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2024 XR Devices and Micro-display Megatrends Analysis

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2.3 Micro-display Hot Issues for XR Devices

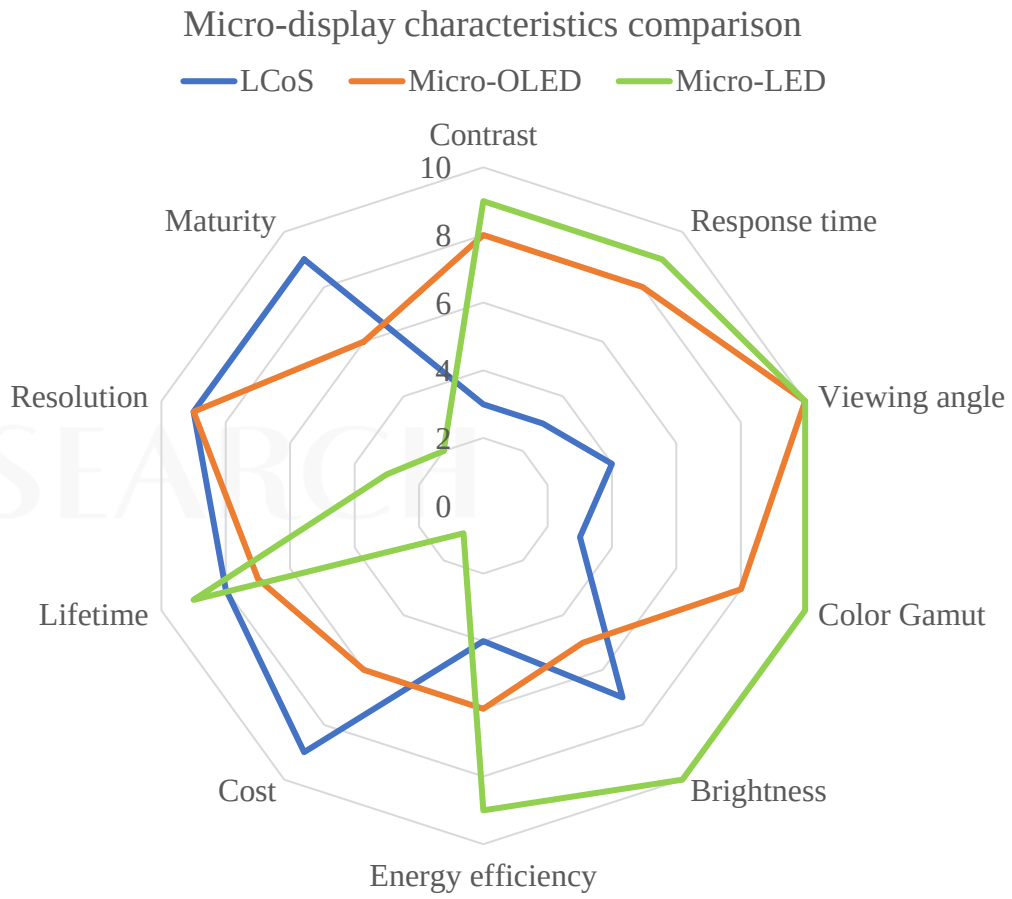
There are three types of micro-displays available for XR devices: LCoS, micro-OLED, and micro-LED.

Unlike displays made on glass substrates, these displays are highly integrated on Si wafers, which allows them to be lightweight.

LCoS, which was first used in XR devices, is competitive with other micro-displays in terms of manufacturing technology, resolution, lifespan, and price. However, because LCoS uses LCDs, it has relatively poor contrast, response time, viewing angle, and color gamut characteristics.

Micro-LEDs, on the other hand, have the opposite characteristics of LCoS. They have excellent contrast ratio, response time, viewing angle, and color gamut. In addition, their brightness, power consumption, and lifespan are superior to other micro-displays. However, micro-LEDs are still very low in manufacturing technology, resulting in very low manufacturing costs and very low resolution.

Micro-OLEDs have features that can compensate for both the advantages and disadvantages of LCoS and micro-LEDs. They have the best viewing angles and resolution, with other characteristics that are also relatively favorable. For this reason, micro-OLEDs are the most popular micro-display for XR devices.



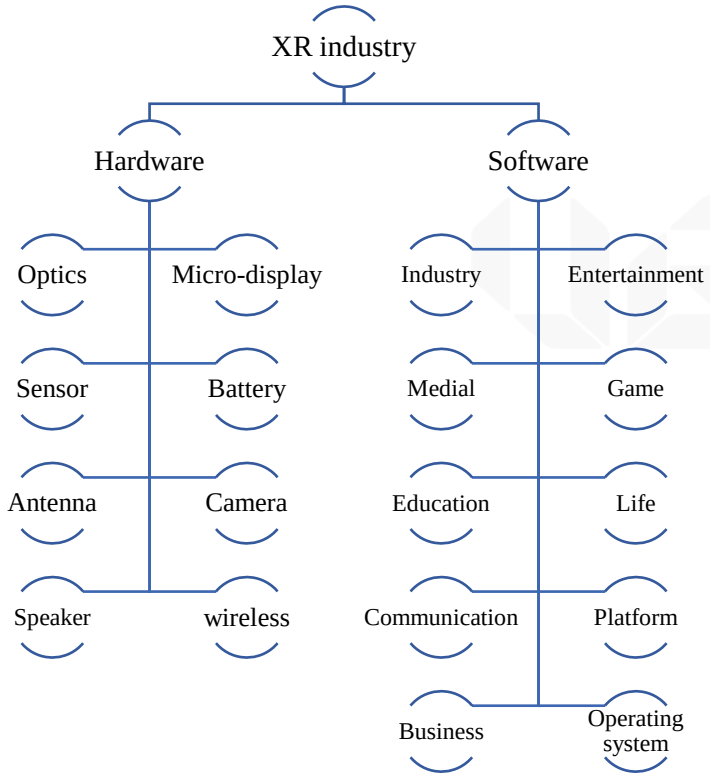
4. XR Definition and Industry Components

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 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 of the XR industry as identified by 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. XR Devices Released in 2023 - 1H 2024

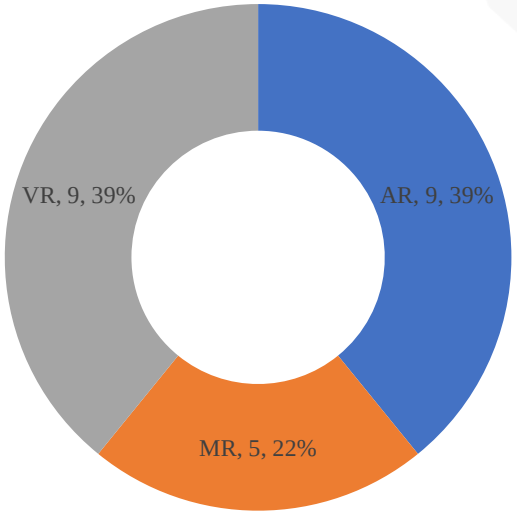
5.2 Specification Breakdown of XR Devices Released in 2023 - 1H 2024

Of the 19 models released in the first half of 2023, AR devices account for 47% with 9 types, VR devices account for 32% with 6 types, and MR devices account for 21% with 4 types.

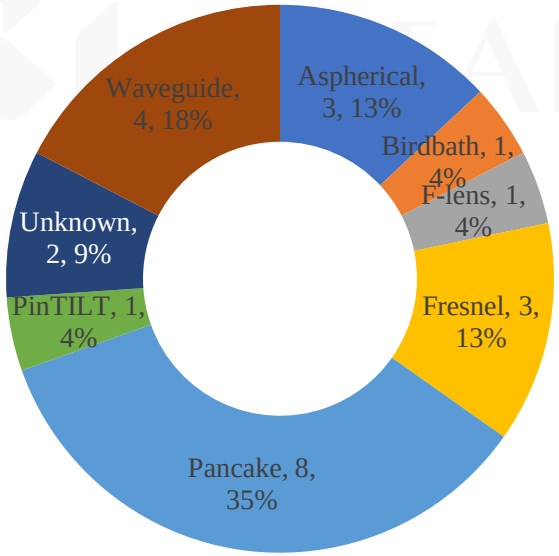
Geometrical optics, such as prisms, account for 63% of the 12 types of optics, and waveguides account for 21% of the 4 types.

There are 5 types of displays for XR, with micro-OLEDs and LCDs comprising 6 types each (32%), LCoS comprising 3 types, and OLEDs and micro-LEDs comprising 1 type each.

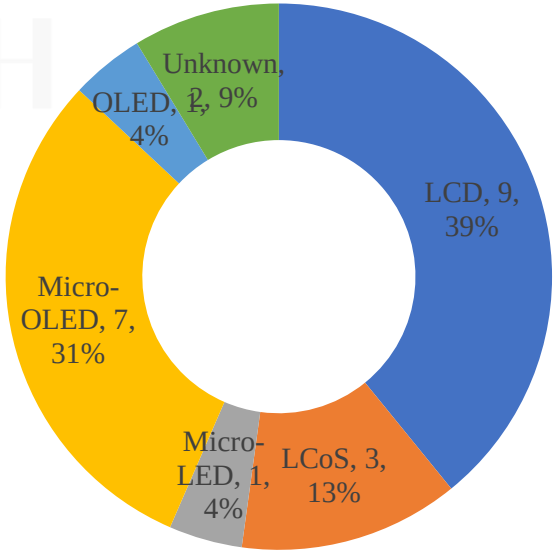
2023~1H24 released XR device model no.



2023~1H24 optics for XR device



2023~1H24 display for XR device



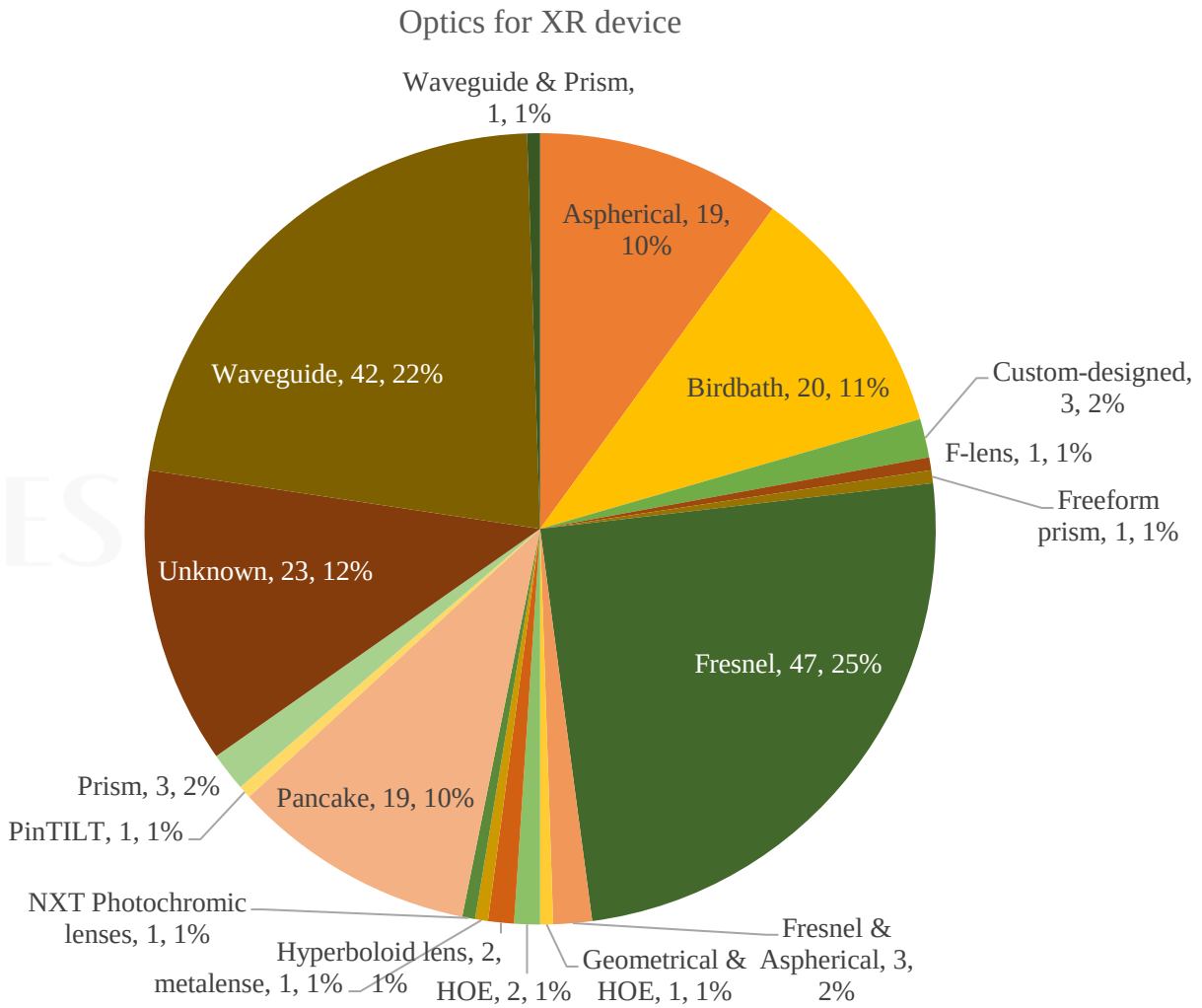
6. Analyzing XR Device Trends Over The Last 5 Years (2019-2023)

6.3 Analyzing Optical System Trends for XR Deices

Of the 190 XR instruments, 18 different optics were used.

The most common is Fresnel, with 47 instruments (25%). This is followed by waveguide with 42 instruments (22%) and birdbath with 20 instruments (11%).

Pancake was used in 19 cases, accounting for 10%.



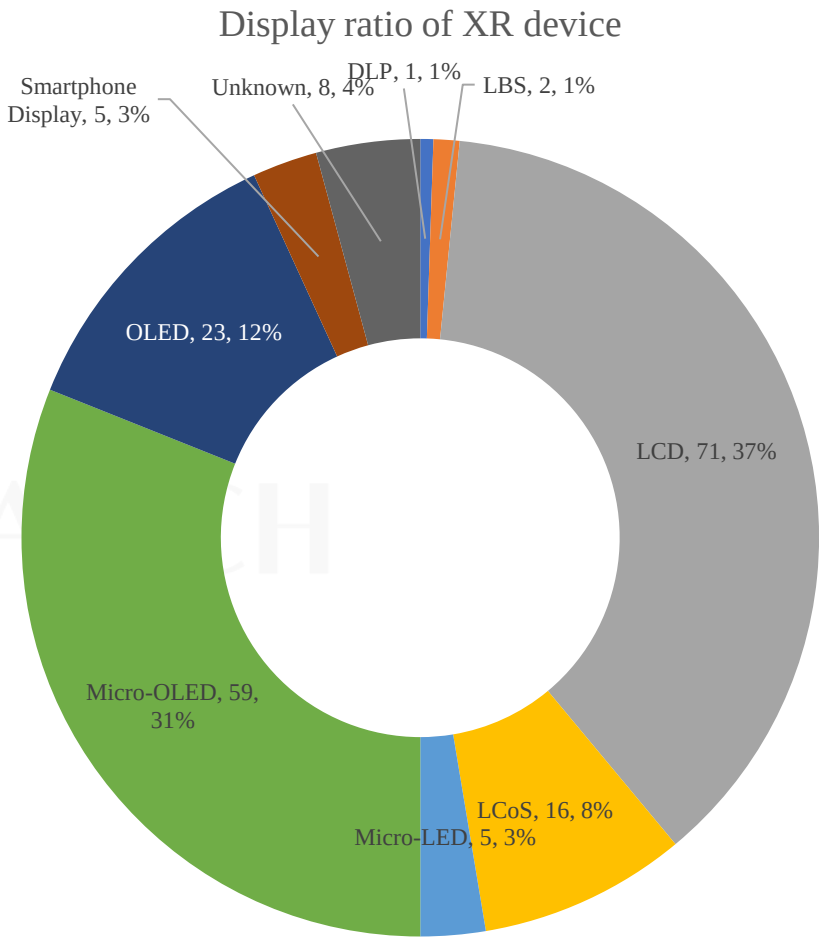
6. Analyzing XR Device Trends Over The Last 5 Years (2019-2023)

6.4 Analyzing Display Trends for XR Devices

There are 9 display types across the 190 XR devices.

Of these, 71 devices use LCD, accounting for 37%.

The next most common display type is micro-OLED, with 59 types.

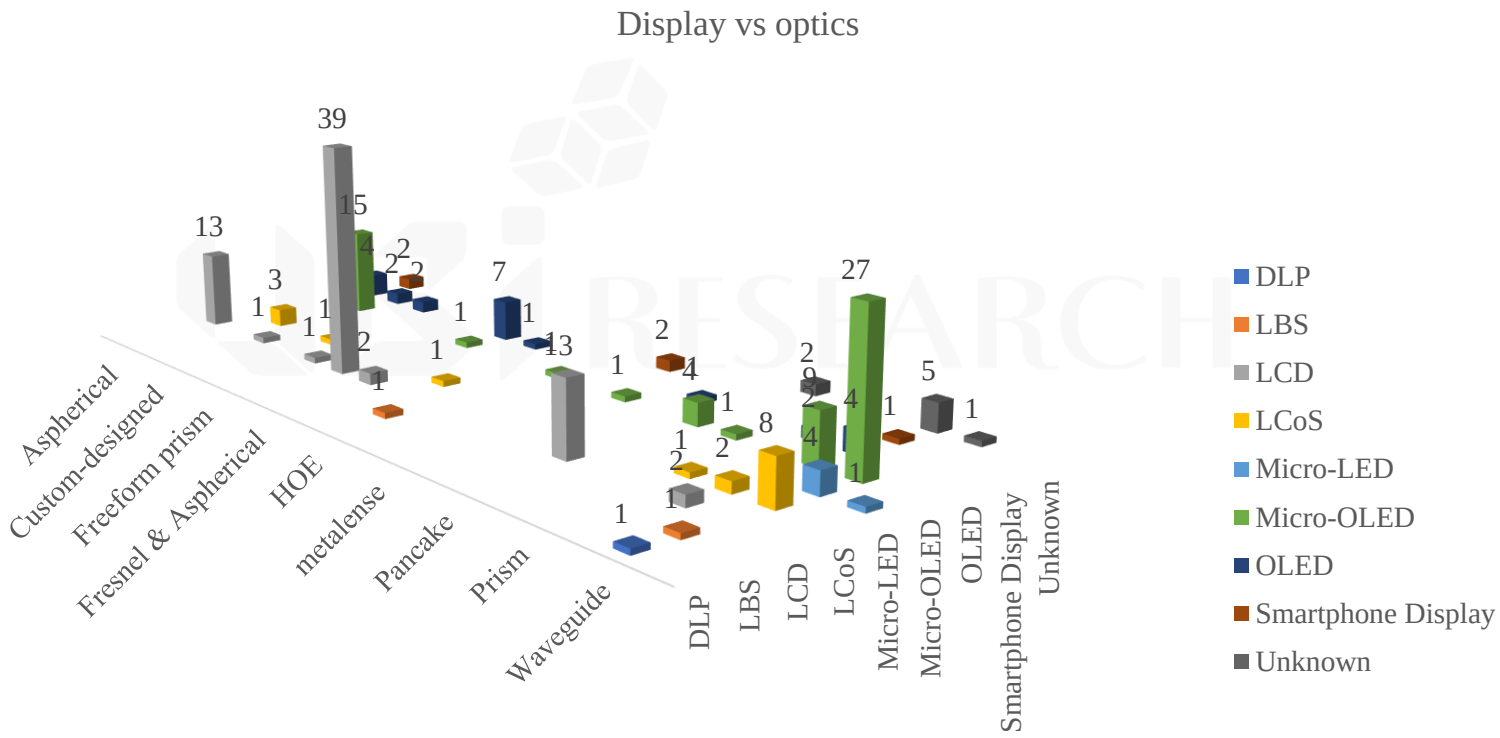


12. Analyzing Micro-display and Optis Combinations for XR Devices (2019-2023)

12.1 Correlating Micro-display and Optics

The most popular display and optics combination in XR devices is LCD and Fresnel, with 39 models.

The next most popular combination is micro-OLED and waveguide, with 29 models, and the third most popular is micro-OLED and birdbath.



13. Analysis of XR device Makers and Number of Models by Country (2019-2023)

13.1 Analysis of The Number of XR Device Makers by Country

From 2019 through the first half of 2023, 17 countries have released XR devices, with 82 companies.

China is the country with the largest number of companies, followed by the United States and South Korea.