

# 공간 컴퓨팅과 생성 AI의 융합 및 산업 전망

2024. 12. 3

전진수

(전) 슈퍼랩스 대표, (전) SK 텔레콤 부사장



# 전진수

전 슈퍼랩스 대표, 전 SK 텔레콤 부사장

기업 자문 및 투자, 멘토, 코칭

<주요 약력>

Super Labs CEO & Founder

SK 텔레콤 부사장, Metaverse 컴퍼니장

SK 텔레콤 5GX 서비스 사업단장

SK 텔레콤 VP, Media Labs 장, ICT 기술센터

SK 텔레콤 Immersive Media Lab장, 융합 기술원

삼성전자 무선사업부 책임 연구원

삼성전자 소프트웨어센터 선임 연구원





## 공간 컴퓨팅의 이해



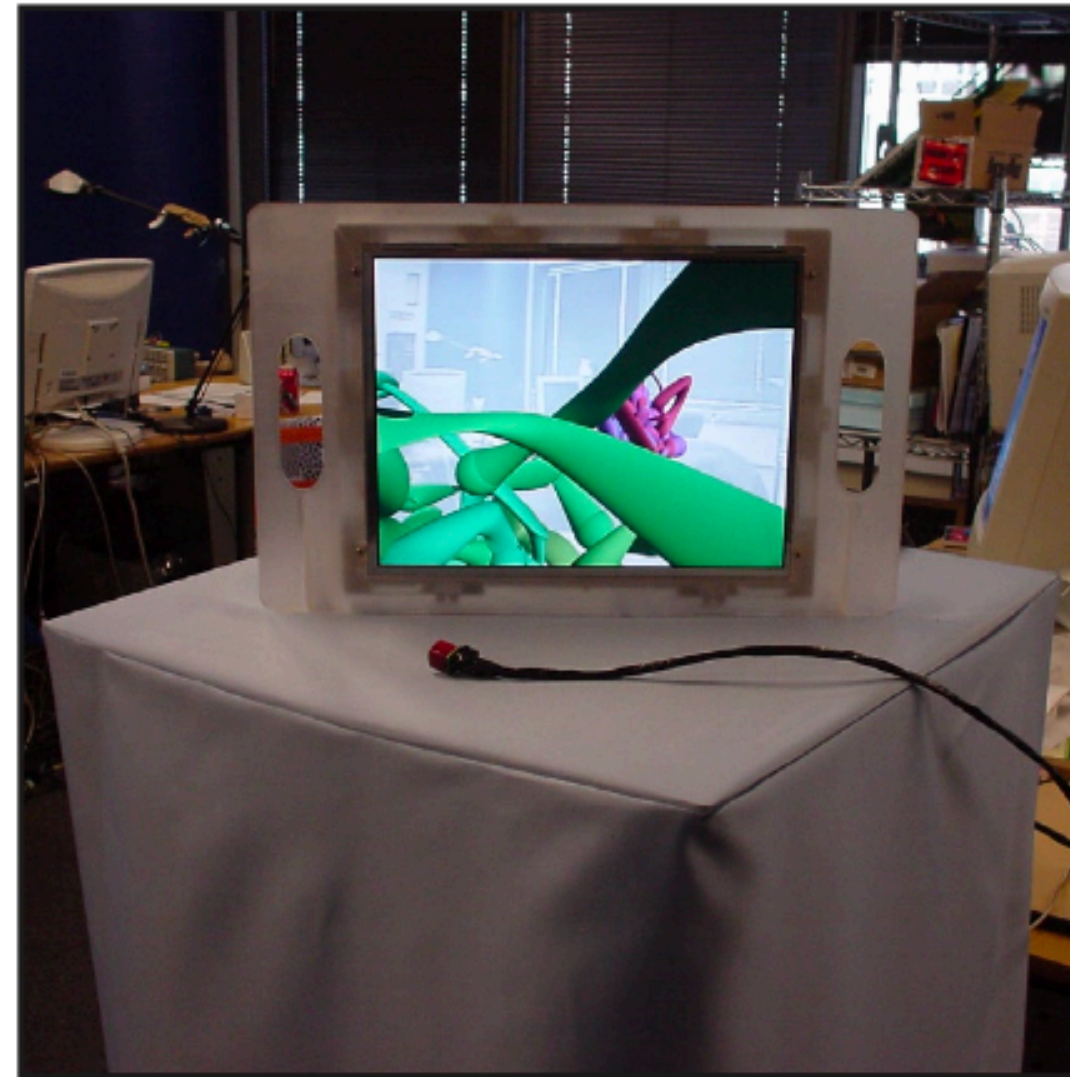
## Spatial Computing

**Simon Greenwold**

B.S., English & Applied Math  
Yale University, June 1995

Submitted to the Program in Media Arts and Sciences,  
School of Architecture and Planning, in partial  
fulfillment of the requirements for the degree of  
*Master of Science in Media Arts and Sciences*  
at the  
Massachusetts Institute of Technology  
June 2003

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**Figure 1.1.** This project, *Installation*, allows users to place virtual objects in real space. It is a good example of spatial computing. (Discussed in detail below.)

## 1.2 Definition

I define spatial computing as **human interaction with a machine in which the machine retains and manipulates referents to real objects and spaces.** Ideally, these real objects and spaces have prior significance to the user. For instance, a system that allows users to create virtual forms and install them into the actual space surrounding them is spatial computing. A system that allows users to place objects from their environments into a machine for digitization is spatial computing. Spatial computing differs from related fields such as 3D modeling and digital design in that it requires the forms and spaces it deals with to pre-exist and have real-world valence. It is not enough that the screen be used to represent a virtual space—it must be meaningfully related to an actual place.

“기계가 실제 객체와 공간에 대한 참조를 유지하고 조작하는 인간과 기계의 상호작용” 으로 정의



# AR.VR.MR



## Augmented Reality

Digital layer over physical elements



## Mixed Reality

Digital elements can interact with physical elements



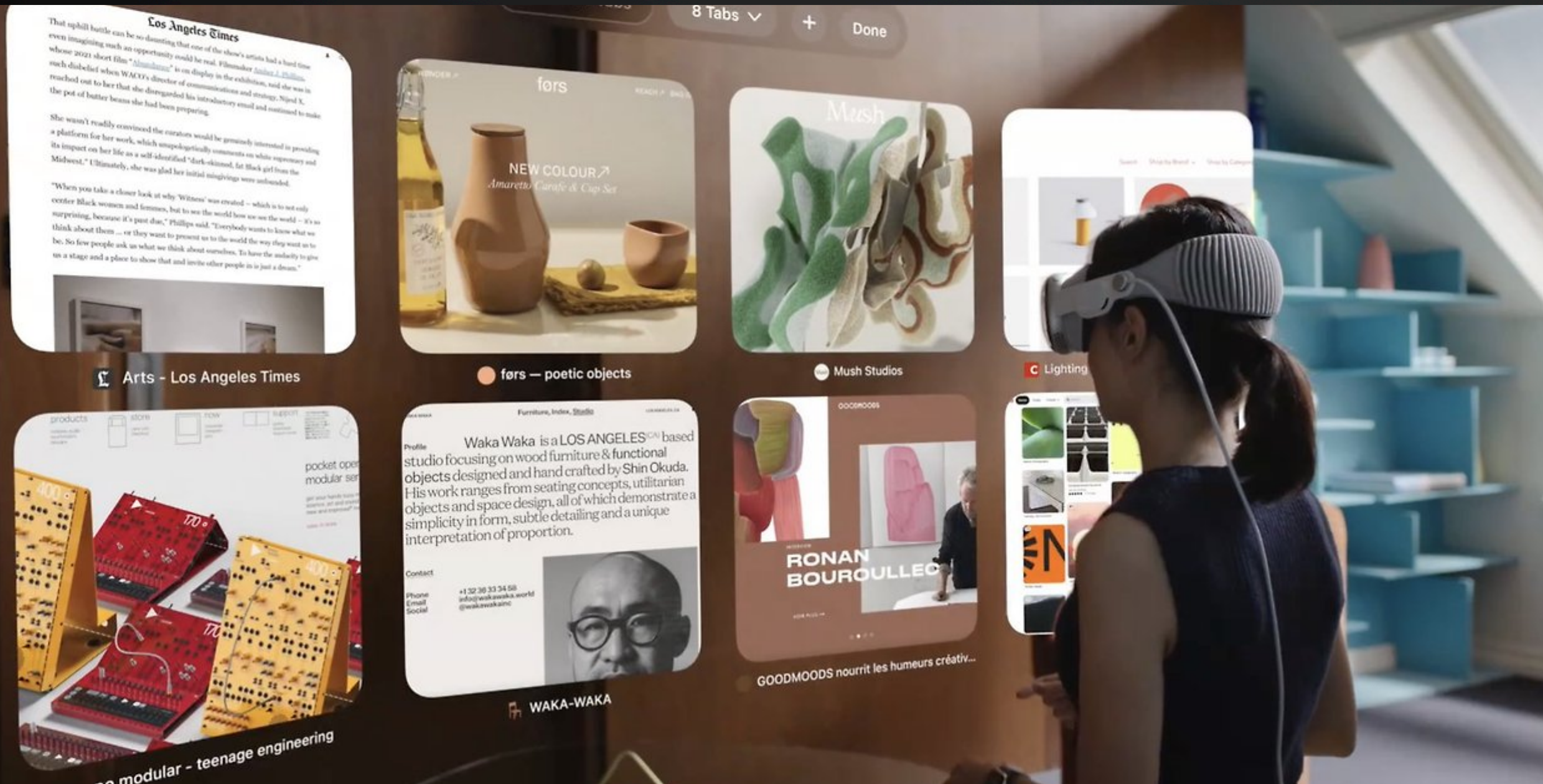
## Virtual Reality

Fully Immersive digital environment





# Spatial Computing



공간 정보를 기반으로 디지털 정보와 상호작용하는 광범위한 기술 영역



# Key Features



## Spatial Recognition

- Understanding the environment
- Vision & Sensor Tracking
- Spatial Mapping



## Visualization

- Contextual Information
- 3D Modeling & Animation
- Realtime Rendering



## Interaction

- Natural User Interface
- Voice, Gestures
- Eyetracking, Haptics



# Spatial Mapping



# Spatial Recognition



Computer Vision & Segmentation, Identify Object, 3D reconstruction & Spatial Mapping



# Tracking

# Spatial Recognition



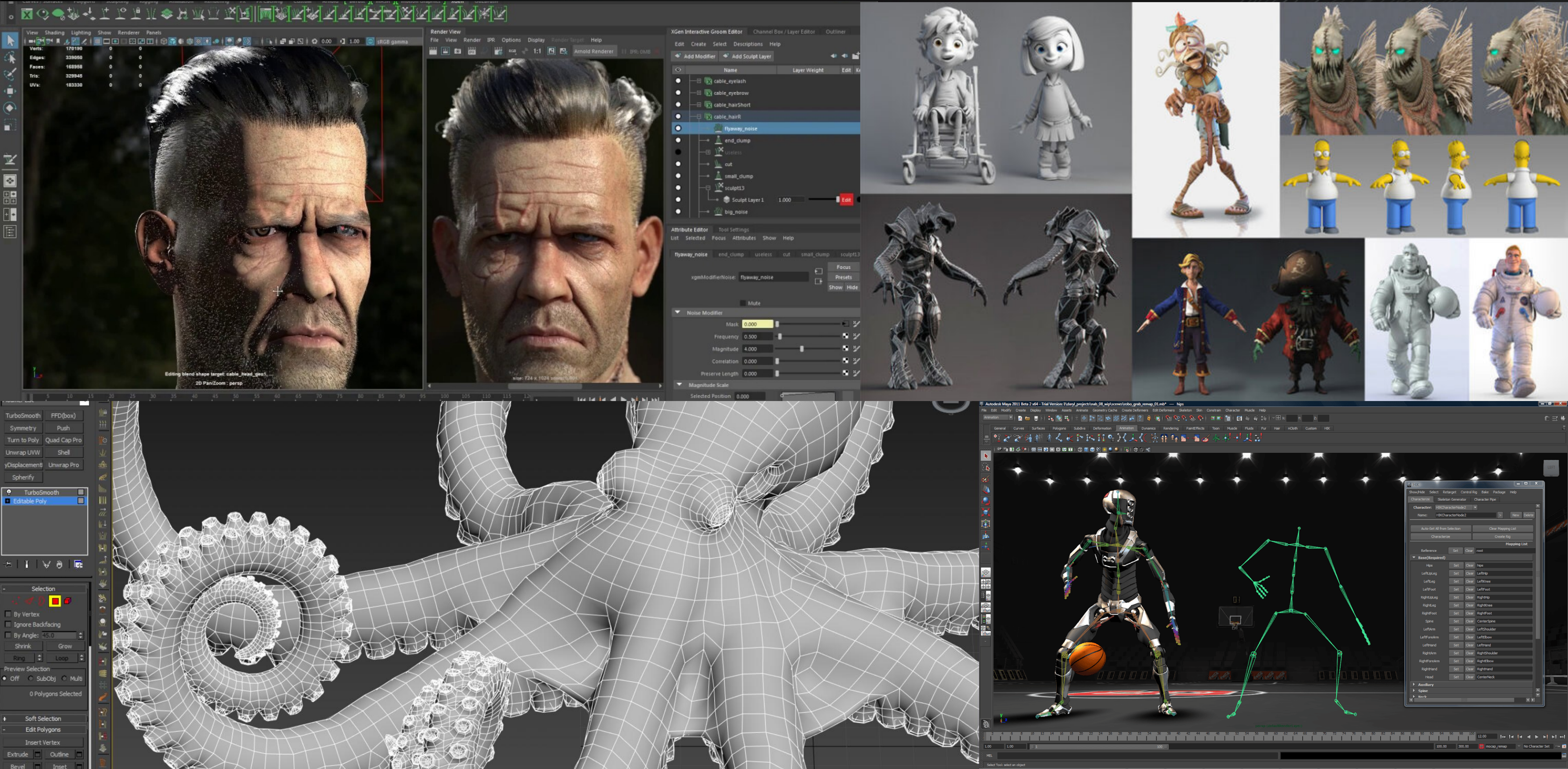
Realtime mapping and position tracking by Camera, Inertial Sensors, Infrared LED and Controller.

Source : Meta



# 3D Modeling & Animation

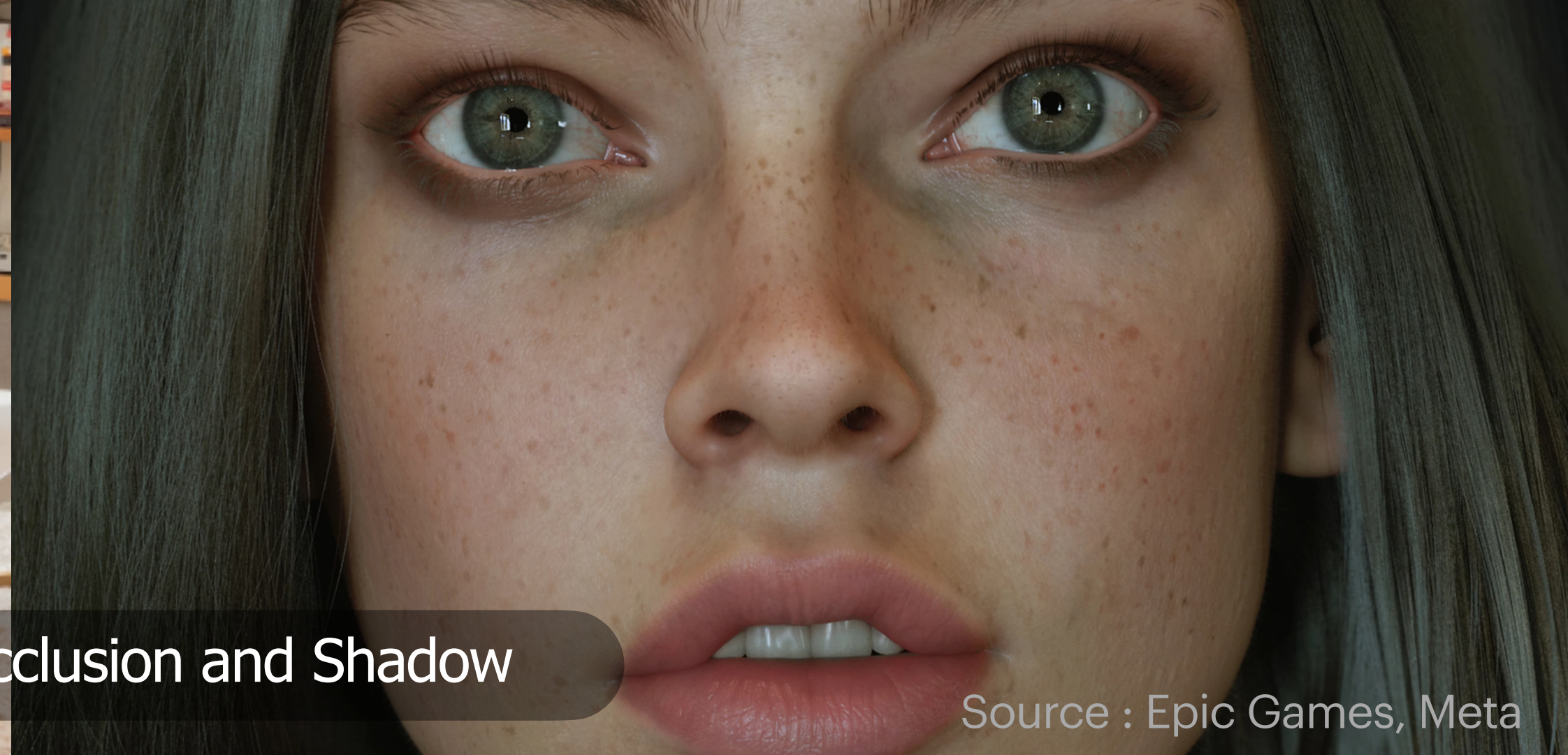
# Visualization





# Rendering

# Visualization

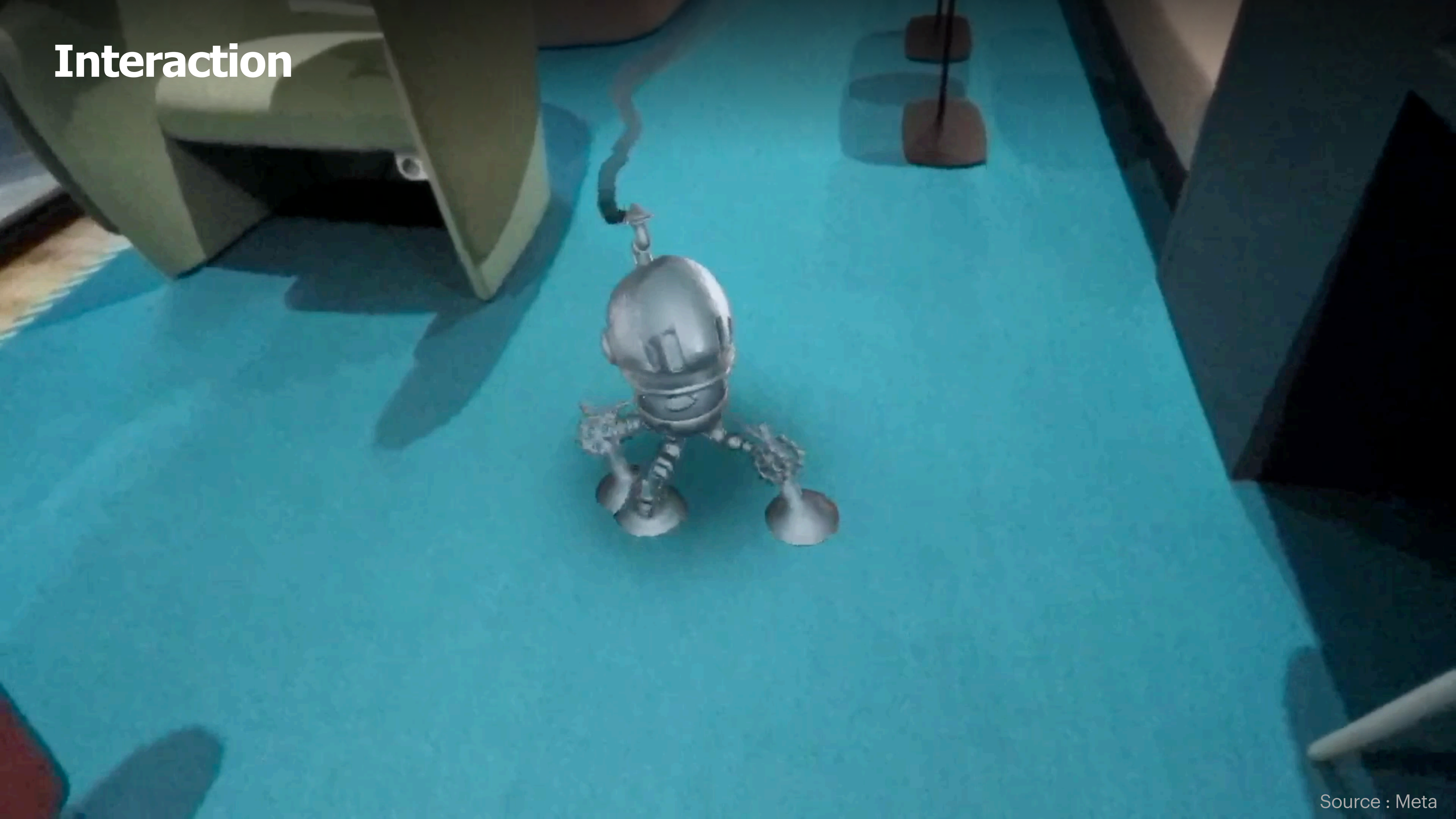


Realistic rendering with Reflection, Refraction, Occlusion and Shadow

Source : Epic Games, Meta



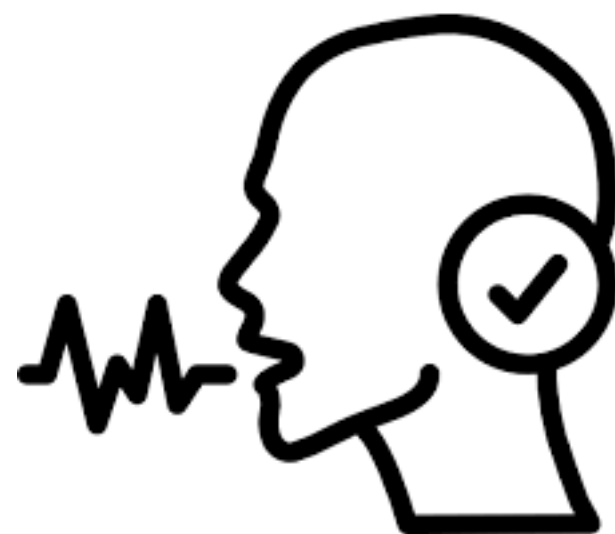
# Interaction



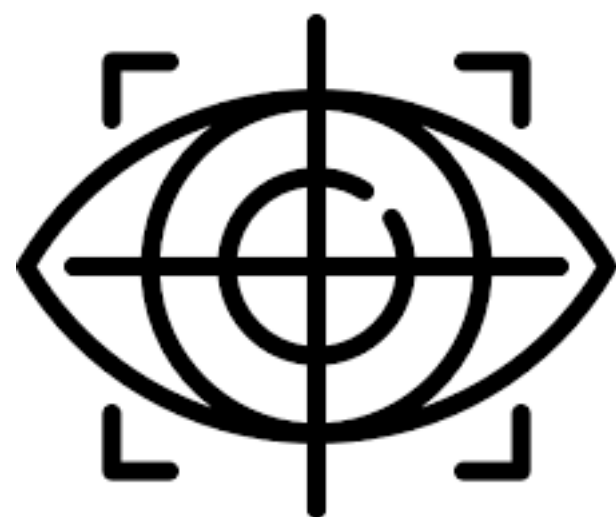




Gesture



Voice



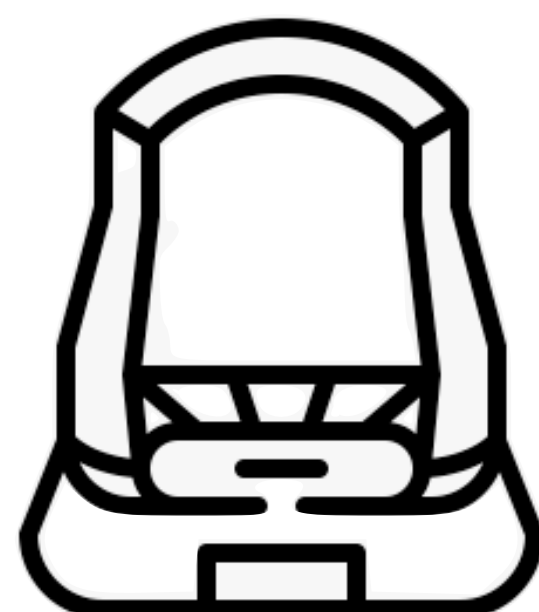
Eye-tracking



MR Controller



Wearable



Treadmill



Display



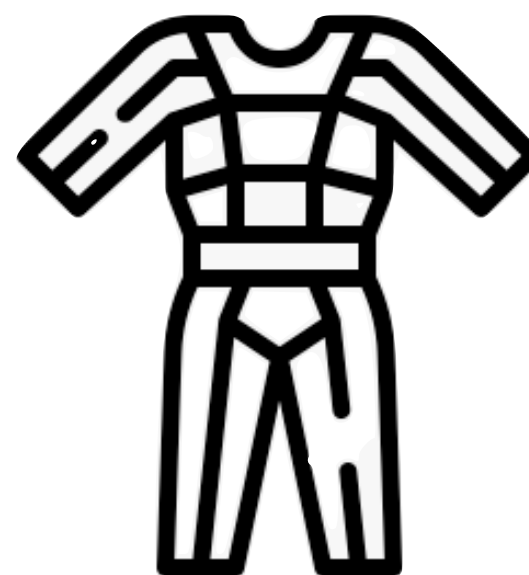
Spatial Audio



Smell

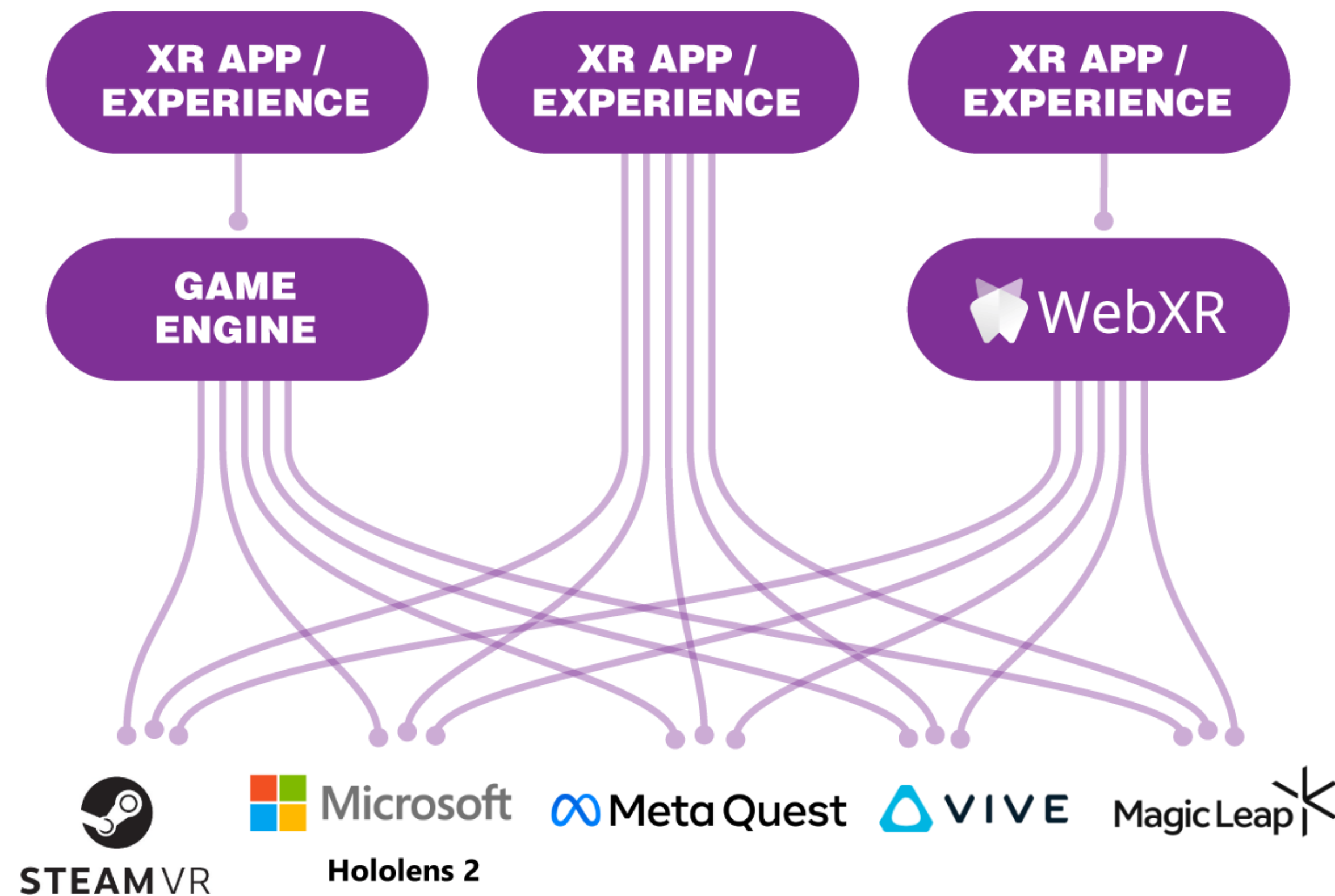


Haptics



Simulator

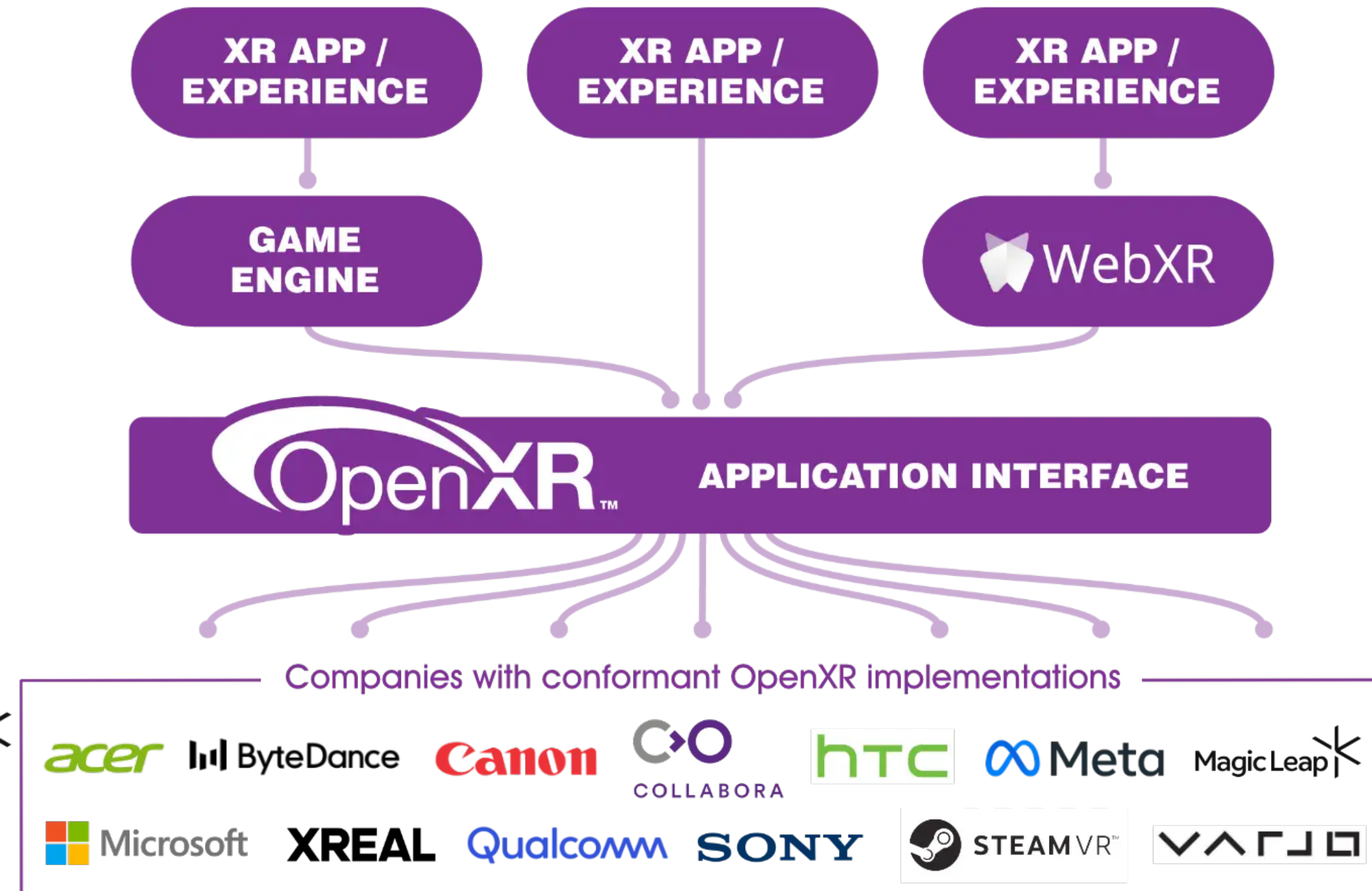




**Before OpenXR:** Applications and engines needed separate proprietary code for each device on the market.

## Fragmentation :

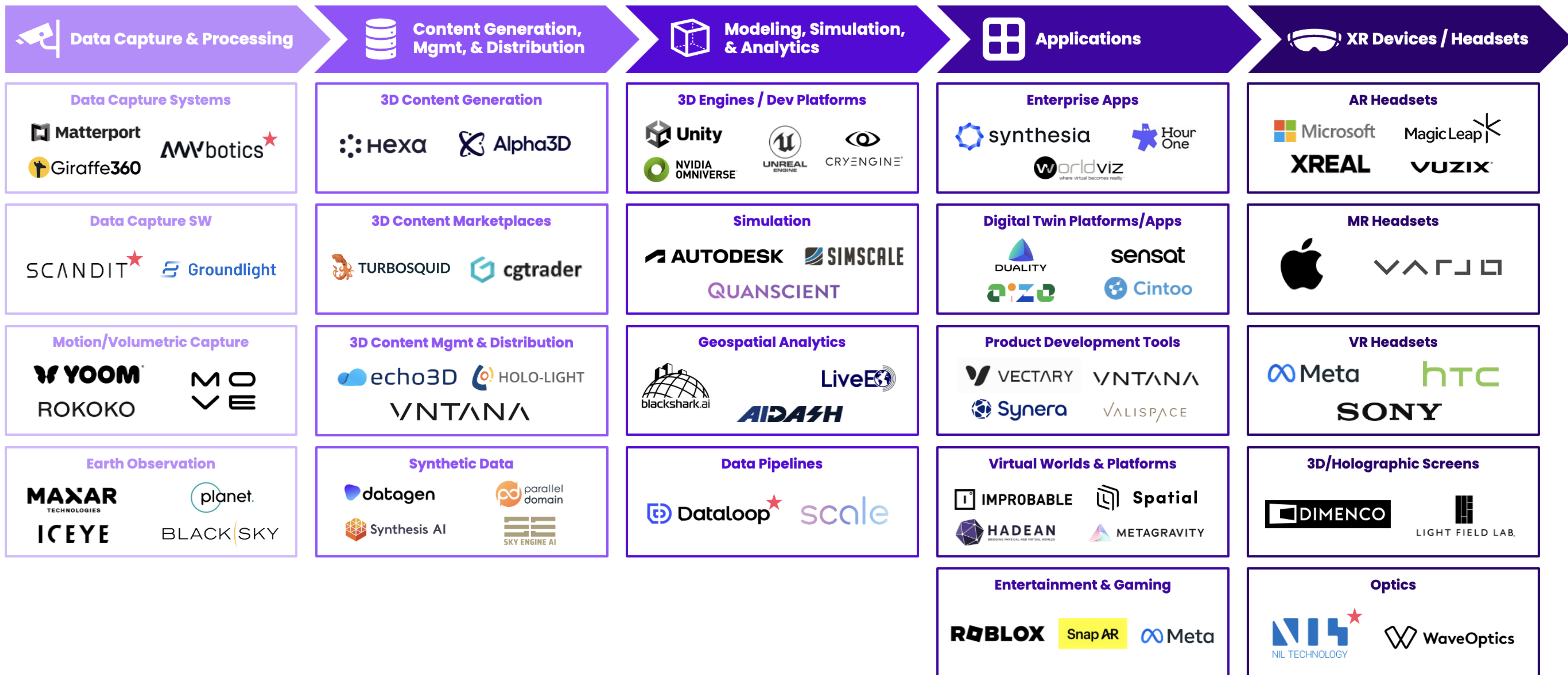
- Head Mounted Displays
- Base Stations
- Controllers
- Trackers: Body, hand, object, eye, etc.
- Haptic Devices
- Game Engines, Network Infra and etc..



**OpenXR** provides a single cross-platform, high-performance API between applications and all conformant devices.

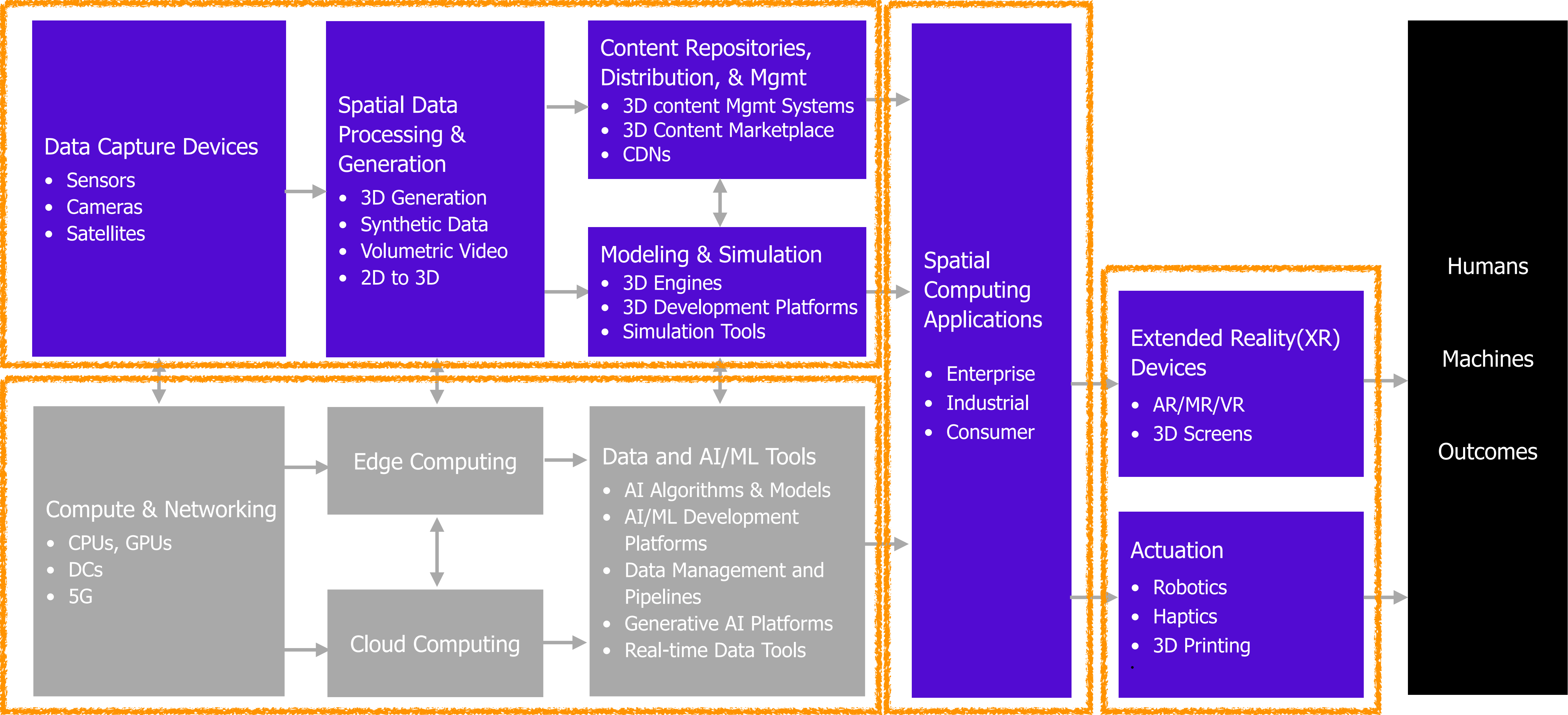


# Spatial Computing Market Landscape





# Spatial Computing Technology Stack



Legend : Unique to Spatial Computing Existing Enablers & Technologies

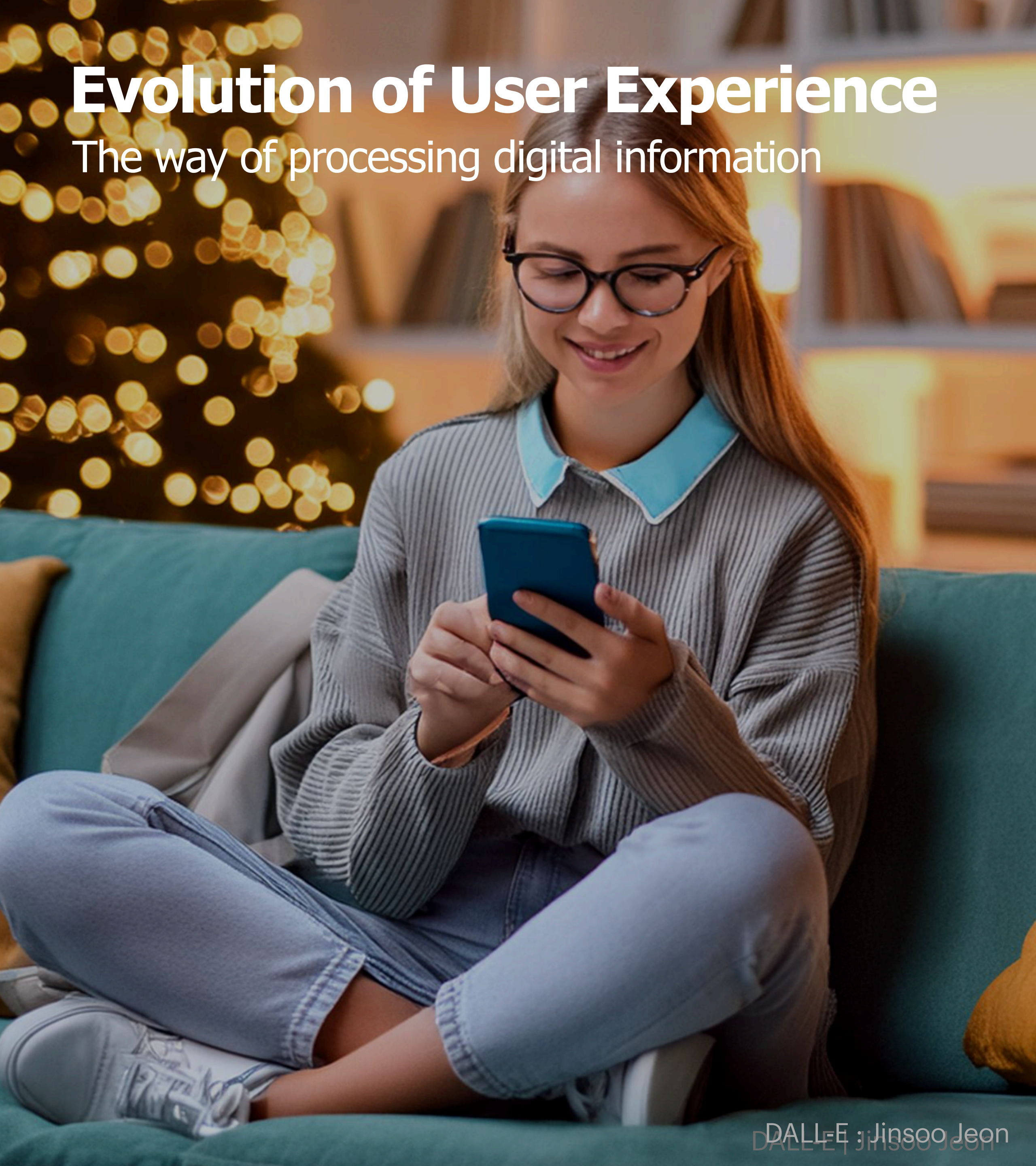


## 왜 공간 컴퓨팅을 주목하는가?



# Evolution of User Experience

The way of processing digital information



DALL-E 2 Jinseo Jeon







**Chip**

M1(8 core CPU, 10 core GPU)  
R1(Sensor processing)

**Display**

23 million pixels micro OLED  
3552×3840 (4K) @90fps

**Camera**

12 Camera  
- 2 high-resolution main cameras  
- 6 world-facing tracking cameras  
- 4 eye-tracking cameras

**Sensor**

LiDAR Scanner  
TrueDepth camera  
4 inertial measurement units (IMUs)  
Flicker sensor  
Ambient light sensor

**MIC**

6 Mics

**Sound**

Spatial Audio

**OS**

Vision OS

**Weight**

600–650 g

**Input**

Hands, Eyes, Voice  
Accessorie  
(Keyboards, Trackpads, Game controllers)

**IPD** Interpupillary  
Distance

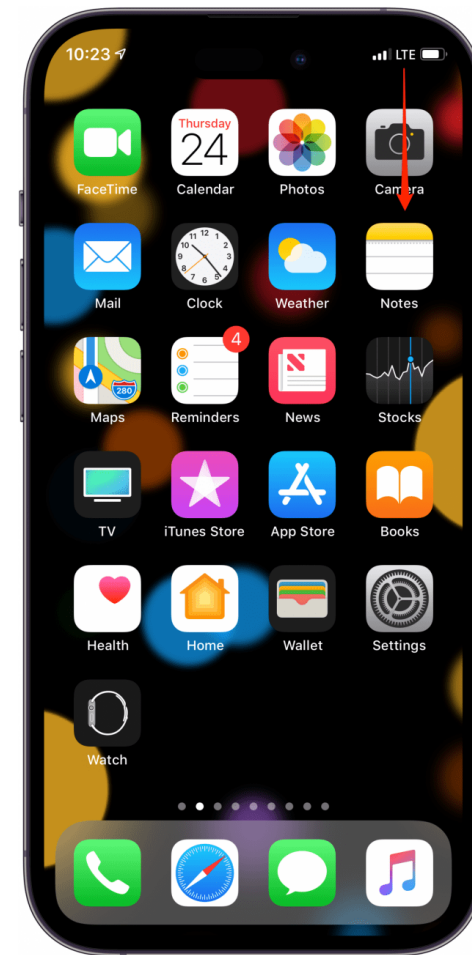
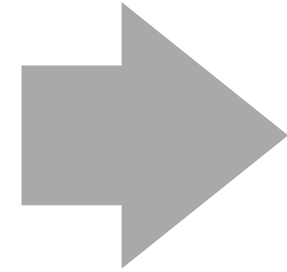
51–75 mm



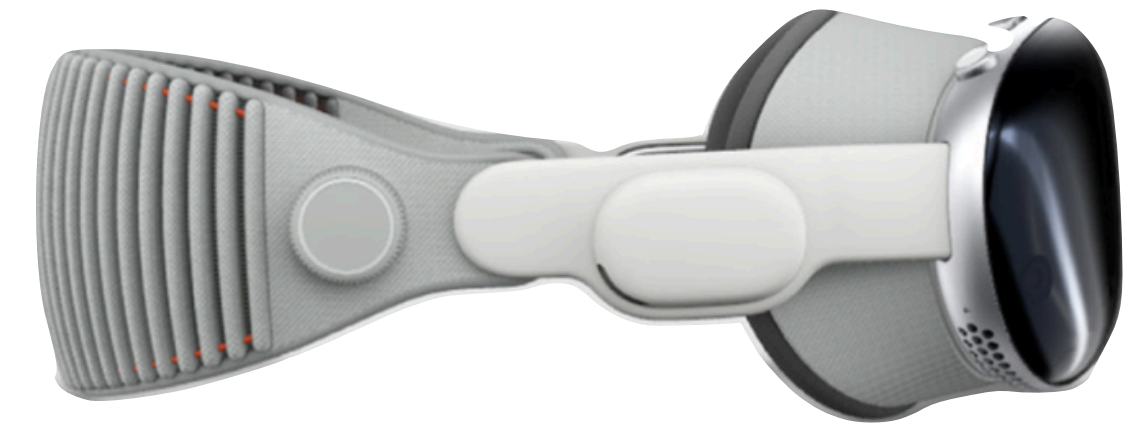
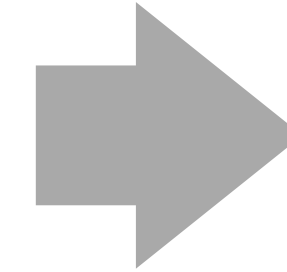
# Next Computing Platform



**Personal Computing**



**Mobile Computing**



**Spatial Computing**

**Evolution of Computing Platform**





## Meta Quest (VR.MR)

Game, Communicate, Work, Play, Create



## Ray-Ban Meta (Smart Glasses)

Camera, Audio, **AI assistant**



## Orion (AR Glasses prototype)

Vision, **Meta AI**, Gestures, Eye-tracking, Holographic displays, neural wristband



# Spatial Intelligence

Fei Fei Li

World Labs : 3D 세상을 인식하고, 생성하고, 상호작용하기 위해 Large World Model 을 만드는 중 (230M\$투자)  
Spatial Intelligence : 창작, 디자인, 학습, AR/VR, Robotics, 자율주행 등에 활용 가능



# 2025 Gartner Top 10 Strategic Technology Trends



## AI imperatives and risks

- Agentic AI
- AI Governance Platforms
- Disinformation Security



## New frontiers of computing

- Post-Quantum Cryptography
- Ambient Invisible Intelligence
- Energy-Efficient Computing
- Hybrid Computing

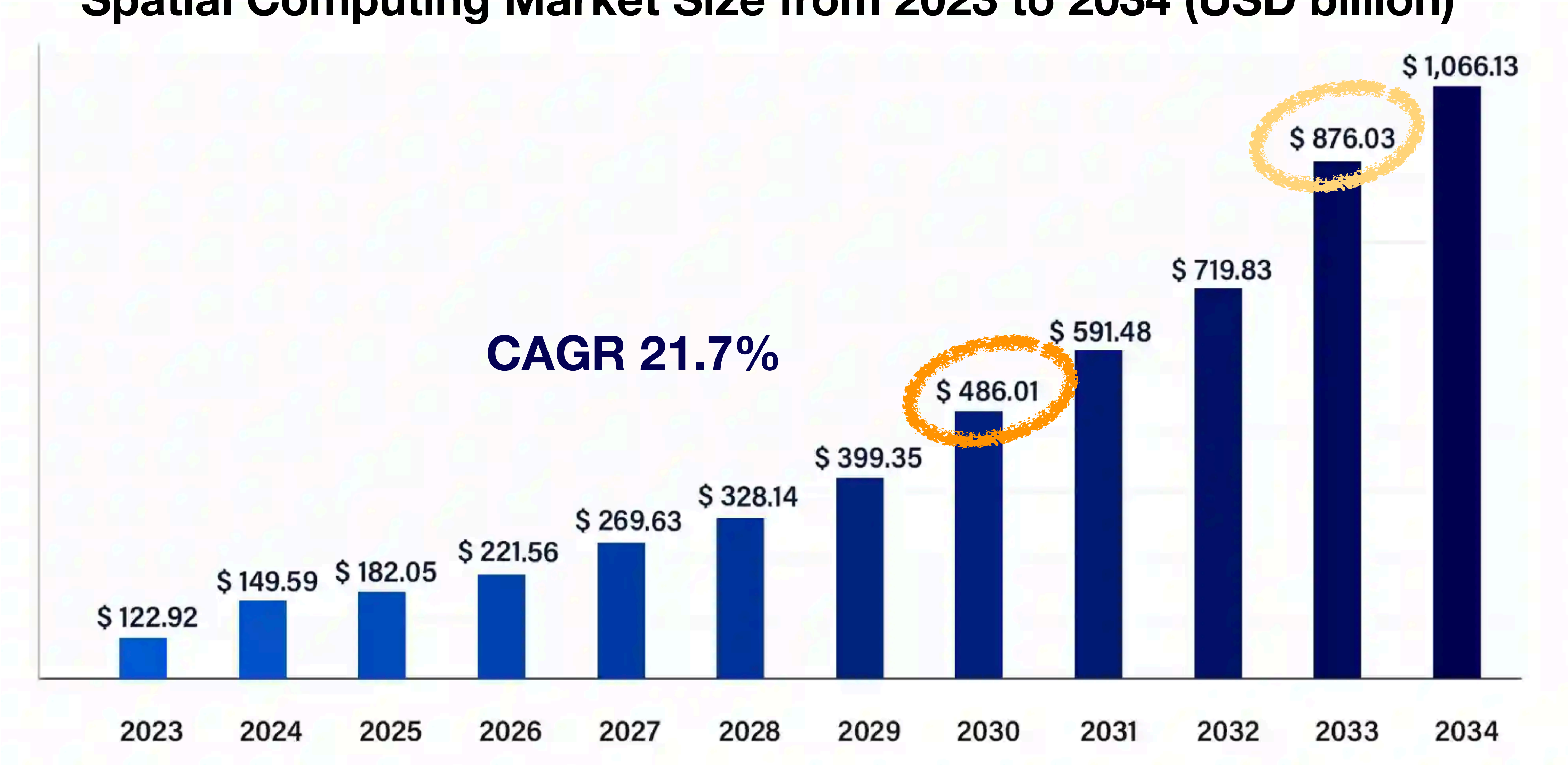


## Human-machine synergy

- Spatial Computing
- Polyfunctional Robots
- Neurological Enhancement

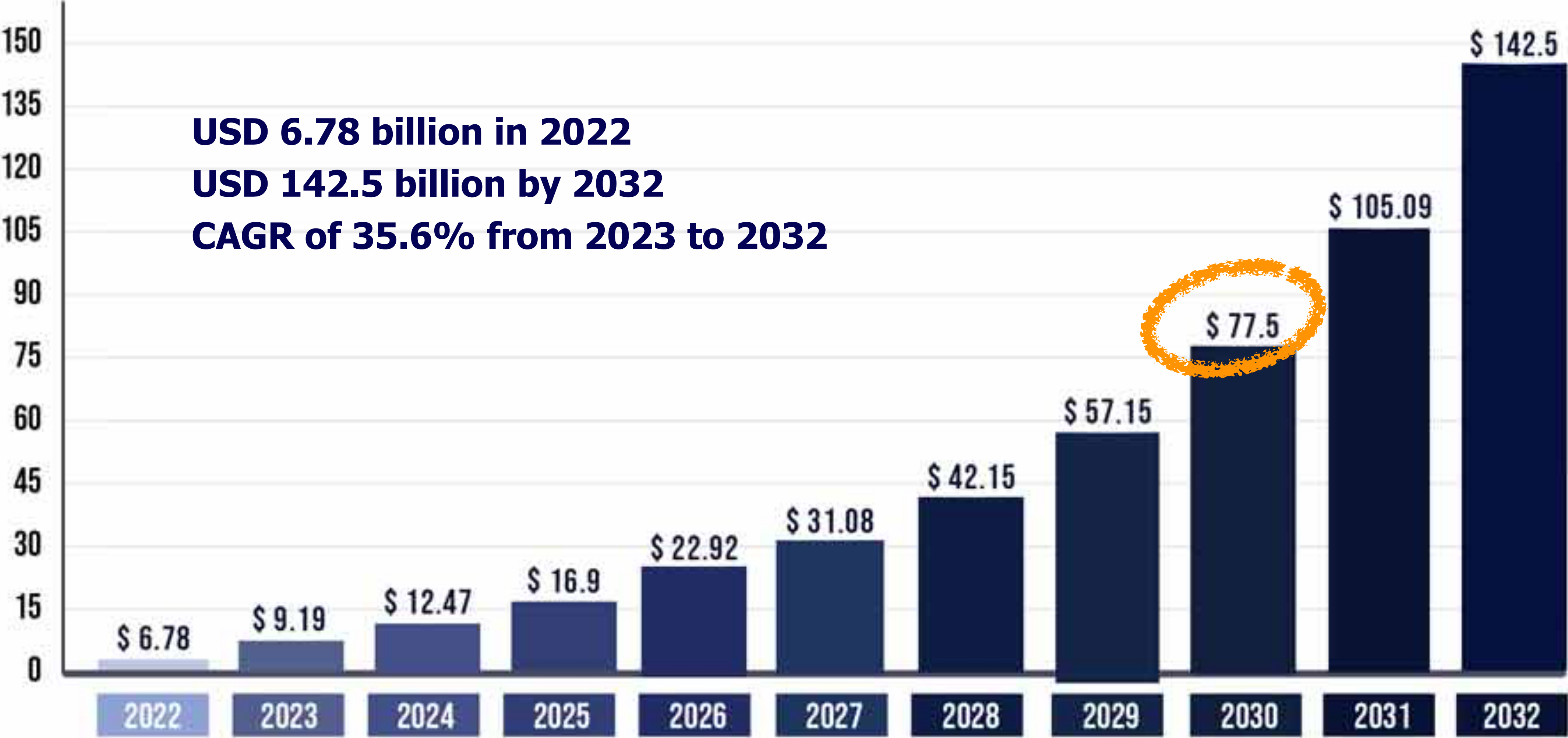


## Spatial Computing Market Size from 2023 to 2034 (USD billion)





## AR.VR Headsets Market Size, 2022 to 2032 (USD billion)





# 공간 컴퓨팅의 주요 활용 사례



# Workspace

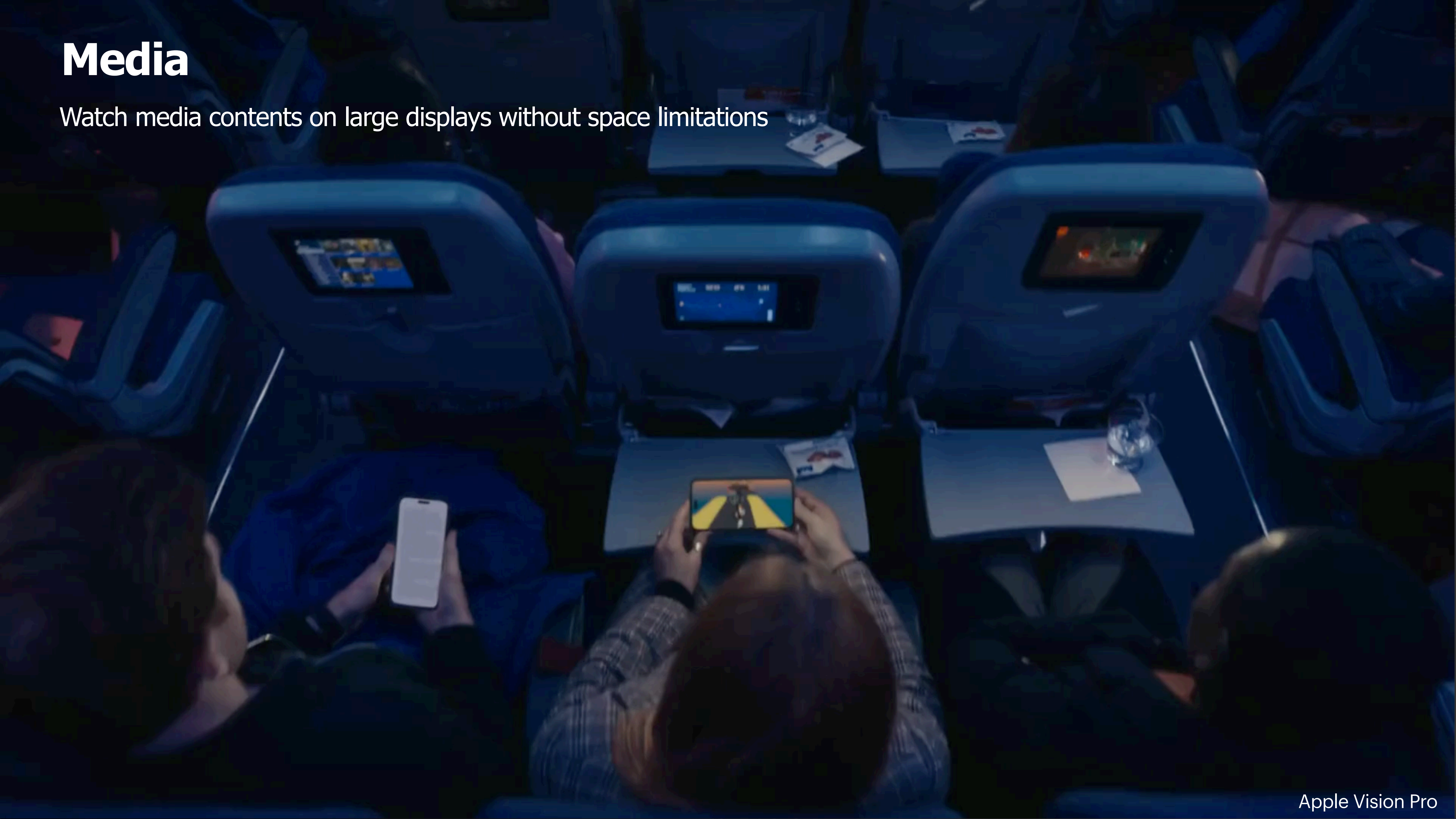
Multiple Virtual Displays





# Media

Watch media contents on large displays without space limitations





# Sports Media

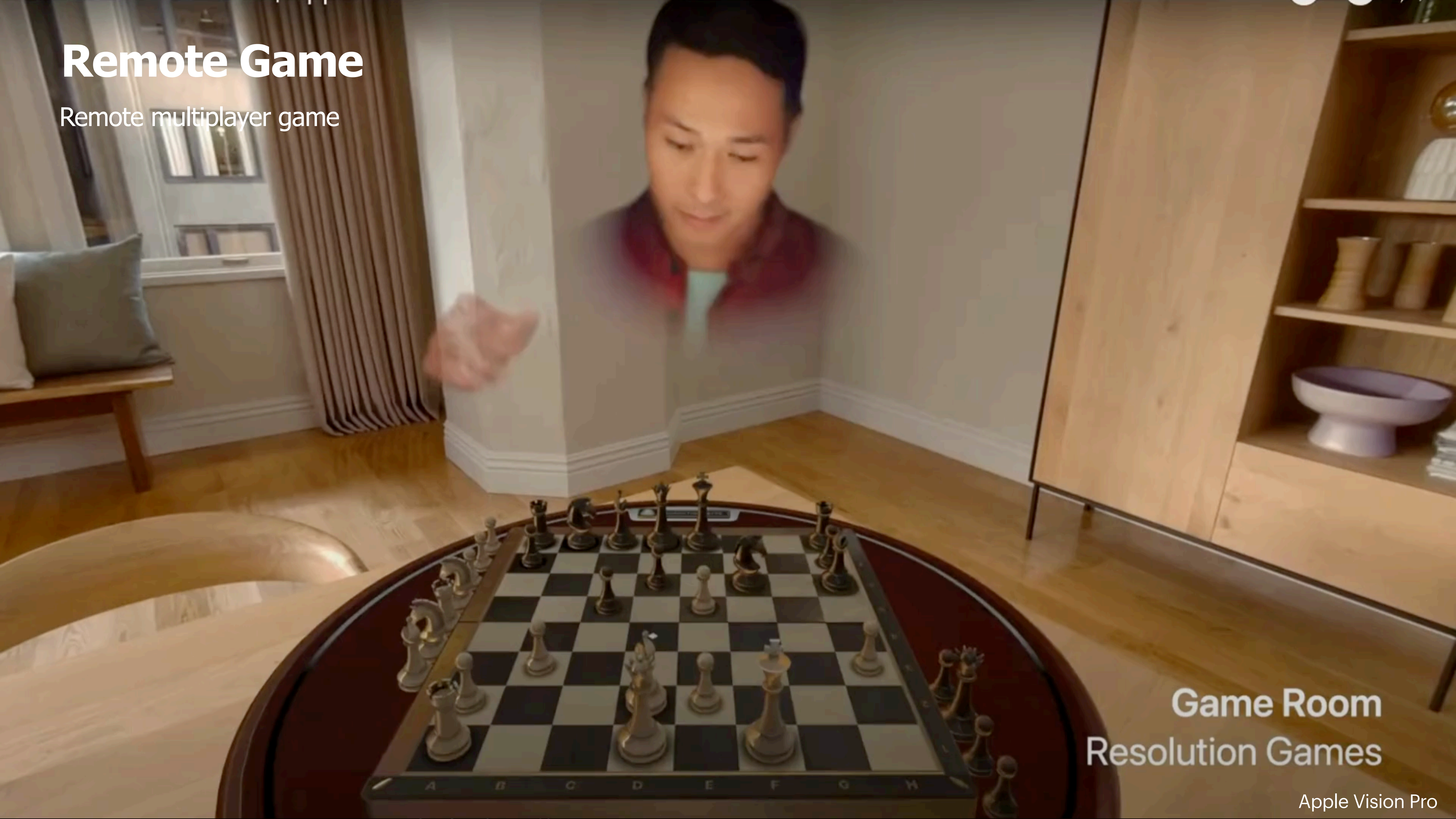
Watch sports from different perspectives





# Remote Game

Remote multiplayer game



Game Room  
Resolution Games



# Education

Explore the Solar system or spatial knowledge

40% more confident, 150% engagement, 11% higher grades (Prisms)



# Construction

Make informed decisions with real-time information

XYZ<sup>TM</sup>



**PASCHAL MCERLEAN**  
CONSTRUCTION MANAGER, PM GROUP

XYZ Reality



# Healthcare

surgical training & visualization of critical information during surgery





# e-Commerce

Virtual experience & Shopping



Justin Ryan

Virtual Shopping by Justin Ryan



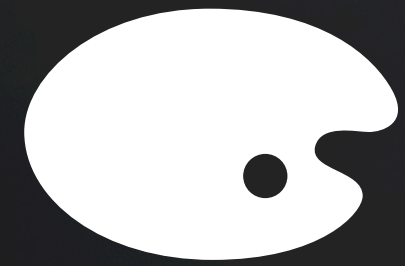
# 공간 컴퓨팅은 생성AI와 어떻게 시너지를 내는가?



# Generative AI



Text



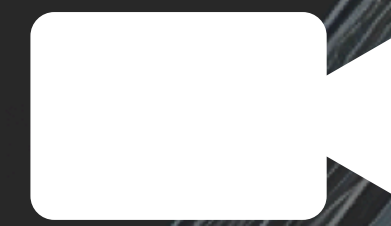
Image



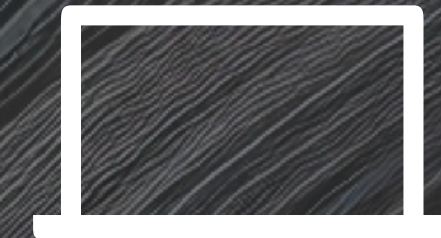
Music



Voice



Video



Code



3D Model



3D World



AI Agent

생성 AI 를 통해 창의성, 생산성, 효율성 뿐 아니라, 지능적 서비스로 진화 중



# AI Generated Images





AI Generated Video





# AI Generated 3D

## 3DFY Prompt(beta)

Convert a text prompt into a high-quality 3D model

### Choose category

#### Interiors

 Table Lamps

 Sofas

 Tables

 Ottomans

 Cutlery

#### Gaming

 Swords V2

 Shields

 Axes

 (old) Swords

#### LowPoly | Mobile

 Tables | LowPoly

#### Example prompts:

A sofa with three loose back cushions. The sofa has a big rolled armrest →

A gentleman's Chesterfield sofa with two seats and a wraparound back. The sofa has wooden feet. →

A sofa resembling a strawberry →

A sofa resembling a blueberry

Seed:  ↺

GENERATE

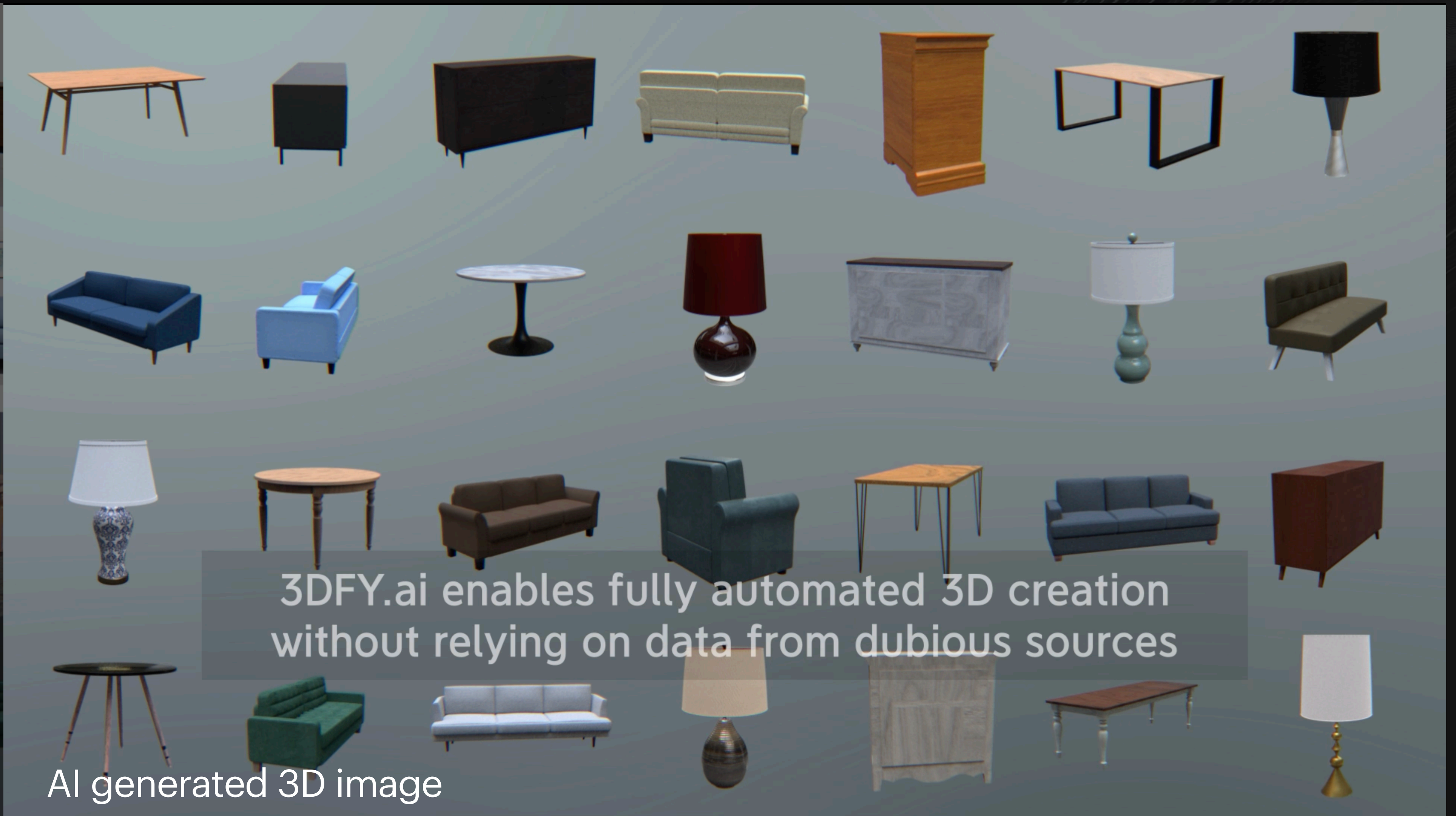
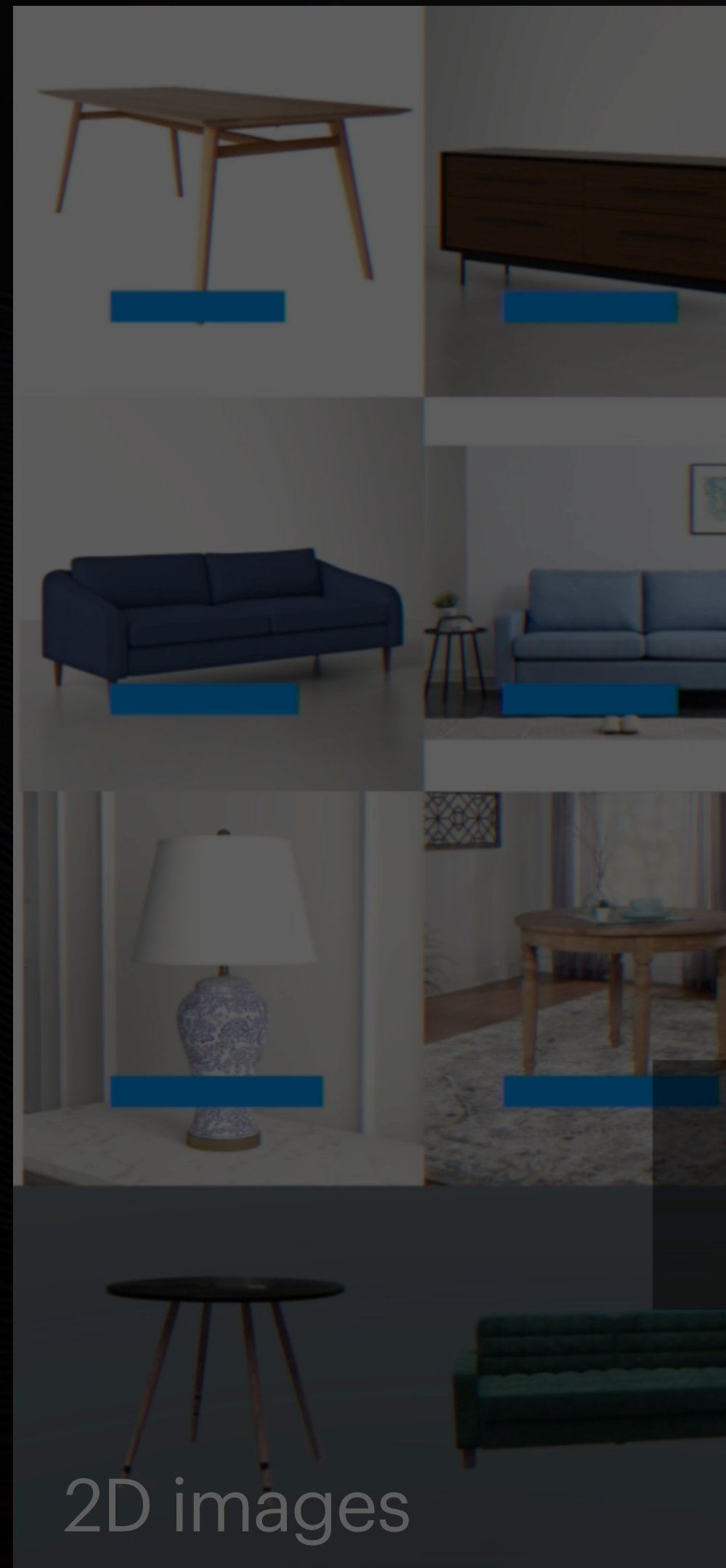
6  0 



Type “A **sofa** resembling a **blueberry**”, and Generate!



# AI Generated 3D





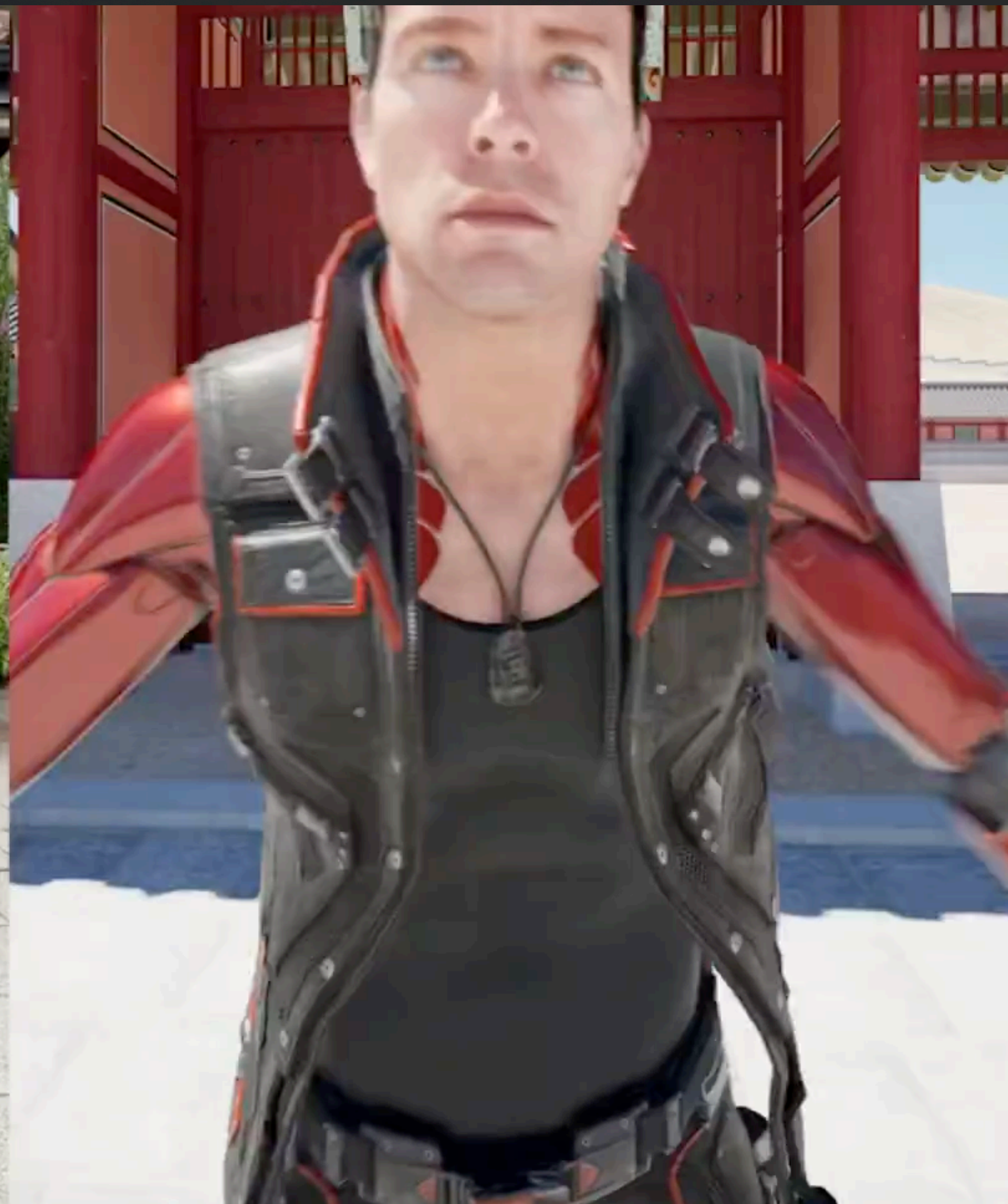
# AI Generated 3D Spaces



Source : Luma AI (Corsewall highhouse hotel )



# AI Generated Motion

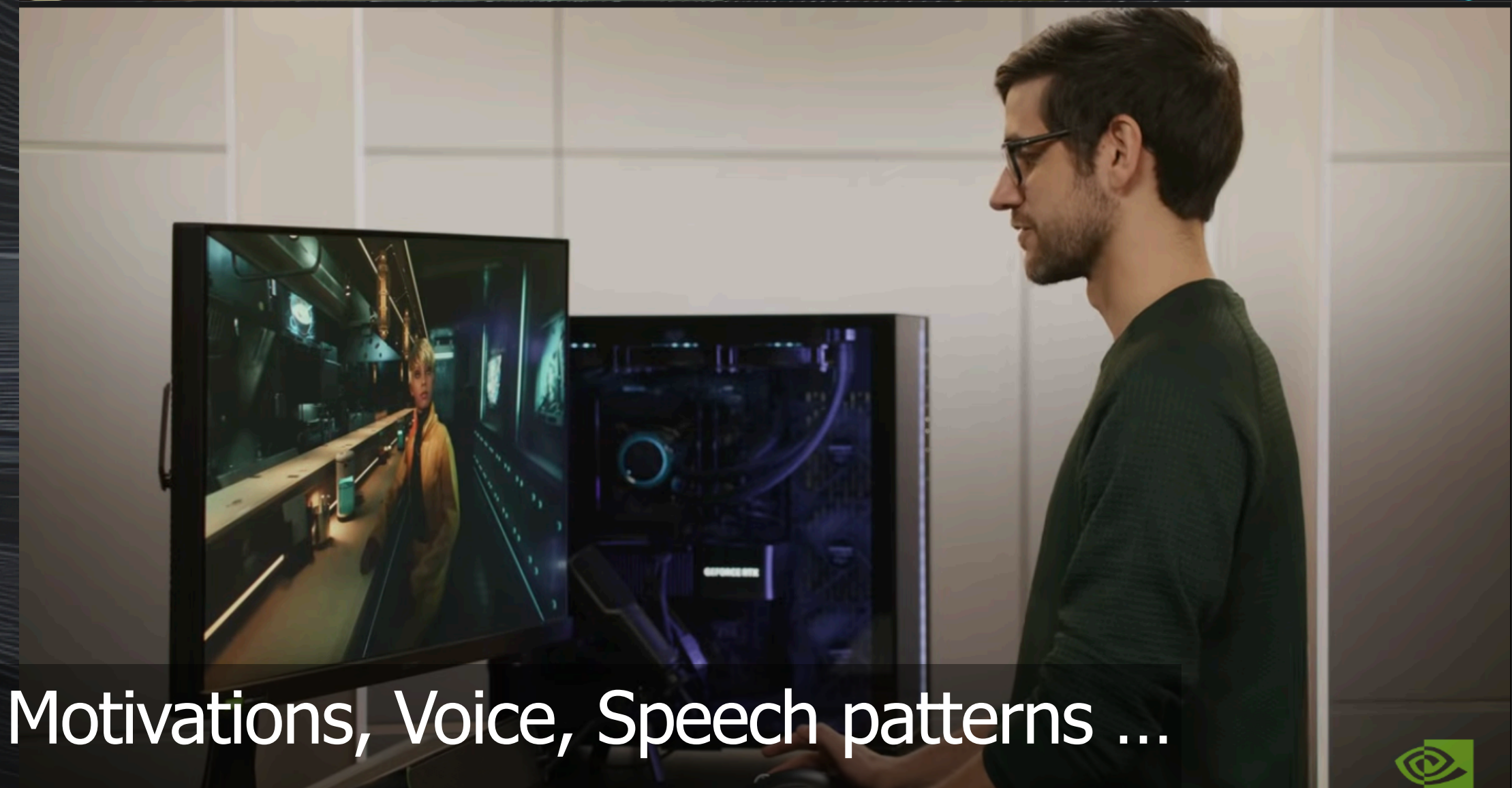
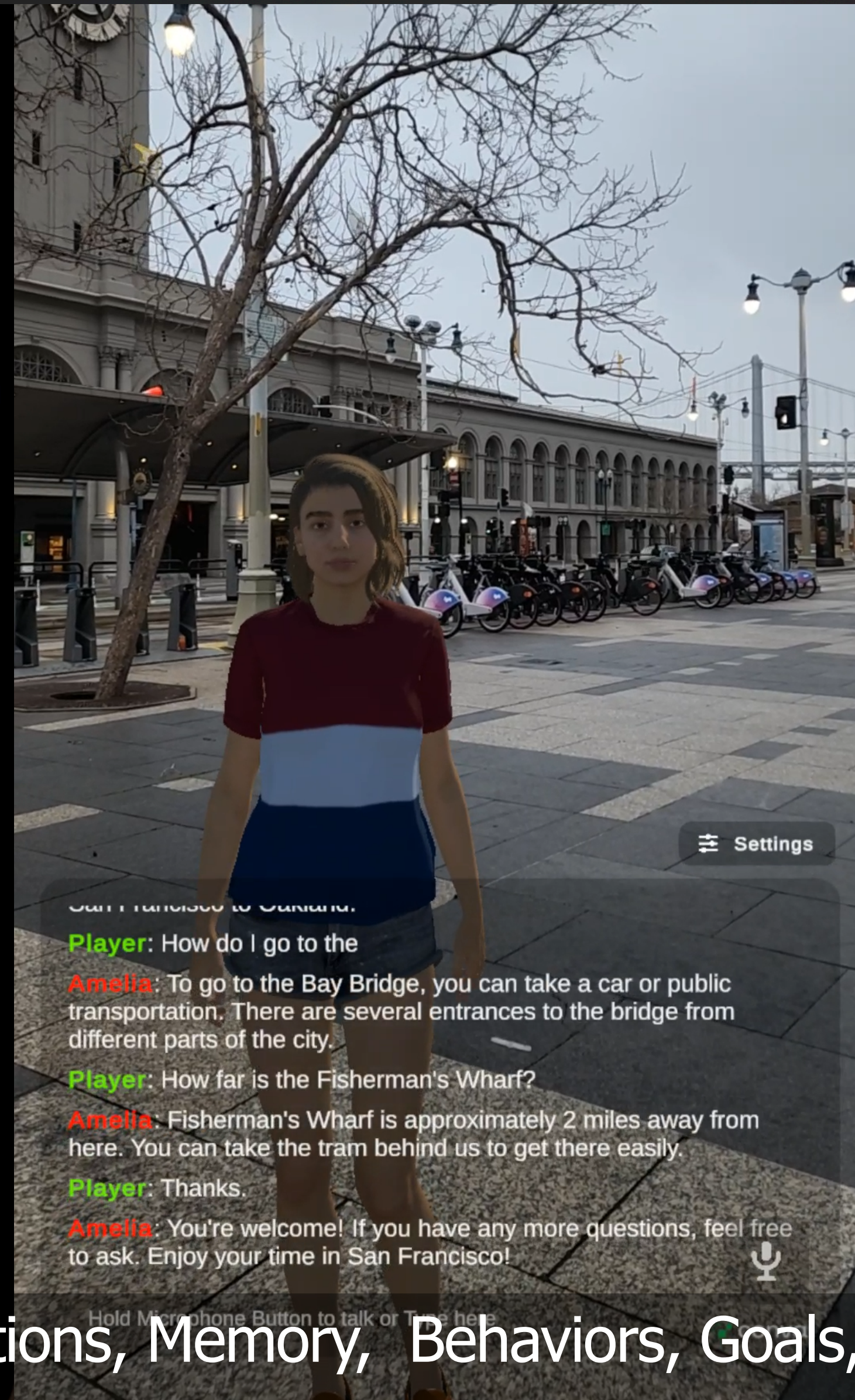
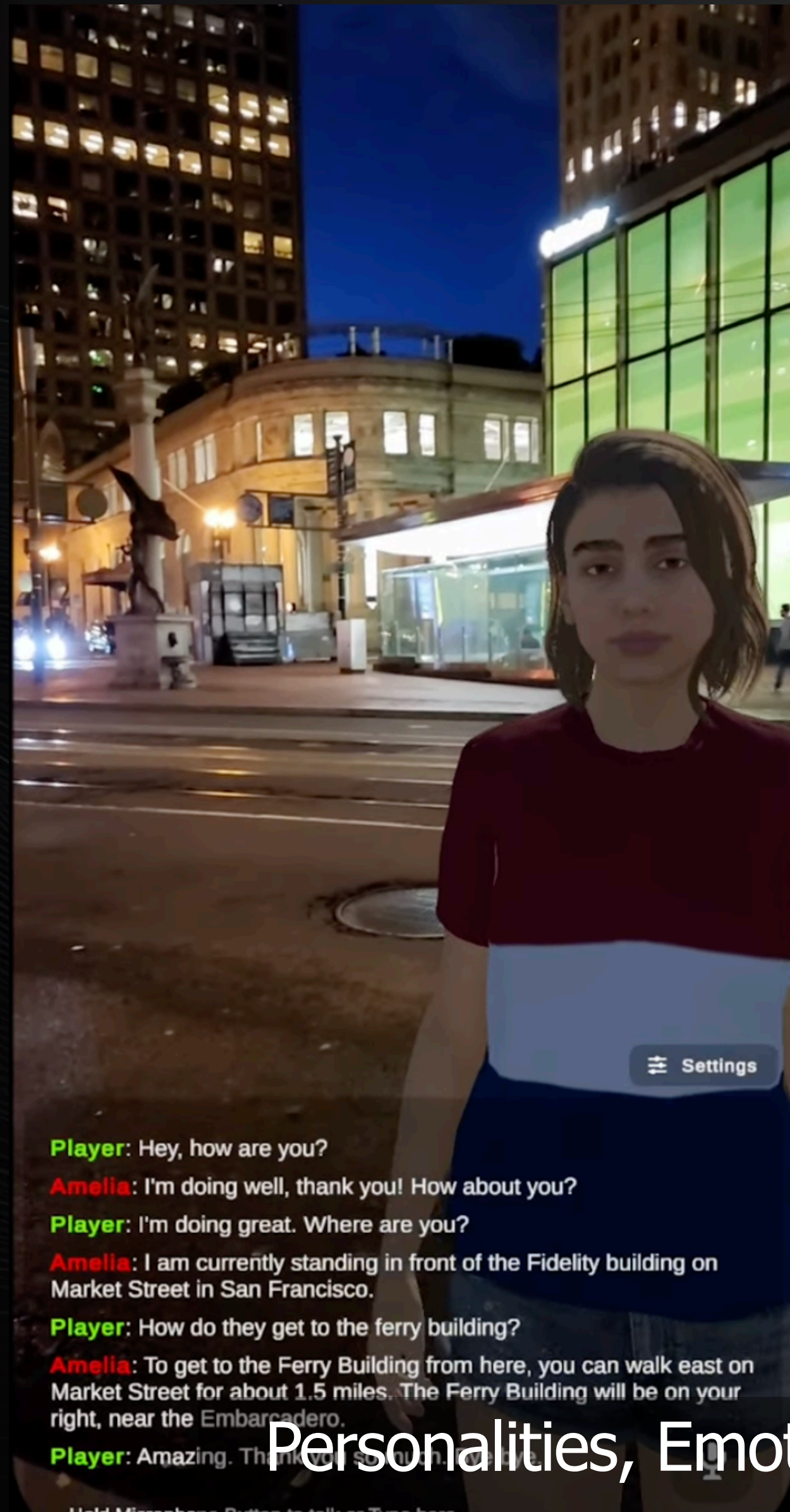


Source : Move AI



# Virtual AI Avatar. AI NPC

Convai



Personalities, Emotions, Memory, Behaviors, Goals, Motivations, Voice, Speech patterns ...



# Virtual Human AI Agent

UNEEQ



## Marketing & Sales

Marketing KPI (+112%~350%)



## Customer Service

Customer Engagement (300%)



# 공간 컴퓨팅의 미래 전망



# Vertical Industry adoption

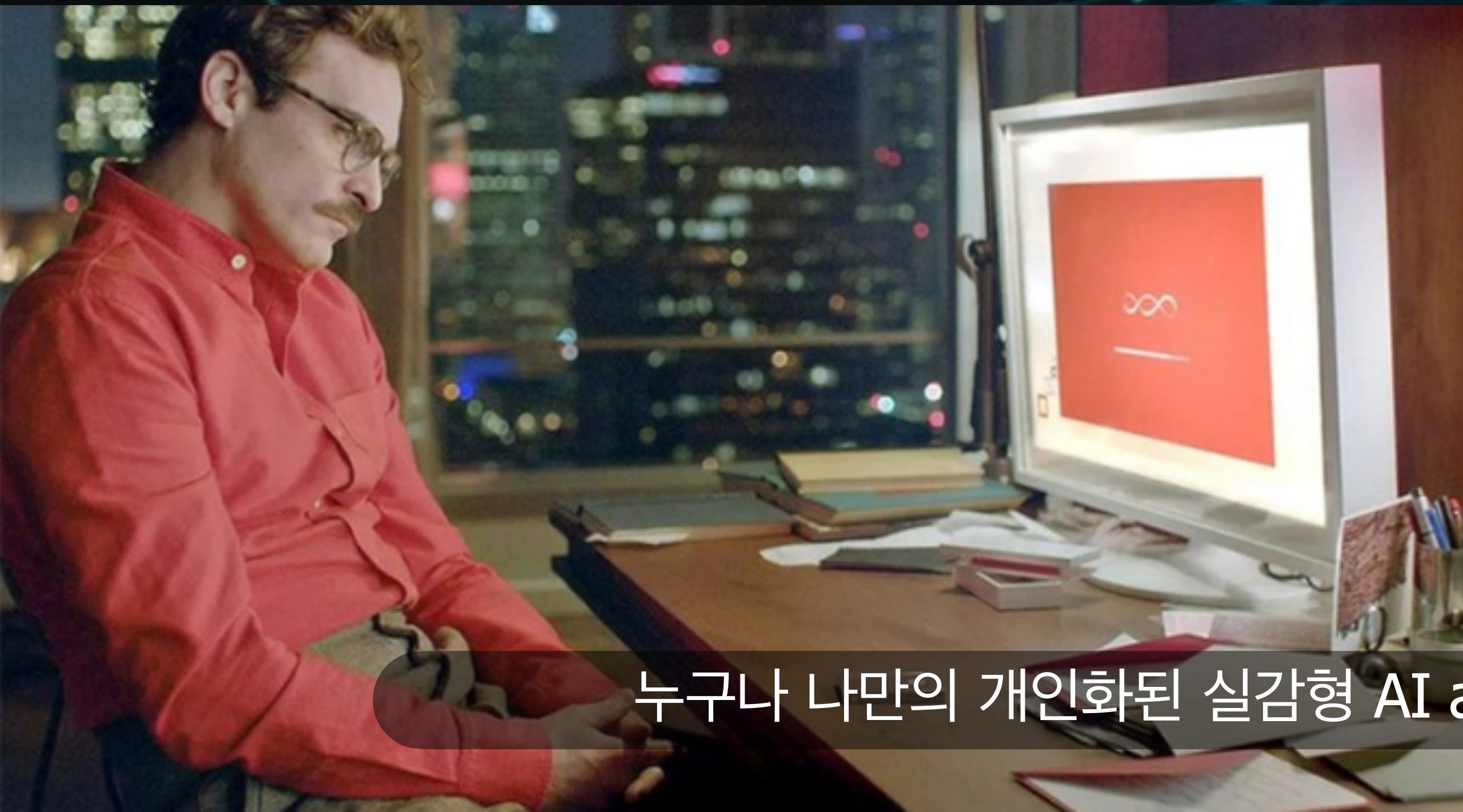


의료, 제조, 교육, 훈련, 물류, 커머스, 스마트 시티, 안전, 국방 및 엔터테인먼트에 도입 사례 확대될 것

xVisioin, Microsoft ,IKEA



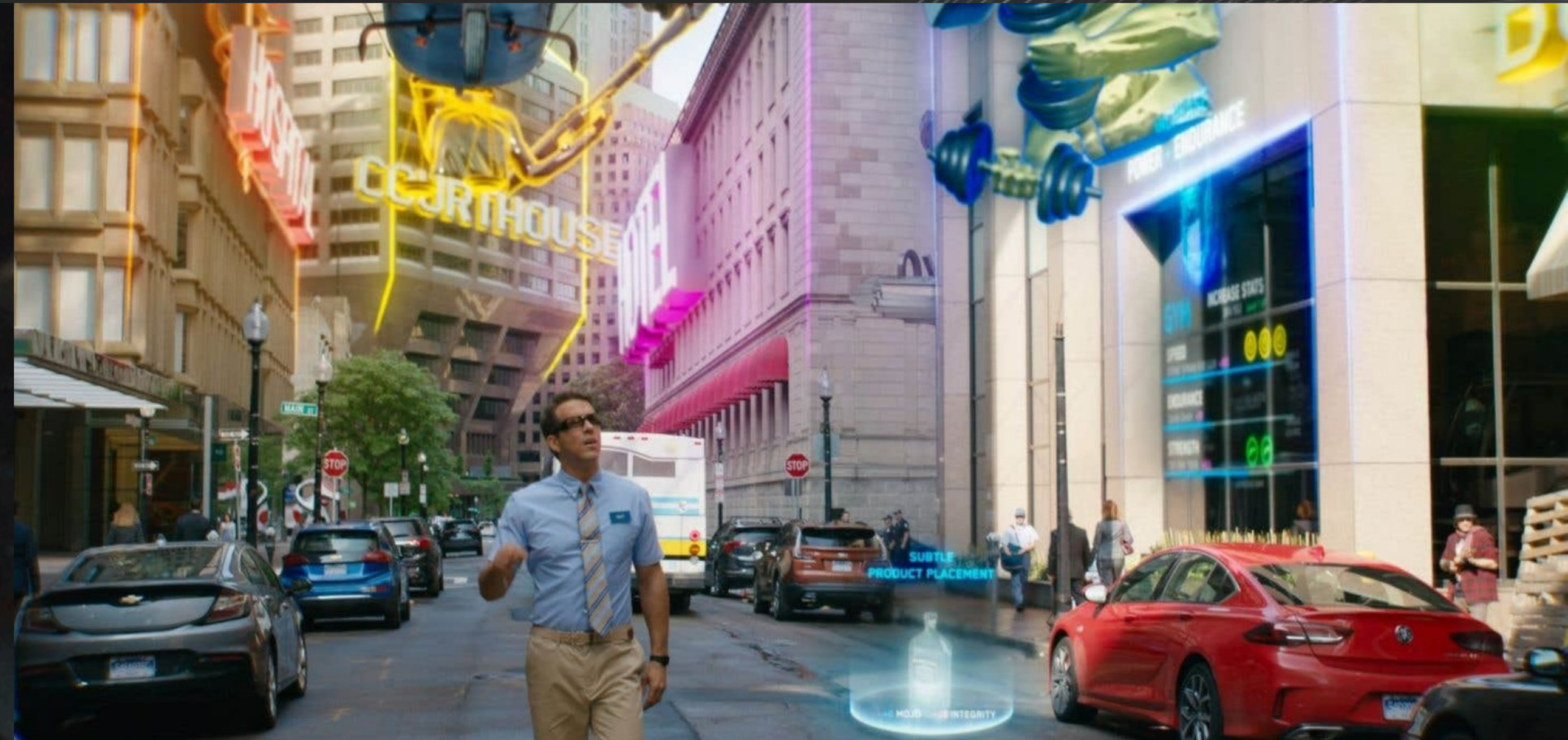
# Personal AI Agent



누구나 나만의 개인화된 실감형 AI agent이자, Companion을 갖게 될 것



# Spatial Intelligent Era



공간 지능의 시대, 일상의 경험에서 현실과 연결된 디지털 정보와 더 자연스럽게 실감나게 상호작용하게 될 것



감사합니다.

email : [jinsowonderful@gmail.com](mailto:jinsowonderful@gmail.com)