例

平台簡介



- EON Reality
 - 適用於開發互動3D應用，尤其是3D結構與組裝教學
 - AVR Platform 跨平台瀏覽器
 - EON Studio/Professional 跨平台開發工具
 - 包含二個/六個模組：EON Studio、EON Raptor、EON CAD、Real-Time Physics、CG、Human Support
 - EON CAD可匯入MicroStation、CADKEY、SolidWorks、Maya and Rhino檔案，以及另外選購模組：CATIA、Pro/Engineer、UG
- Unity
 - 適用於 2D/3D + AR/VR 跨平台互動介面、互動應用、遊戲開發

EON Reality



COMPANY ▾

GLOBAL LOCATIONS ▾

AVR PLATFORM ▾

SIGN IN

START FOR FREE

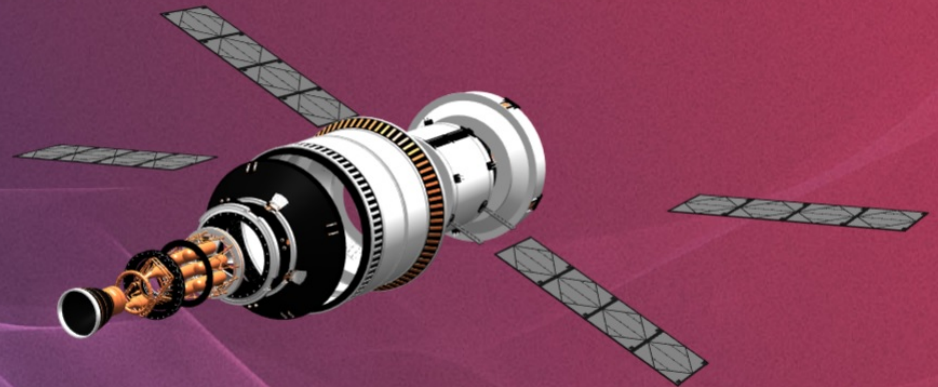
Your Content, Any Reality

LEARN/TRAIN/PERFORM using any device, web, mobile, AR, & VR



START FOR FREE

▶ WATCH VIDEO



Unity



Products

Solutions

Made with Unity

Learning

Support & Services

Community

Get started



UNITY FOR GAMES

Create a world with more play

Bring your game to life with the most complete and flexible real-time development platform. Unity enables you to quickly create, easily operate, and fully monetize your game.

Get started

Enterprise

Explore the new features of 2019.3 [Learn more](#)

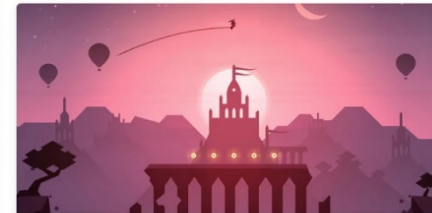
Explore our gaming solutions



Console and PC Games

Offering rich visual fidelity and artist-friendly tools, Unity delivers ultimate performance for your multi-threaded console and PC games.

[Learn more](#)



Mobile games

Unity Mobile Games Development Platform is everything you need to create device-ready content, launch and monetize your mobile games.

[Learn more](#)



Instant Games

With Unity, build instant games that are smaller, lighter and faster than ever before.

[Learn more](#)



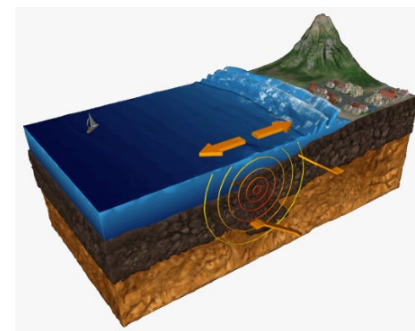
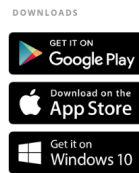
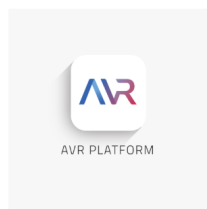
AR and VR Games

Our flexible real-time tools offer unlimited creative possibilities – powering more than 60% of all VR/AR content.

[Learn more](#)

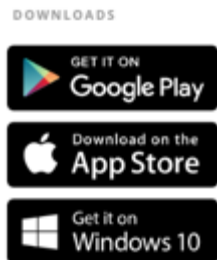
應用分析

- EON Reality
 - 利用 EON Studio/Professional 開發互動3D內容
 - 利用 AVR Platform 瀏覽互動3D內容(單一瀏覽器看很多內容)



- Unity

- 開發 2D/3D + AR/VR 互動介面、互動應用、遊戲(一作品一App)



EON Reality 線上資源(1/6)

☰  PLATFORM LIBRARY MY WORKSPACE CREATE LESSON 5  CREATOR AVR

Library



SEARCH

✓ ALL CATEGORIES

-  AERONAUTICAL ENGINEERING
-  ANIMAL LIFE ON EARTH
-  ASTROPHYSICS & ASTRONOMY
-  AUTOMOTIVE ENGINEERING
-  BIOLOGY
-  BIOLOGY AND MEDICAL
-  BOTANY
-  CHEMISTRY
-  CULTURE AND THE ARTS
-  EARTH SCIENCE
-  ENGINEERING



HOW A NEURON WORKS



BALL BEARING AND ITS PARTS



N95 MASKS AND DONNING PROCEDURE



PRO NHL - BEHIND THE SCENES OF LOCKER ROOM



THE JEWEL OF MUSLIM ART IN INDIA



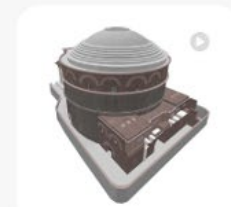
国际空间站 CHINESE




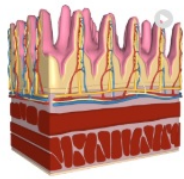
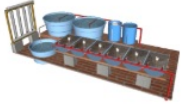




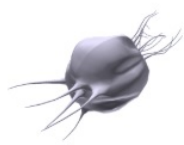











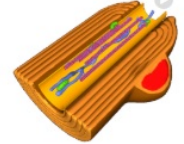












F-16D FALCON STARTUP PROCEDURE



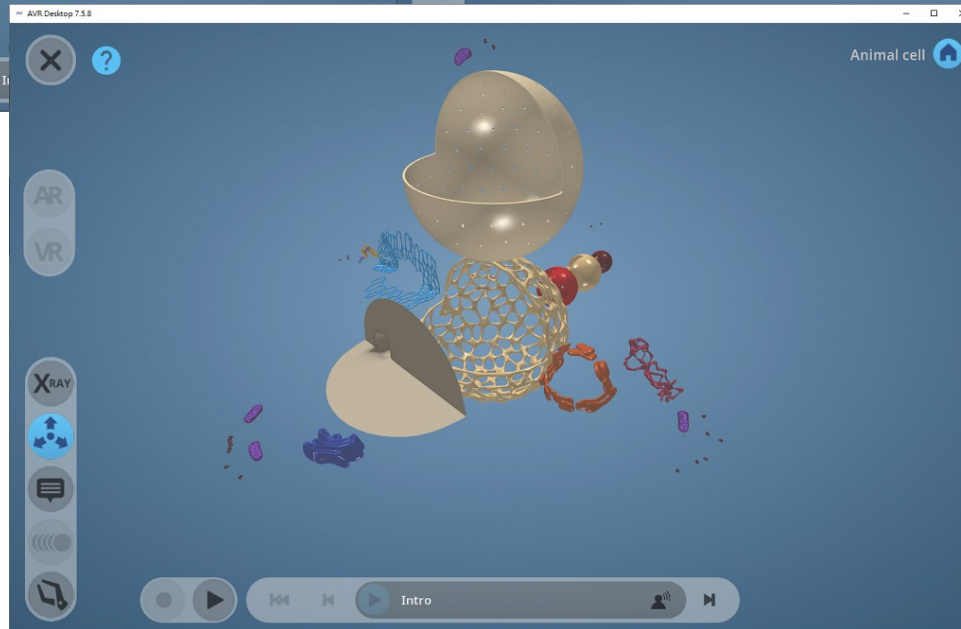
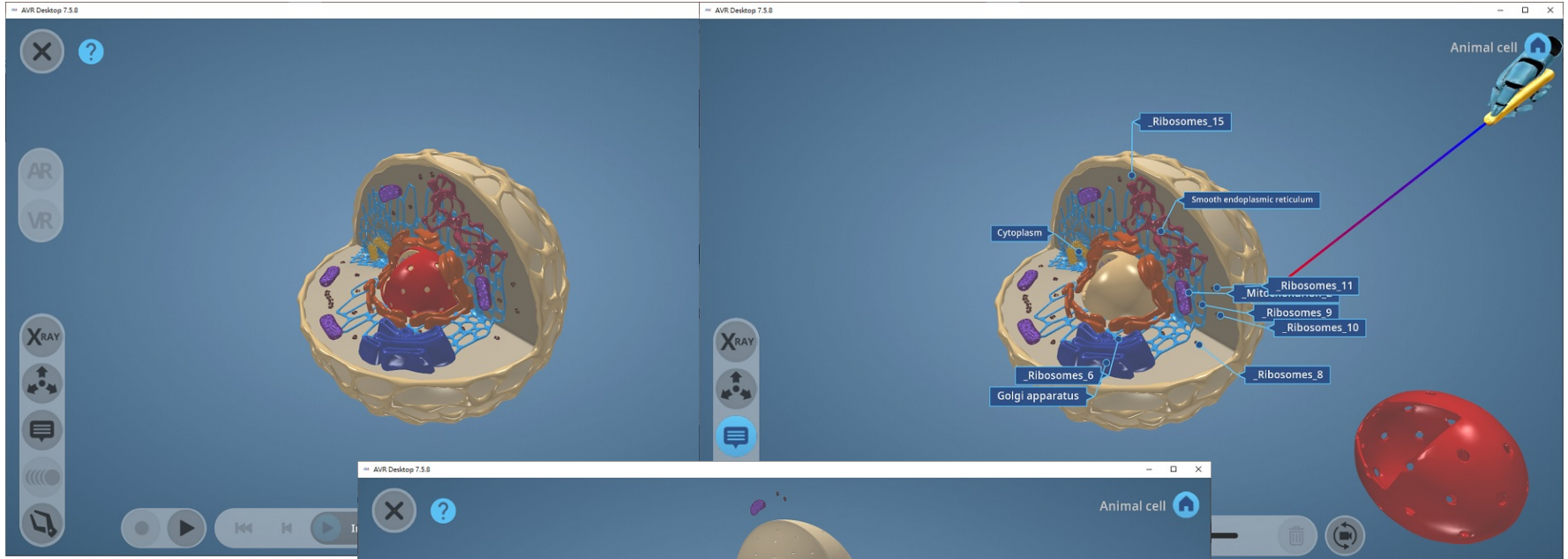
MEDIVATOR- REPLACE CHANNEL PUMP



EON Reality 線上資源(2/6)

ALL CATEGORIES				
 AERONAUTICAL ENGINEERING	HOW A NEURON WORKS	L'INTESTIN GRÉL FRENCH	एकापोनिक्स सिस्टम - HINDI	HOW DO FROGS ABSORB WATER?
 ANIMAL LIFE ON EARTH				
 ASTROPHYSICS & ASTRONOMY	HOW DOES A FROG DIGEST FOOD?	WHAT ARE MACROPHAGES?	HOW ARE SPINES STRUCTURED	FROG'S SKELETAL SYSTEM
 AUTOMOTIVE ENGINEERING				
 BIOLOGY	FROG'S NERVOUS SYSTEM	FROG'S CIRCULATORY SYSTEM	FROG'S MUSCULAR SYSTEM	FUNCTION OF A RED BLOOD CELL
 BIOLOGY AND MEDICAL				
 BOTANY	ANATOMY OF THE LUNG	MYELIN SHEATH - NEURON OF FAT-CONTAINING CELLS	THE MYSTERY OF AN ANIMAL CELL	COMMON SURGICAL INSTRUMENTS
 CHEMISTRY				
 CULTURE AND THE ARTS				
 EARTH SCIENCE				
 ENGINEERING				
 FINE ART & SCULPTURES				
 FOOD AND NUTRITION				
 GENERAL SCIENCE				
 GEOGRAPHY				
 HISTORY				

EON Reality 線上資源(3/6)



EON Reality 線上資源(4/6)

Create Lesson

3D LESSON →



360 LESSON →



Browse 3D Assets

ALL CATEGORIES



SEARCH



Purchased Assets



MEDICAL - SURGICAL
FACE MASK WITH DUMMY
HEAD



MASK PARTICULATE
RESPIRATOR 8210



SURGEON DOCTOR



DIGITAL THERMOMETER



SIEMENS MRI MEDICAL
SCANNER MAGNETOM
TERRA

Browse 360 Assets

Free Assets



SOCIAL DISTANCING



F-16 INTERIOR

ALL CATEGORIES



SEARCH



POWDER MOUNTAIN
UTAH



23 HAPPY FAMILY



WARU8015



OUTSIDE QUARTERS EON
REALITY ITALY



OUTSIDE QUARTERS EON
REALITY ITALY 2



MIAMI 360 AERIAL



PANORAMA MIAMI



WARU8015



LIVING ROOM
SURREALISTIC



FISHERMAN WHARF



360_PHOTO_J_2048



360_EGYPT



360_PHOTO_E



360_IMAGES



360_IMAGE6

EON Reality 線上資源^(5/6)

<https://eonreality.com/quick-start-guide-video-avr-platform>

EON Reality 線上資源^(6/6)

<https://eonreality.com/quick-start-video-guide-for-personal-computers>

Unity 線上資源(1/2)

SPRING SALE STARTS SOON • See the Mega Deals today

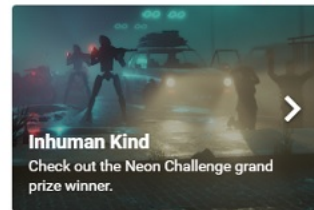
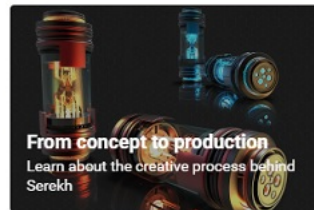
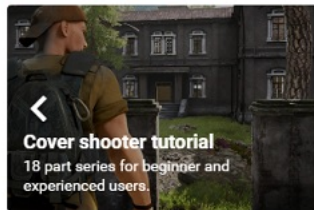
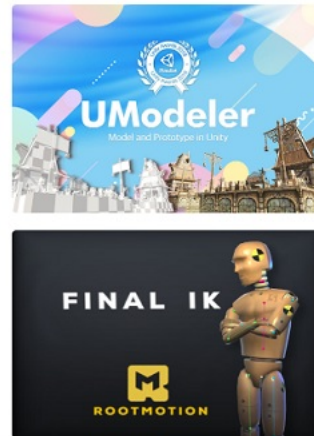
unity Asset Store

Search for assets

Sign In

Assets Tools Services By Unity Industries

Sell Assets Feedback FAQ



Refine by [clear filters](#)

All Categories

- 3D (32995)
- 2D (7502)
- Add-Ons (36)
- Audio (5585)
- Essentials (43)
- Templates (2732)
- Tools (8242)
- VFX (2356)

Pricing

\$ 0 — \$ 3500

- Free Assets (5919)

Unity Versions +

Publisher +

Top assets

Unity 線上資源(2/2)

SPRING SALE STARTS SOON · See the Mega Deals today

unity Asset Store

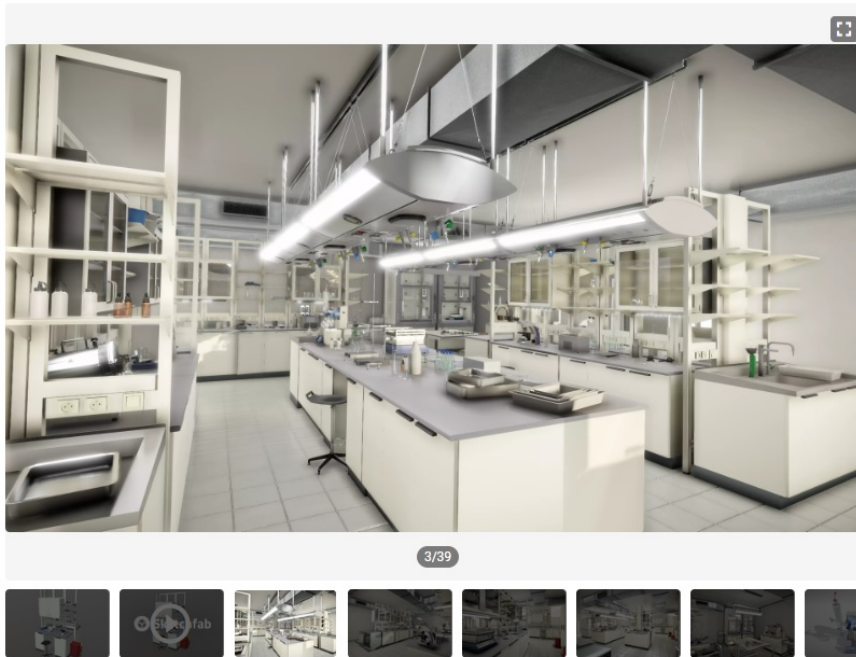
Search for assets

Sign In

Assets ▾ Tools ▾ Services ▾ By Unity ▾ Industries ▾

Sell Assets Feedback FAQ

Home > 3D > Environments > Laboratory Package



Laboratory Package

EON Reality SAS (not enough ratings)

\$34.99

Taxes/VAT calculated at checkout

License: Single Entity

- Single Entity**
Recommended for individuals and small businesses.
- Multi Entity**
Recommended for large enterprises working across multiple locations.

[See details.](#)

Refunds - We've got you covered

Add to Cart

[Add to List](#) [Share](#)

License	Single Entity
File size	320.5 MB
Latest version	1.2
Latest release date	May 20, 2019
Support Unity versions	2017.4.17 or higher

[Description](#) [Package Content](#) [Releases](#) [Reviews](#)

Laboratory package contains a set of VR ready 3D assets for a laboratory environment scene.

You might also like [See more](#)

其他線上資源

Sketchfab EXPLORE BUY 3D MODELS FOR BUSINESS

Search

CATEGORY Science & Technology SORT BY Relevance























\$3 \$500

FORMATS Any POLY COUNT Any LICENSES Any RATING Any OTHERS PBR Animated Rigged Show Restricted

RESET

Science & Technology 3D Models

3D models related to science and technology. Including natural sciences like fossils, biology, and anatomy 3D models. Some technology 3D models incorporate science fiction or fantasy elements. Don't forget to also visit our Electronics and Gadgets category for more 3D models. File formats include FBX, OBJ, 3DS, MAX, C4D, BLEND and GLTF.

 <p>Stylized anatomy \$25</p>	 <p>Photorealistic human mouth \$25</p>	 <p>Anatomy2 \$25</p>	 <p>Ecorche - Anatomy Human Male Muscul... \$25</p>		
 <p>3d Animated Realistic Human Heart - V2.0 \$149</p>	 <p>Pipeline \$25</p>	 <p>2019 Blade Runner Ground Police Car \$17.99</p>	 <p>[Animation] Human Heart \$25</p>	 <p>Diodon nichthemerus [Quick Scan] \$14.99</p>	 <p>Cyberpunk City (two Year Old Project) \$15</p>
 <p>BMW R nineT motorbike raw photogram... \$18</p>	 <p>March17 Torso Study: Full Skeletal Torso \$14.99</p>	 <p>Sci-Fi Modular Space Laboratory \$14.99</p>	 <p>Twin Steam Engine \$250</p>	 <p>Ear Cross-Section \$119</p>	 <p>Microgravity Science Glovebox - ISS MSG \$4.99</p>
					

推行方式(1/4)

Support for all the Things

From affordable smartphones to high-end consumer and industrial head-mounted displays, the AVR Platform works and connects with dozens of the most popular AR and VR devices.

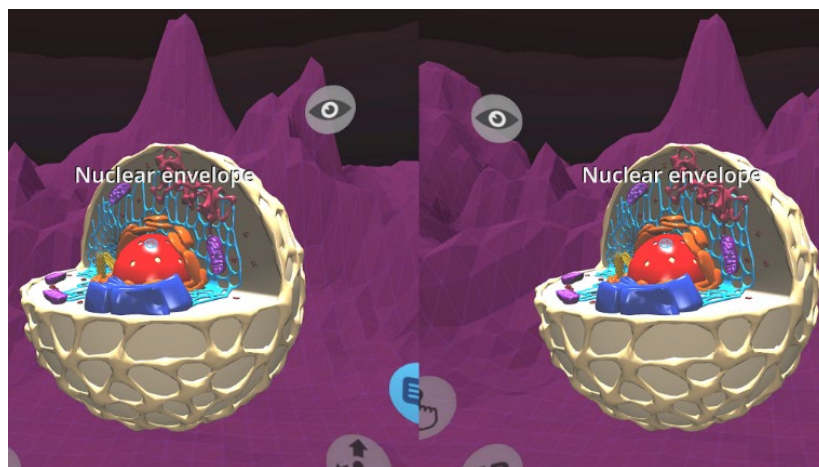
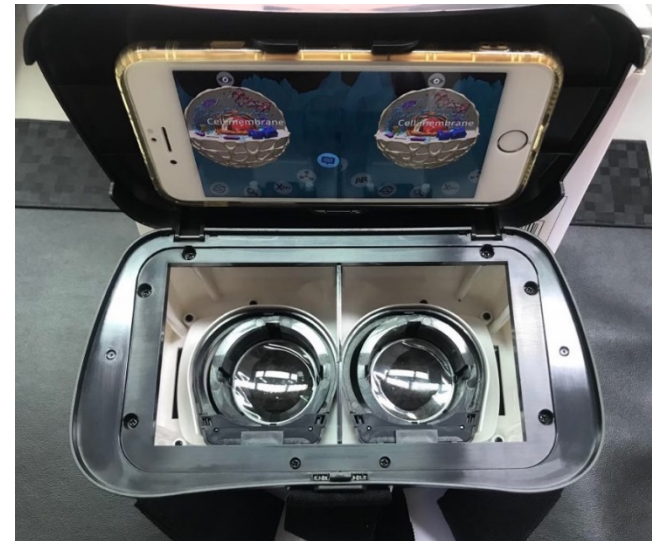
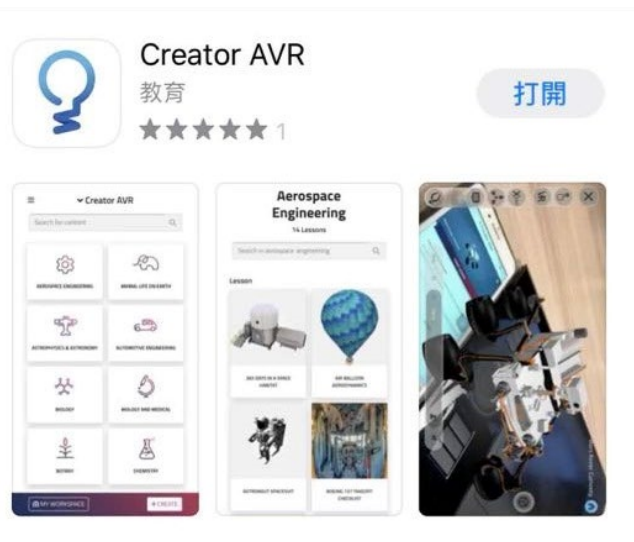


推行方式(2/4)

- 成本
 - 硬體成本
 - 建議以個人手機+VR Case (199元)為主推行
 - 如以HTC VIVE Pro為例
 - HTC VIVE Pro VR眼鏡 · 39,900元
 - GeForce RTX 2080 Ti繪圖卡 · 39,900元
 - Acer VM6660G主機 · 32,900元
 - 軟體成本
 - EON Reality採AVR瀏覽內容(Free)
 - Unity採Individual授權(Free)
 - 內容開發成本
 - 應用免費教材+自行開發
 - EON Reality超過免費額度之計價方式須請廠商報價

推行方式(3/4)

最推薦推行方式：個人手機 + VR Case (199元)

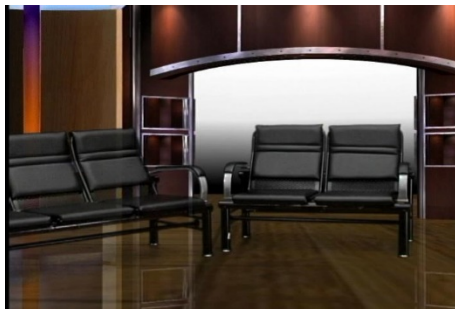


推行方式_(4/4)

- 建議
 - AR/VR為新世代介面，值得推薦老師們採用
 - 建議 有興趣+課程合適 的老師優先採用
 - 初期只要將部分內容轉為AR/VR方式呈現，逐步累積
 - 以線上免費資源開始嘗試課程設計
 - 免費內容不足時，可少量從線上商店購買合適(最大效益)內容
 - 有興趣老師可到系上虛擬攝影棚體驗看看

教學應用案例析(1/7)

虛擬攝影棚+VR



教學應用案例析(2/7)

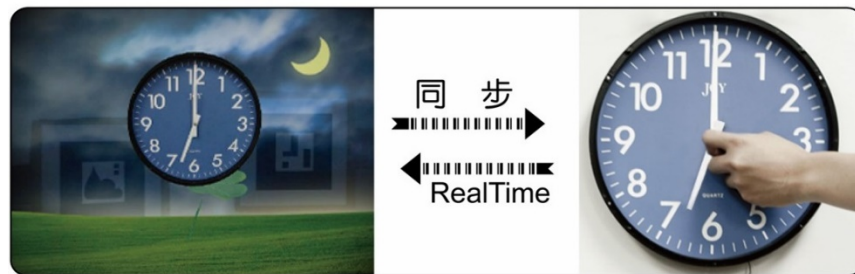
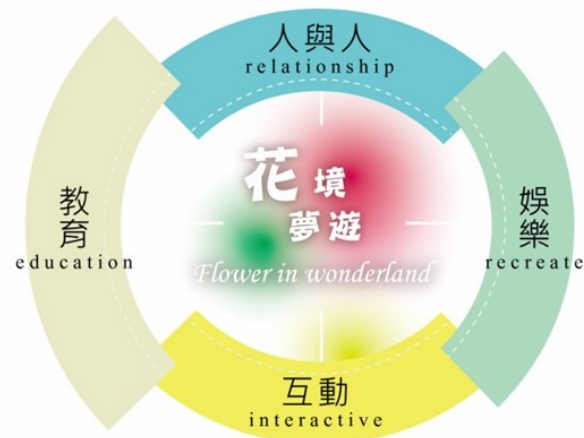


虛擬攝影棚+VR



教學應用案例分析(3/7)

自然生態教學設計實例 - 花境夢(1/2)

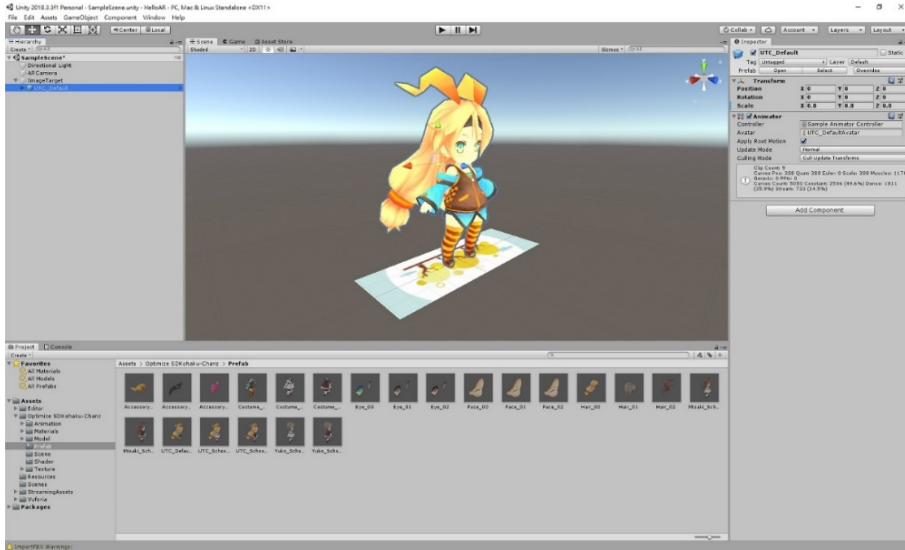


教學應用案例析(4/7)

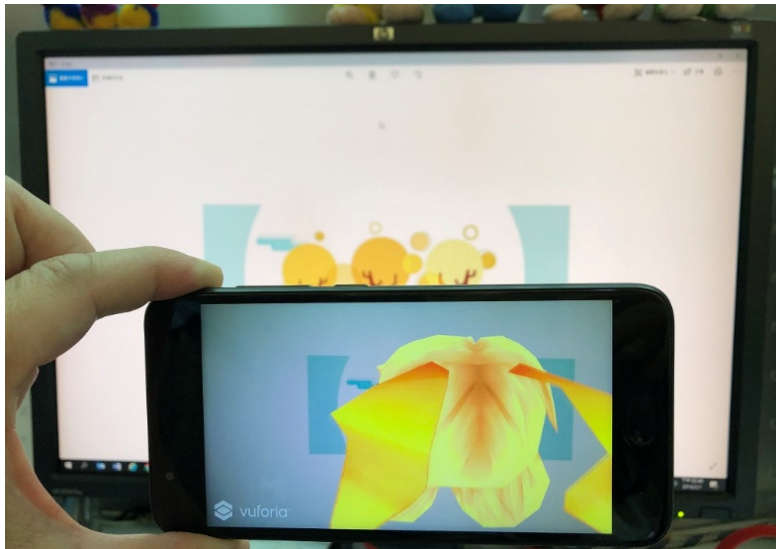
自然生態教學設計實例 - 花境夢(2/2)



教學應用案例析(5/7)



EPSON Moverio BT-300 AR 眼鏡



教學應用案例析(6/7)



教學應用案例析(7/7)

AR/VR + AIoT

Applications and services

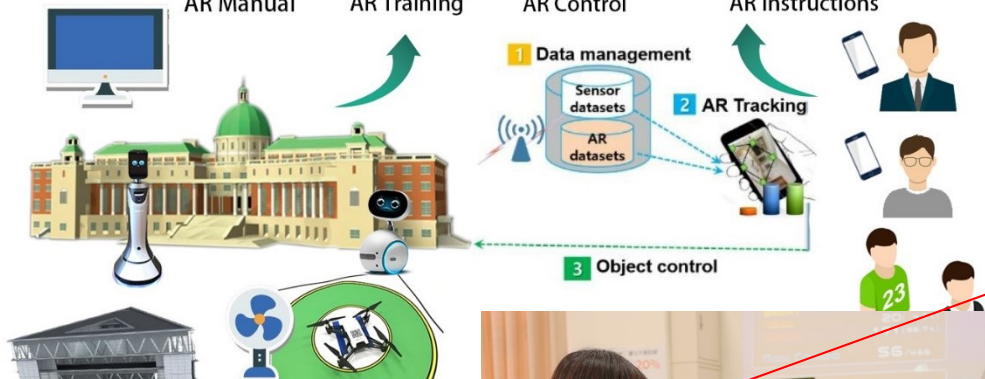


AR Manual

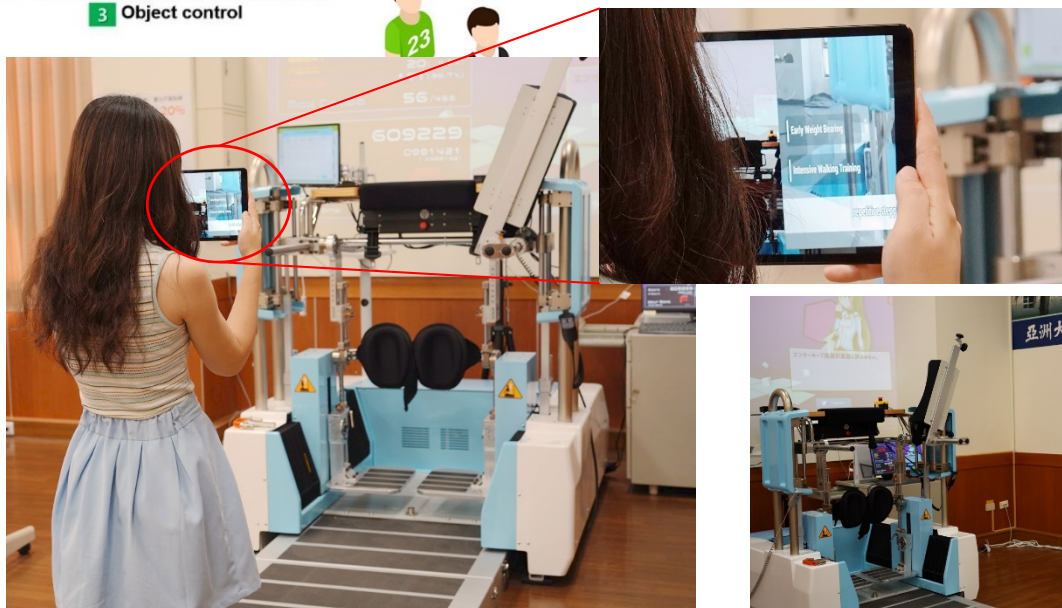
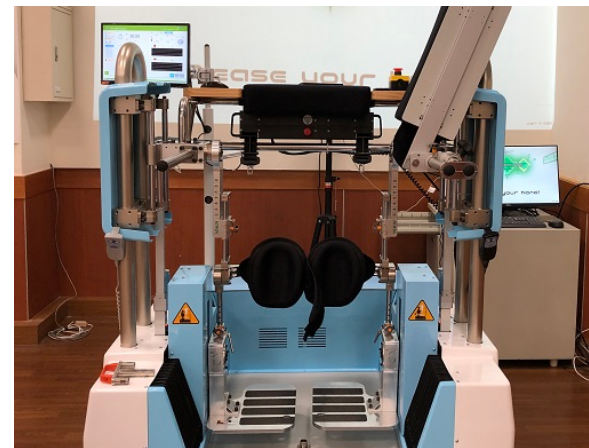
AR Training

AR Control

AR Instructions



MRG-P100



3D攝影與應用

3D攝影(1/2)



3D攝影 (2/2)



3D顯示裝置



360°攝影與應用

Kodak PIXPRO SP360 4K



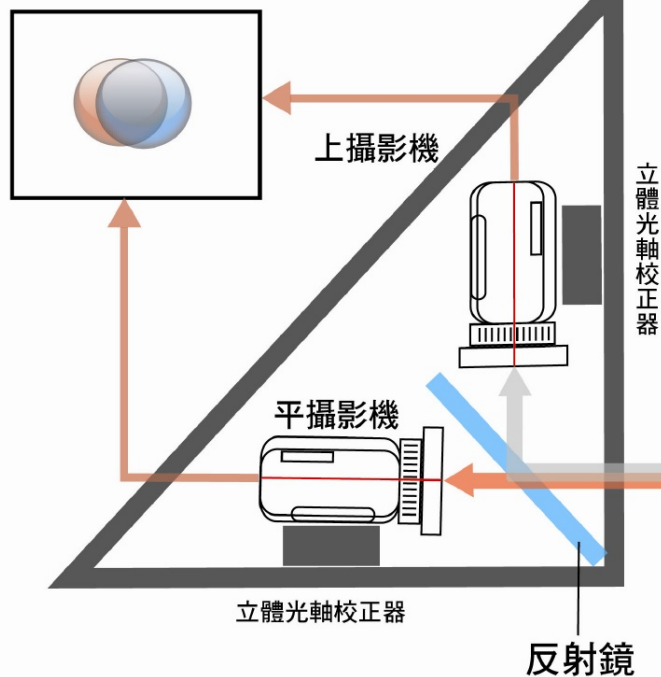
Ricoh Theta V 4K 360



Explore the World in 4K 360

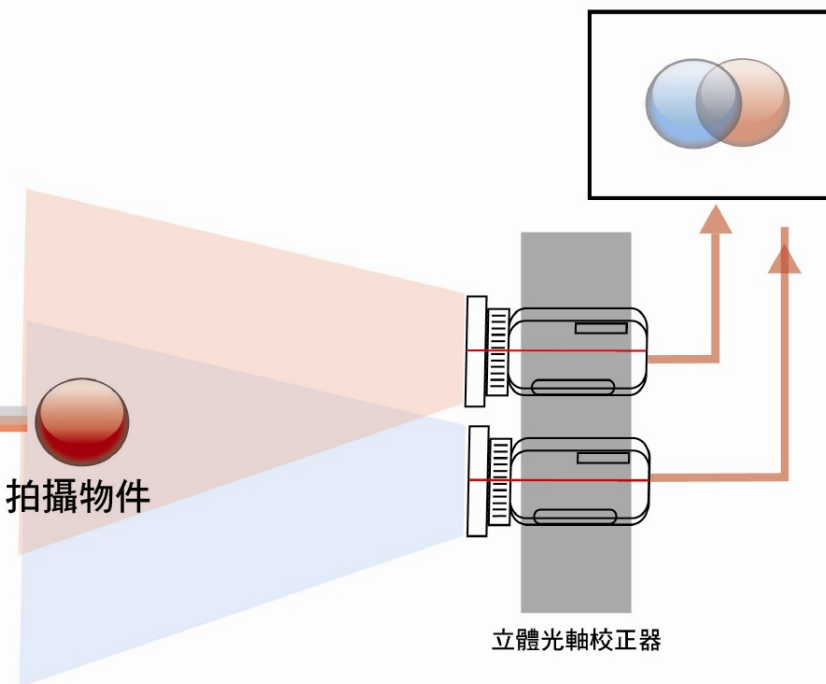
3D攝影機架構原理圖

近拍物件L.R攝影機

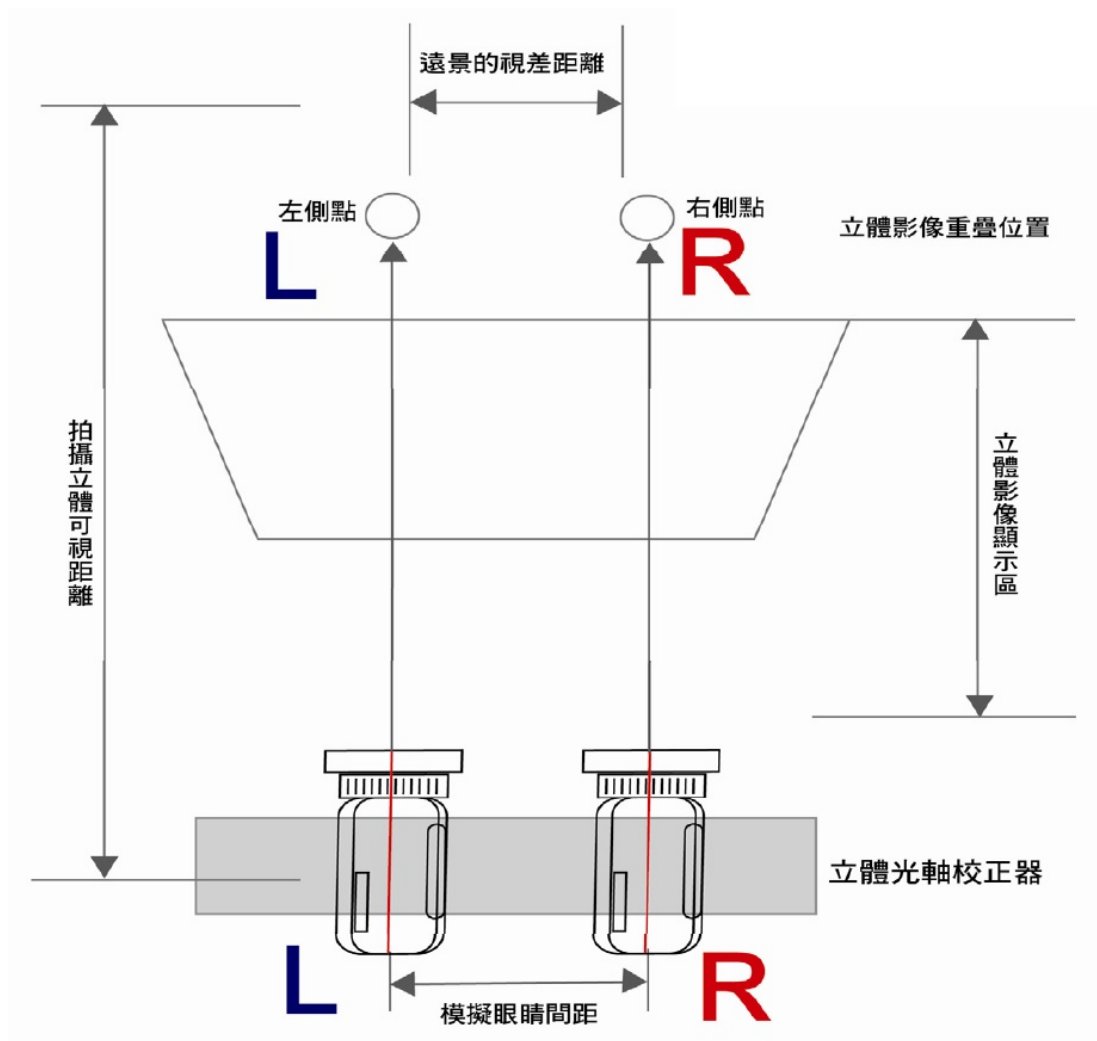


90度透視法立體攝影機架構原理圖
(適用平行式/交叉式拍攝方式)

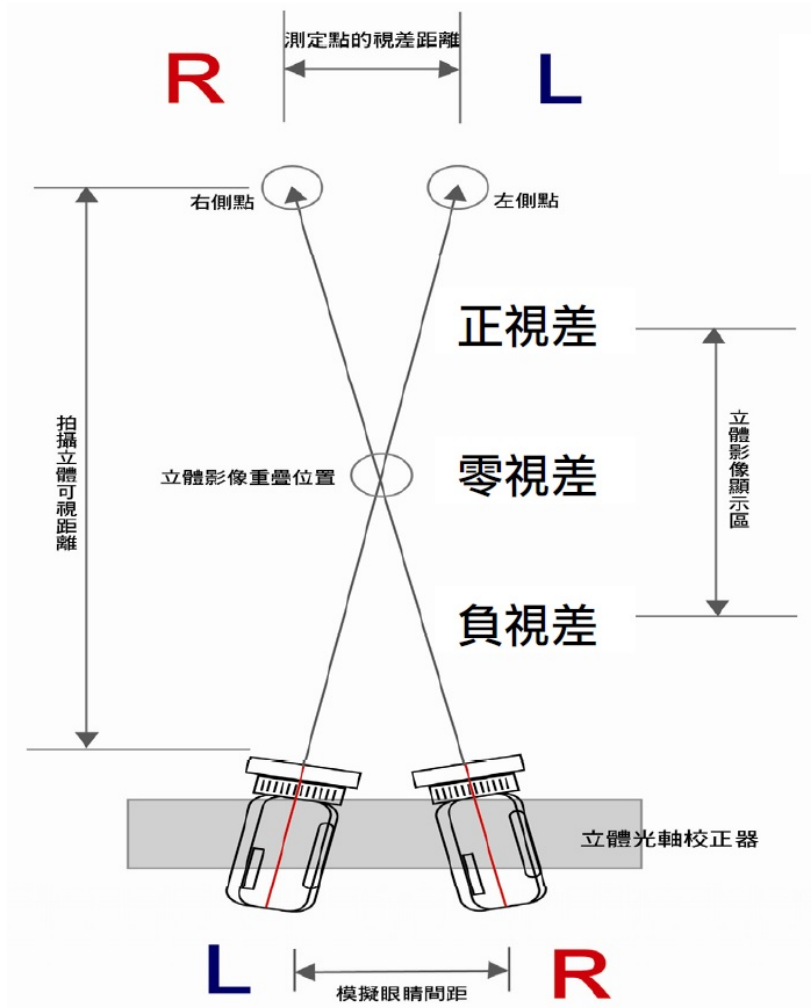
平行式立體攝影機架構原理圖
(適用平行式/交叉式拍攝方式)



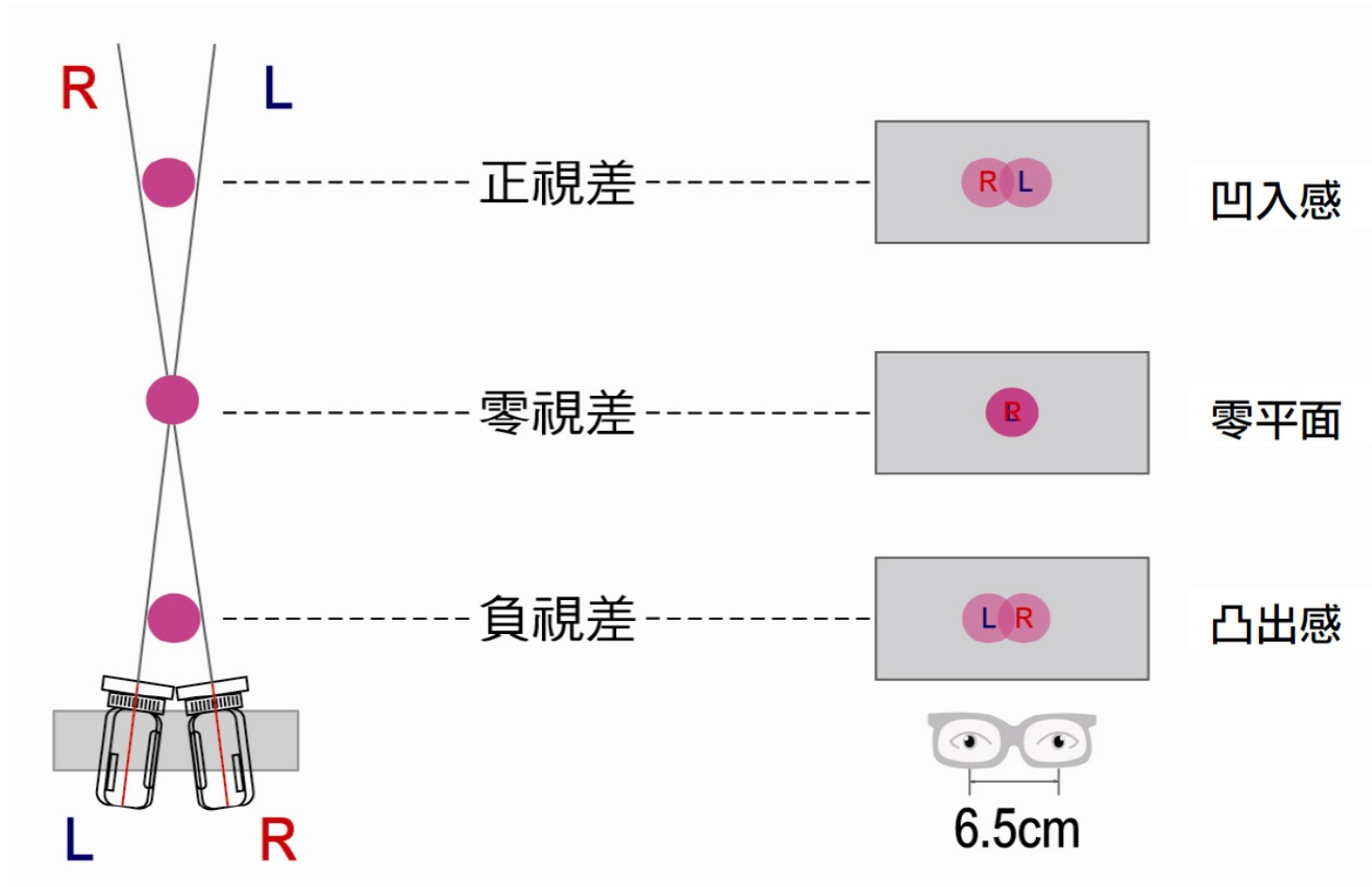
平行式3D拍攝原理圖



交叉式3D拍攝原理圖



不同距離的影像分離程度



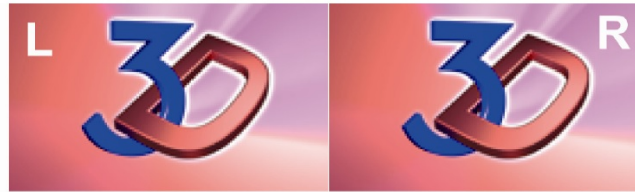
3D影像格式



Side by Side, Left Image First
(960+960=1920x1080)



Side by Side, Right Image First
(960+960=1920x1080)



Sention (1920+1920=3840x1080) SONY採用(HDMI1.4)



Over/Under, Left Image Top
(1920x(540+540)=1080)



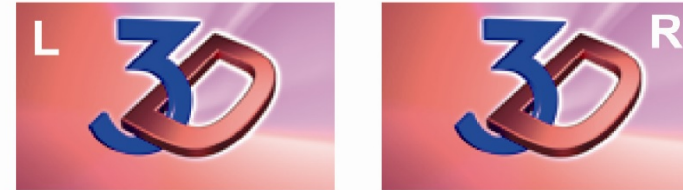
Over/Under, Right Image Top
(1920x(540+540)=1080)



MVC (1920+1920=3840x1080) SONY採用(HDMI1.4)
L,r,穿叉120Hz,120/1-L,120/2-R,容量為原檔案1.5倍



SIS Attachment (960+960=1920x1080)



L,R分開輸出,各(1920x1080)母片

從幻想到真實

幻想？

科技？

遊戲？

模擬？

虛擬？

真實？

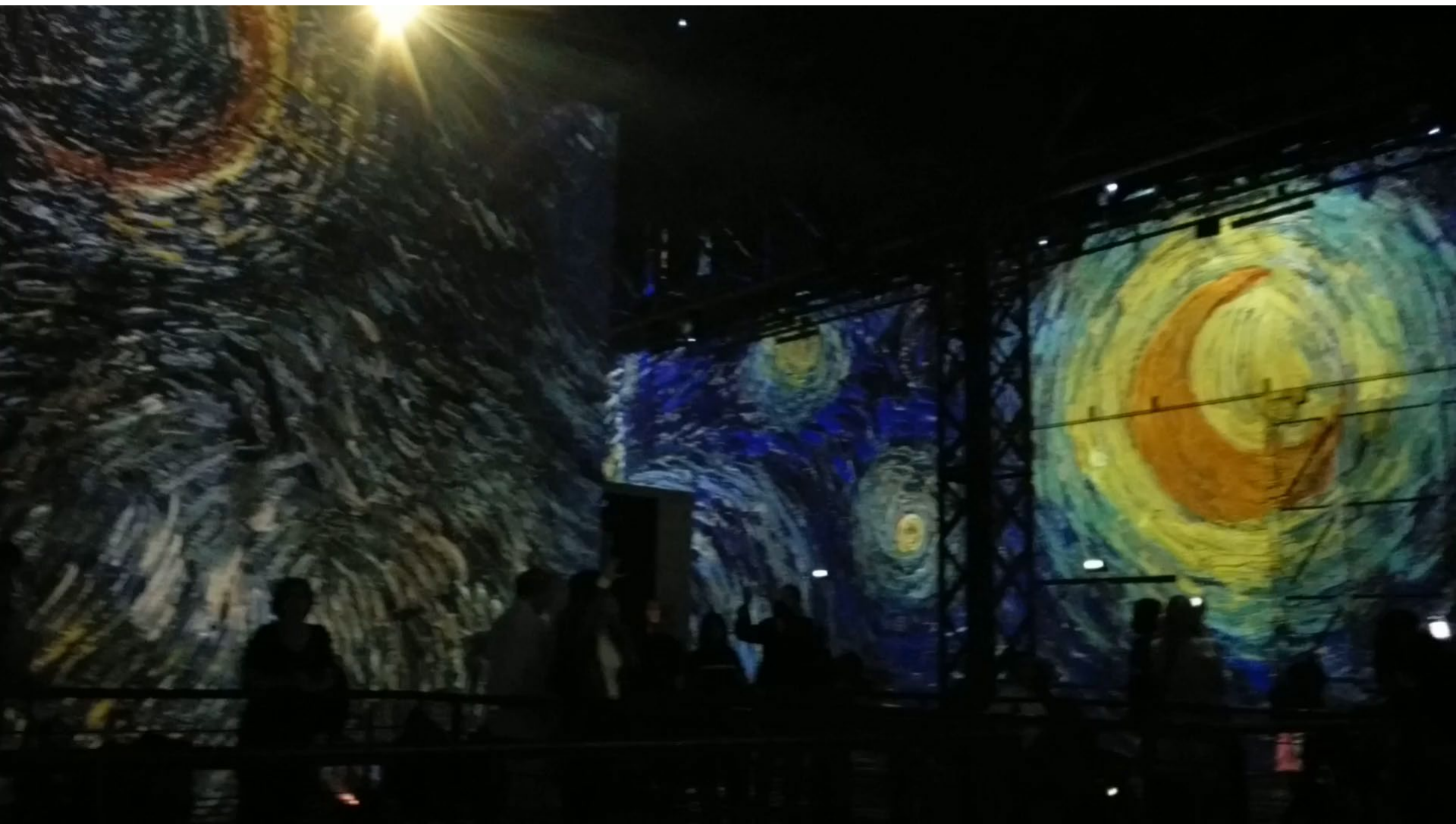
Hakuna Matata (1/2)



Hakuna Matata (2/2)



巴黎光之博物館：梵谷星夜



Q & A

投影片下載連結



謝謝您的參與 ^_^