Megatrend Analysis of the XR industry

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2.1 Apple's Vision Pro will drive digital convergence

Apple's mixed reality (MR) device, the Vision Pro, unveiled on June 6th of this year, anticipates changes in modern lifestyles.

Inside the Apple-provided Vision Pro are two 1.4-inch, 3800x3000 resolution, 3,400ppi micro-OLEDs made by Sony.

The refresh rate is 90Hz, and the optics are a pancake.

Behind the micro-OLEDs is an M2 chip that manages computing functions, temperature, and noise, and an R1 chip that processes image information from real-time sensors every 12ms.
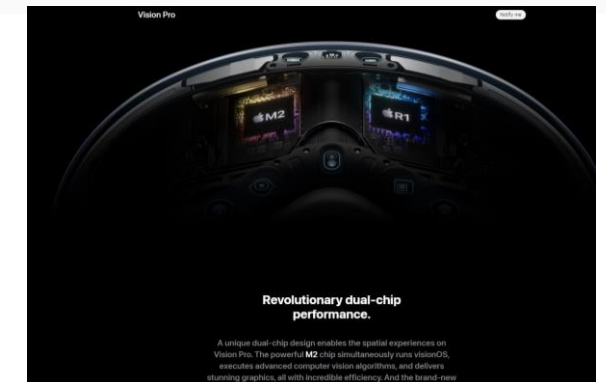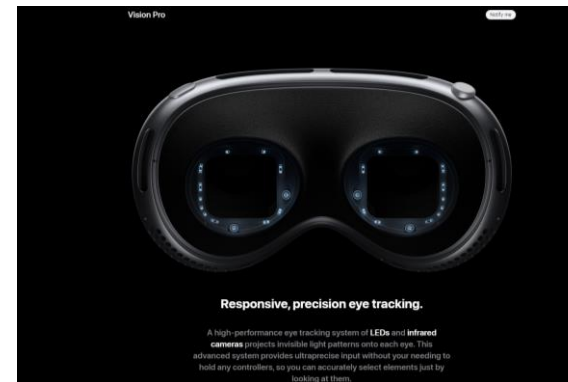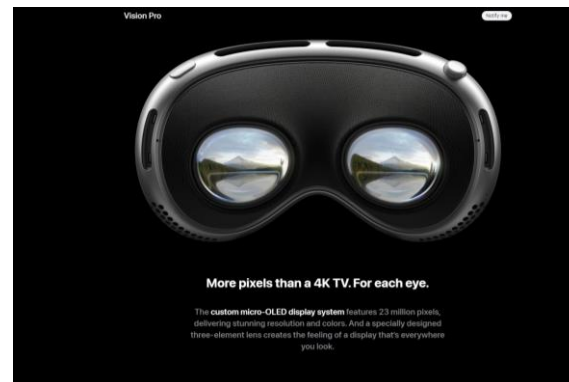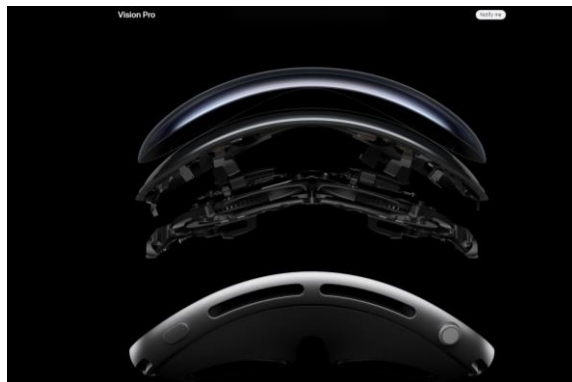
4.2 XR Industry Components

The XR industry is composed of the hardware-oriented device industry and the software industry for these devices.

The XR device industry includes the AR, VR, and MR device industries, and the component material industry is a key component.

The software industry has many different genres. The table below categorizes the different genres in the XR industry according to UBI Research.
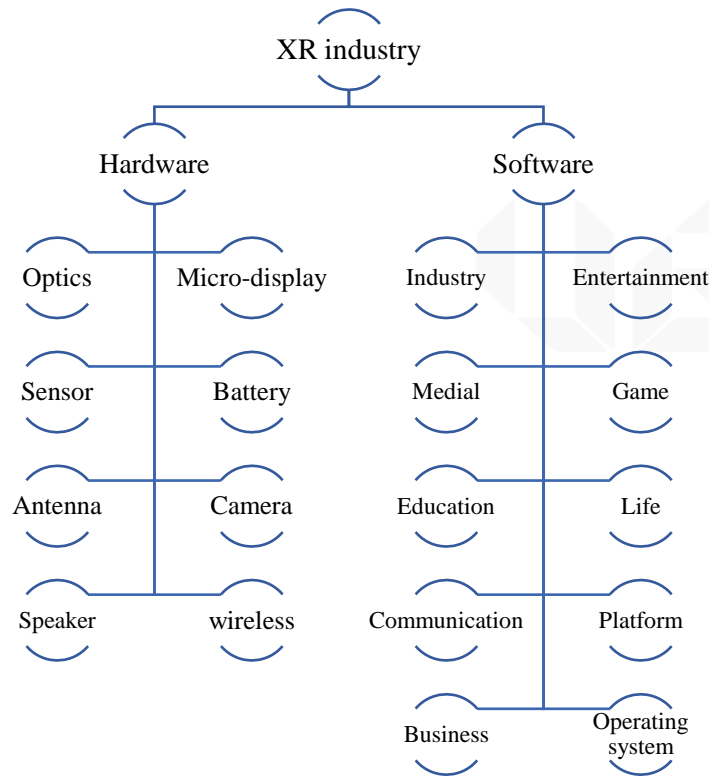
Genre Category	Software genre
Industry	SDK, Bootcamp, Remote Assistance ,Modeling, Marketing, Design, Engineering, Architecture
Entertainment	Movie, Film, Music, Streaming, Art, Tour, Video Marking
Medical	Medical, Surgery, Medical examining
Game	Gaming contents, Game Streaming, Game Development
Education	Education
Life	Blockchain & NFT, Tour, Health Management, Map, Motion Tracking, Navigation
Communication	Chatbot, Online Meeting, Social
Platform	Platform, Gaming Platform, Software architecture that acts as a basic structure upon which applications, processes, and technologies are developed and run to enable business or work outcomes
Business	Retail, Advertising
Operating System	Operating System

5.2 Analyzing the Specifications of XR devices Released in 2023

MR device

Company	Lenovo	Arpara	AjnaLens	AjnaLens
Product name	ThinkReality VRX	Arpara VA all in one	AjnaXR	AjnaXR Enterprise Edition
Type	Headset			
Optics 　Ocularity 　FoV (˚): D 　　　 H 　　　 V	Pancake Binocular 95	Pancake Binocular 95 90	Pancake Binocular 108 400	Pancake Binocular 108 90 70
Display 　Resolution 　Brightness (nits) 　Hz	Unknown 2280x2280 90	Micro-OLED 2560x2560 90	LCD 1600x1600 90	LCD 2280x2280 90
Tracking type	6 DoF inside-out via 4 integrated cameras			
Weight (g)		380	390	380
Power connection	Standalone			
Price ($)	1,299			
Nation	China	Hongkong	India	India

FoV- D: diagonal, H: horizontal, V: vertical

6.1 Scope and Classification

Analyzed manufacturers' models of XR devices released between 1989 and 2022.

The applications indicated by the vendor's model are VR, VR and AR, VR and MR, AR, and AR and MR.

VR devices were defined as those without a camera to view the external environment, MR was defined as VR and AR or VR and MR, and AR was defined as AR or AR and MR.

MR is a goggle-type device with a similar design to VR, but with a camera that can see the external environment and is a product that enables VST (video see-through) type AR, so it is a product that has evolved from VR.

AR devices were limited to OST (optical see-through) type only, and products with MR function have parts that block light on the outside of the AR device.

Trends by XR device were analyzed from 1989 to 2022.

Category	Application
VR	VR
MR	VR & AR VR & MR
AR	AR AR & MR

XR device evolution ➤ VR ➤ MR ➤ AR
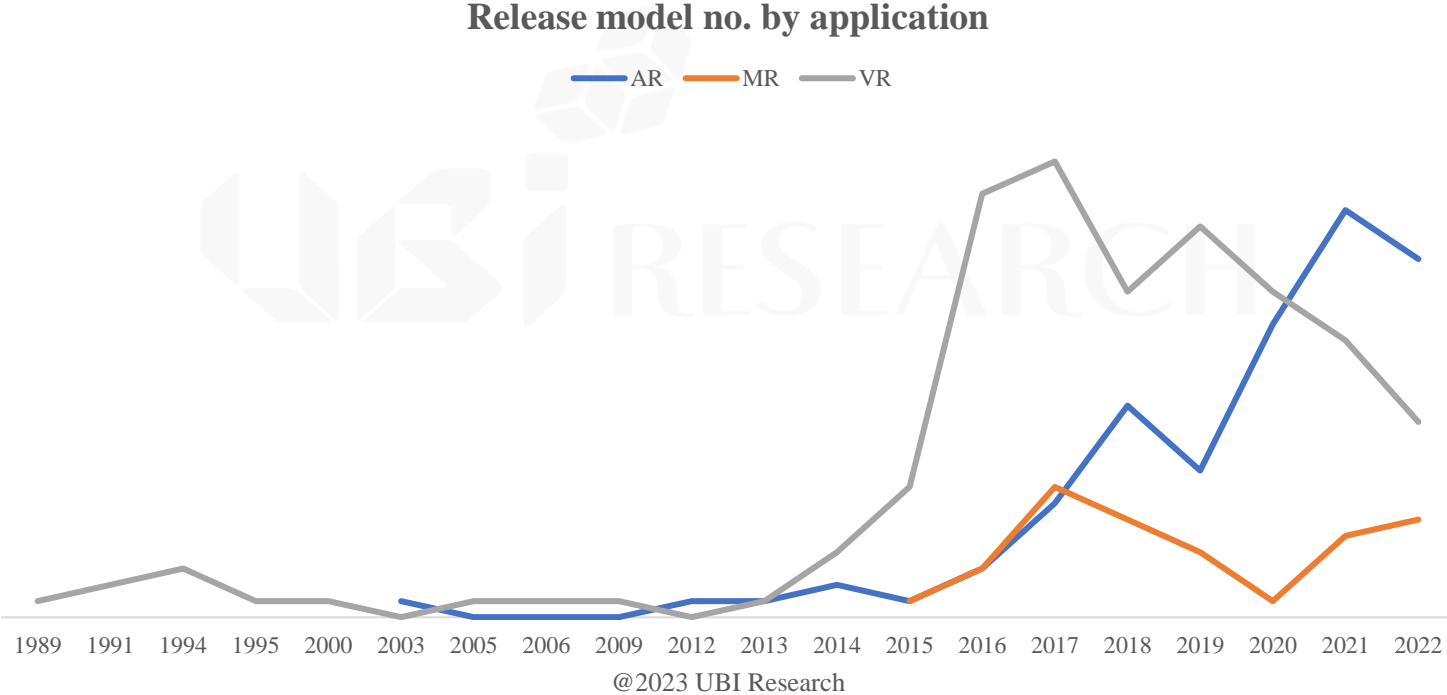
6.2 Analyze Trends in the Number of XR Device Model Releases

Analyzed the number of AR, MR, and VR device models released by year.

Starting in 2020, the year Covid-19 started, the number of AR device models reversed from VR device models.

The decline in VR device models since 2020 is likely due to the increase in MR device models.

Release model no. by application

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6.5 Correlating Optics and Displays for XR Devices

Display & optics
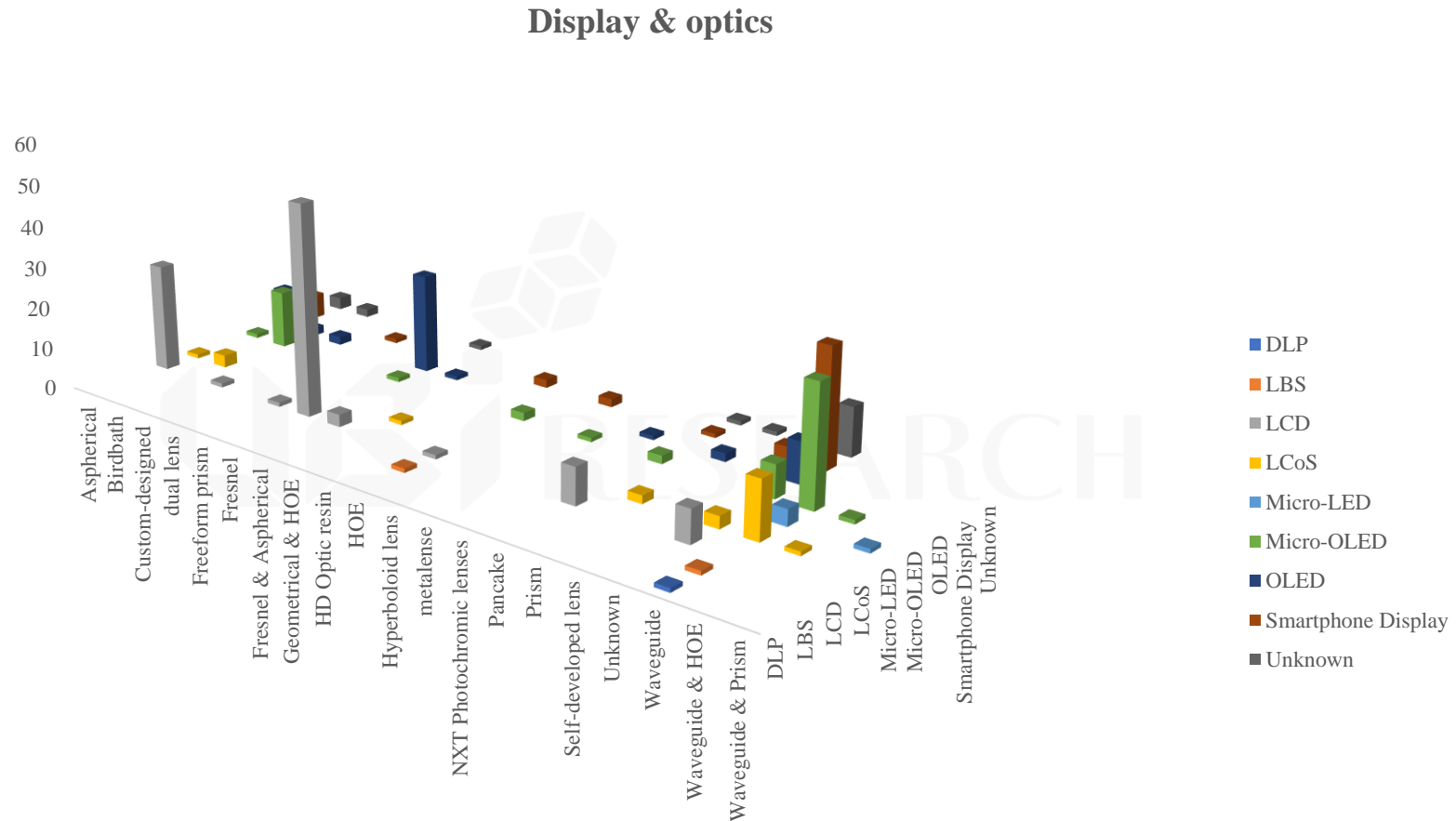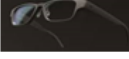
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6. Analyzing Hardware Trends for XR

6.8 Analyzing AR Device Trends

AR glass trend

7.1 Analyzing AR Device Trends

Analyzed the relevance of optics to the display.

The number of models with micro-OLED and waveguide methods was 27.

Optics by display for AR device

Legend:
- Waveguide & HOE
- Waveguide
- Unknown
- Prism
- Pancake
- NXT Photochromic lenses
- metalense
- HOE
- Geometrical & HOE
- Custom-designed
- Birdbath

X-axis: DLP, LBS, LCD, LCoS, Micro-LED, Micro-OLED, OLED, Smartphone Display, Unknown
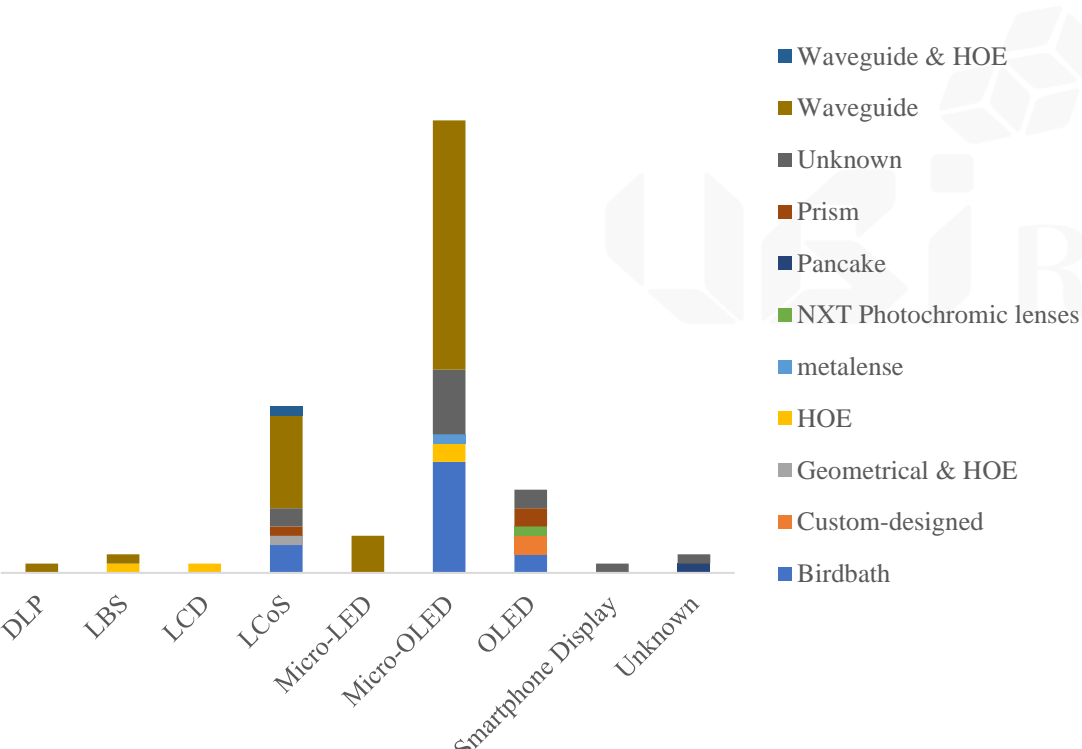
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Display by optics for AR device

Legend:
- Unknown
- Smartphone Display
- OLED
- Micro-OLED
- Micro-LED
- LCoS
- LCD
- LBS
- DLP

X-axis: Birdbath, Custom-designed, Geometrical & HOE, HOE, metalense, NXT Photochromic lenses, Pancake, Prism, Unknown, Waveguide, Waveguide & HOE
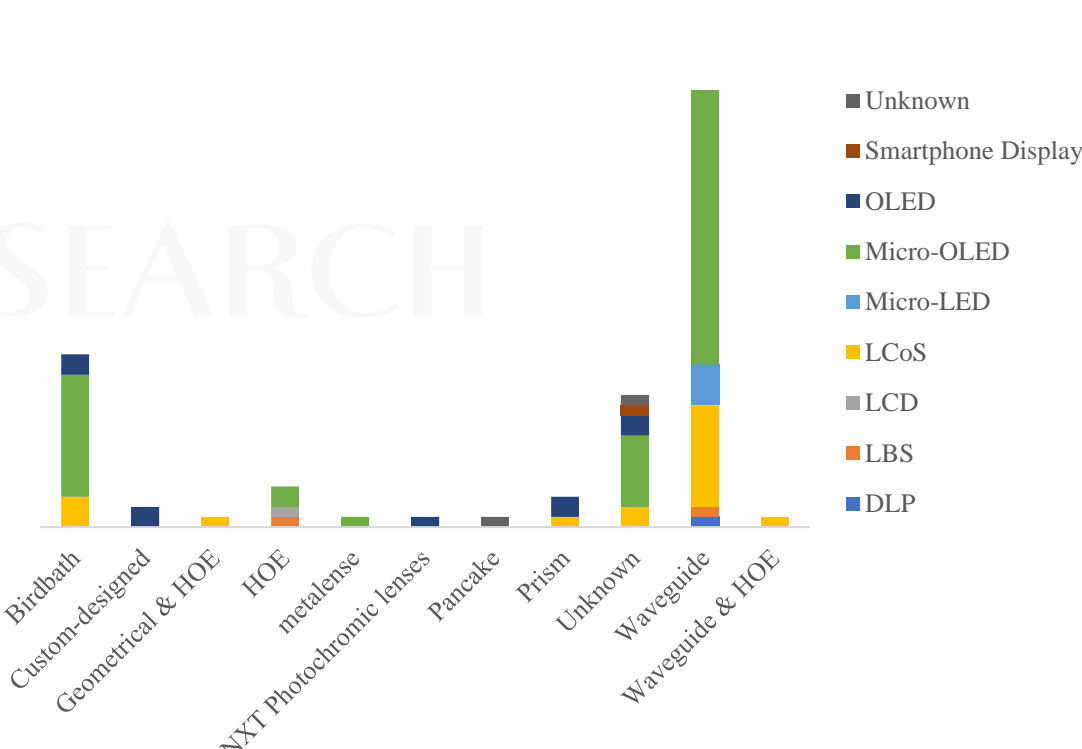
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8.4 Optics FoV Analysis

XR device FoV (diagonal (˚))
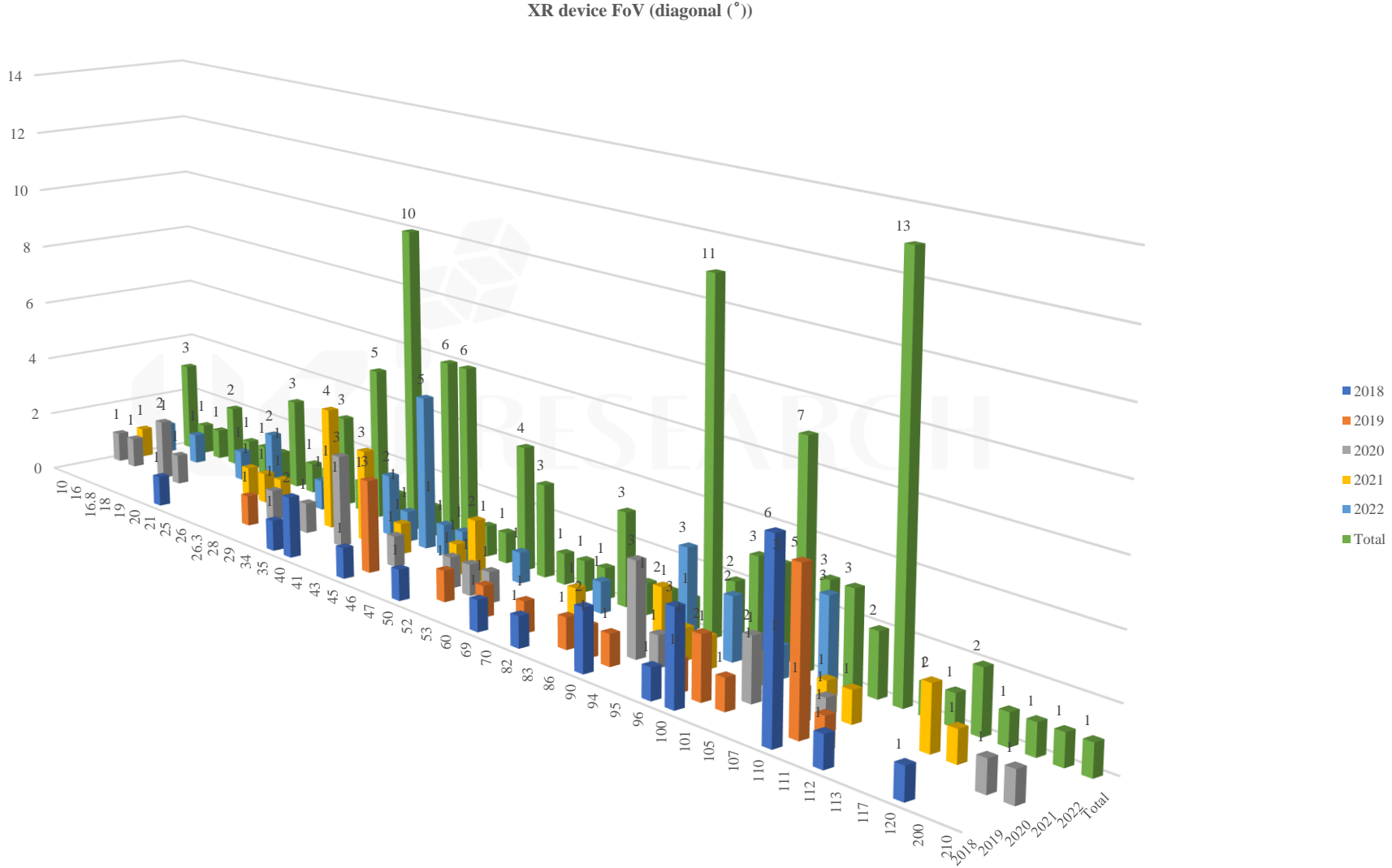
9.3 Analyzing Display Resolution

AR display resolution by year
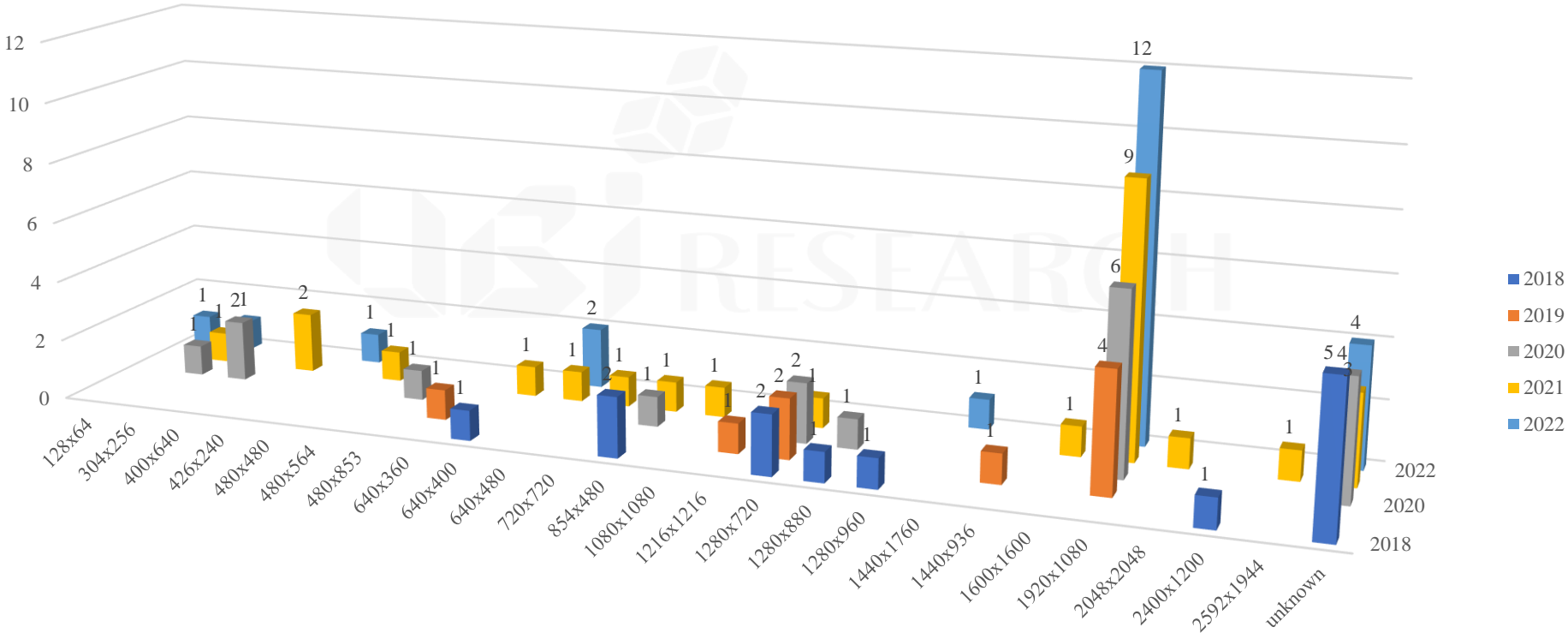
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11.1 Analysis of the Numbers of XR Device Companies by Nation

From 1989 through the first half of 2023, 16 countries have released XR devices, with 131 companies.

The United States has the largest number of companies with 39, followed by China with 28.

XR device company by nation
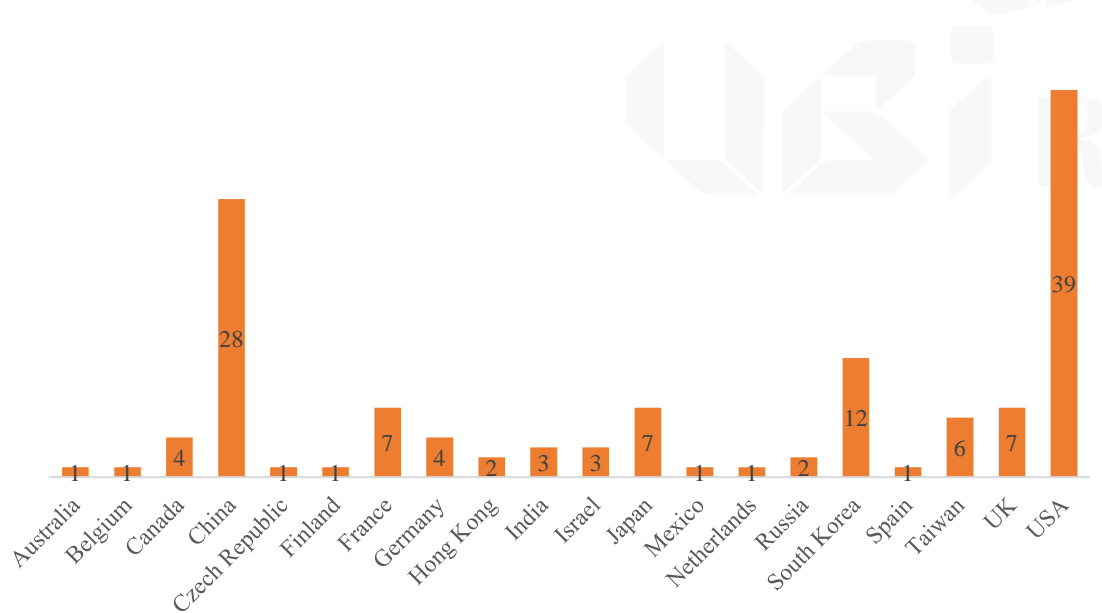
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XR device company ratio by nation
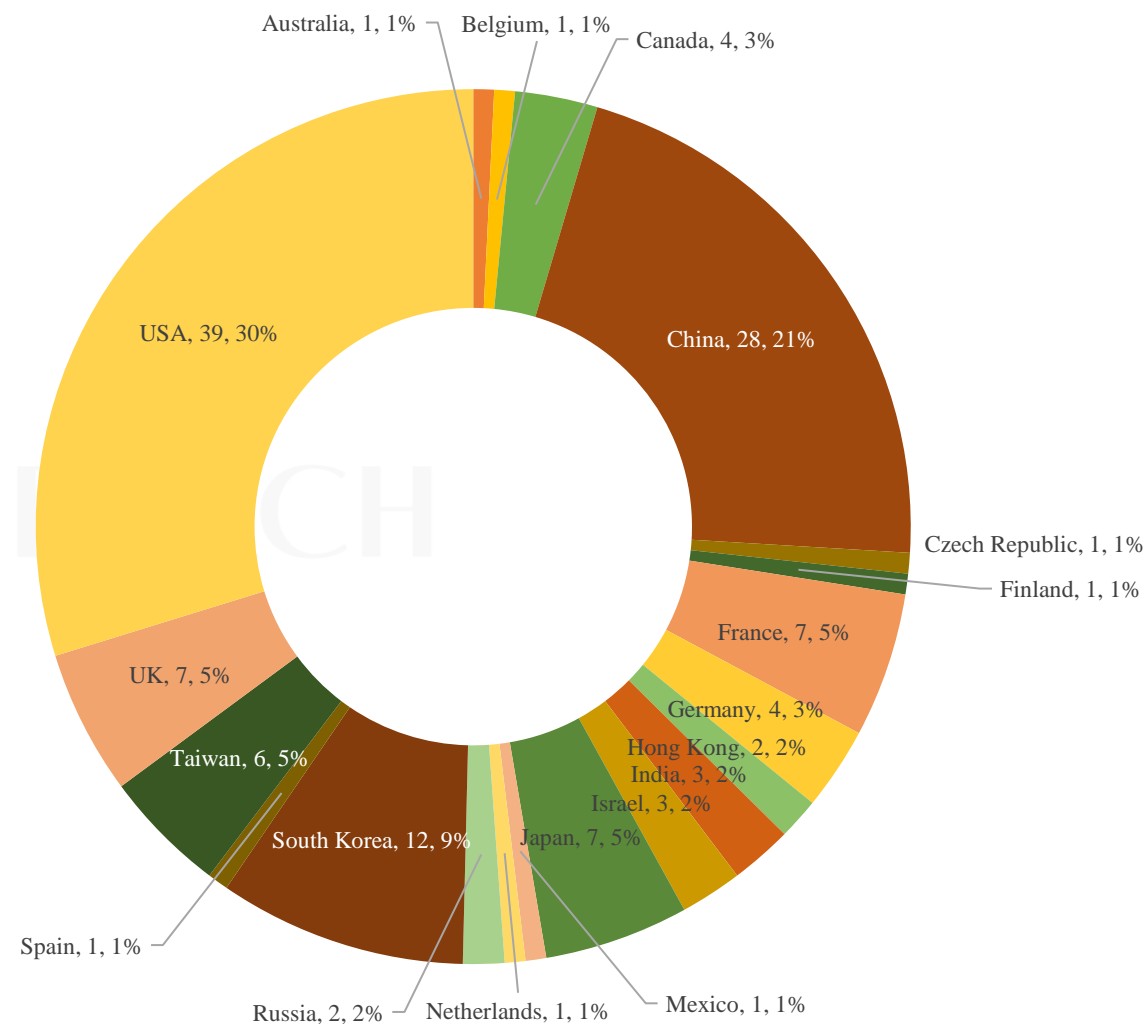
13.1 Categorizing Software for XR

The XR applications listed by software companies in their products are shown in the table on the left below, reclassified for AR, VR, and MR to facilitate analysis. Software applications vary widely by industry. For the purposes of analyzing software applications, we have categorized them into 10 categories, as shown in the table on the right.

Field	Software category
AR	AR
VR	VR
MR XR AR & VR AR & MR VR & XR MR & XR AR & VR & MR AR & VR & XR VR & MR & XR AR & VR & MR & XR	MR

Genre Category	Application of XR software
Industry	SDK, Bootcamp, Remote Assistance ,Modeling, Marketing, Design, Engineering, Architecture
Entertainment	Movie, Film, Music, Streaming, Art, Tour, Video Marking
Medical	Medical, Surgery, Medical examining
Game	Gaming contents, Game Streaming, Game Development
Education	Education
Life	Blockchain & NFT, Tour, Health Management, Map, Motion Tracking, Navigation
Communication	Chatbot, Online Meeting, Social
Platform	Platform, Gaming Platform, Software architecture that acts as a basic structure upon which applications, processes, and technologies are developed and run to enable business or work outcomes
Business	Retail, Advertising
Operating System	Operating System

13.5 Analyzing Software Release Trends by Nation

We examined the distribution of genres by country.

China released 170 software in the game category.

In relation to China's concentration in the VR industry on the previous page, it is clear that China's XR software is focused on the gaming industry for VR.

Genre by nation

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3Glasses

Acer, AjnaLens, Alcatel (TCL Communication), Altergaze, ANTVR, Apple,

Arpara, Aryzon, ASUS, Avegant

Bigscreen, Bnext, Brilliant Labs

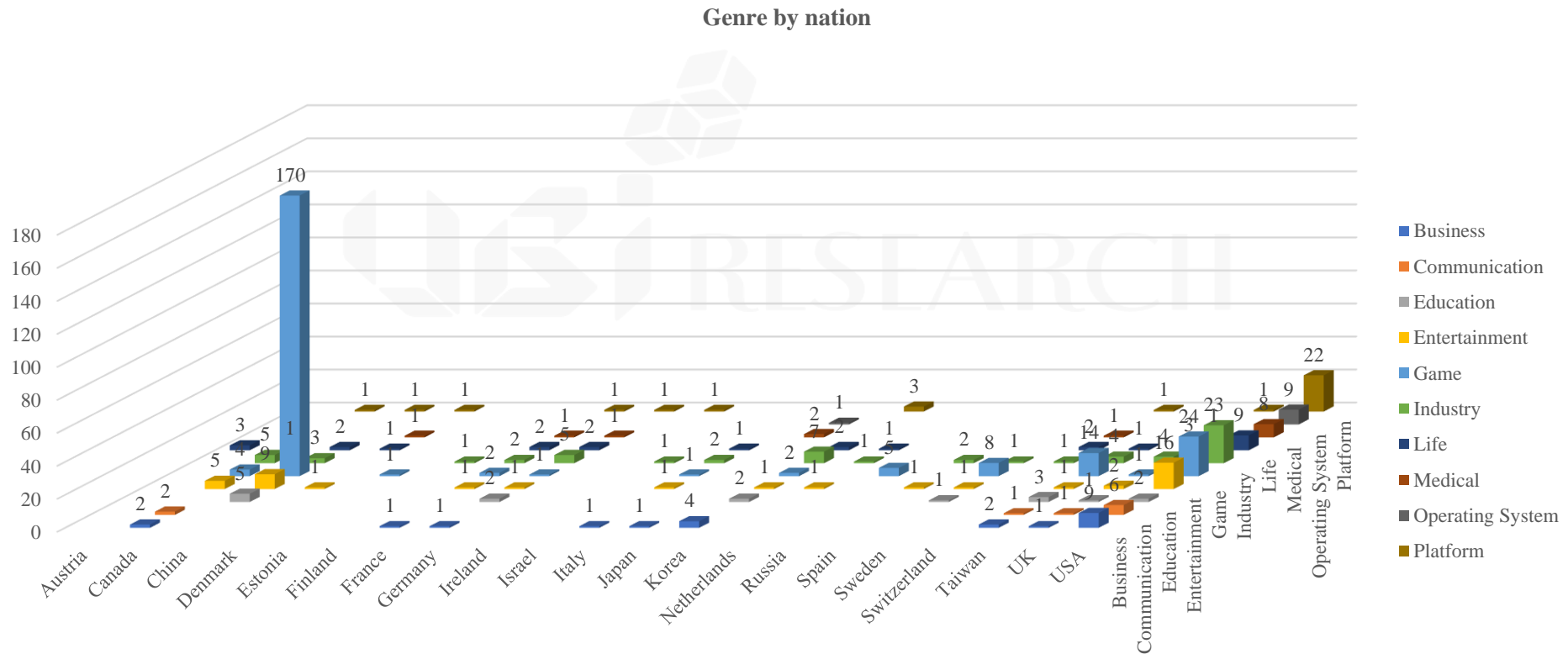Campfire, Canbor, Canon, Carl Zeiss, CEEK VR, Cellico, ClassVR, Cosmo Connected

Dell, DESTEK, DEUS, DigiLens, Diver-X, DPVR, Dreamworld, Durovis Dive

eMagin, EmdoorVR, ENGO, Epson, Everysight

FIBRUM, Firefly, FOVE, Fujitsu, FundamentalVR, FXGear

GALAX, GenBasic, Google, Guangli

HP, HTC, Homido, Huawei, Hypereal

ImmersiON-Vrelia, INMO, Iristick, iQIYI

Jio Tesseract, Jorjin Technologies Inc. Julbo

Kaiser Baas, Kopin, Korea Design Membership+ X Model Solution.

Lenovo, LetinAR, LG, Longan Vision, Looxid Labs, LUCI Immers, Lumus, Lynx

MAD Gaze, Magic Leap, Mattel, MAXLOGIC, Mentice, Medion, Merge, Meta, Microsoft, Miralabs.io

Nimo Planet, NOLO, North, NVIS, NuEyes

Occipital, ODG, Oppo, Optinvent, OSTLOONG INNOVATION , Oveede

pAnAceA, Pansonite, PICO, Pimax, P&C Solution, Pixieray, Proteus VR Labs

Qualcomm Technologies Inc., QWR (Question What's Real)

Razer, Realmax, Realwear, ReTrak, Rokid

Samsung, Shadow Creator, Shiftall, Shinecon, Simula, Skyworth, Snap, Somnium Space, Sony, StarVR

TCL, ThirdEye, Thundercomm, Tilt Five, Tooz Technologies, Toshiba, TQSKY

Varjo, Valve, VeeR, Vision AID, Viture, VR Box, Vrgineers, Vuzix

Woxter

Xiaomi, Ximmerse, Xreal, Xrspace, Xvisio, XYZ Reality

YVR

Zappar, zSpace

ADMI Inc., Apple Inc., ARborXR, Atheer, Augment

Beijing Perfect World, Beijing WIMI Hologram Cloud Inc.

Daqri, Dassault Systèmes, **Digital Bros, DPVR**

Felix & Paul Studios

Glue Collaboration

Google ATAP (Google Spotlight Stories)

HTC China, Holoeyes Inc.

Inpixon, iQiyi

Jio Tesseract

Mace Virtual Labs, Magic Leap, Meta Platforms, Inc., MetaVRse, **Movidius (Intel)**

Netdragon, Newsoft Technology Corp, Next Animation Studio, Nextech AR Solutions (Nextech3D.ai), Nexus Studios

OpenText Corporation, Precision OS

RE'FLEKT, Riseup Labs

Scope AR, Sense Arena, Smilegate Entertainment (Stove VR), **Snap Inc.,** Sngular, Sony Corporation

The Osso VR, The Yord Studio

VOKA

Unity Technologies

WayRay

Ximmerse, Xreal