

# **Augmented & Virtual Reality Market by Enterprise (Small, Medium, Large), Technology ( AR and VR), Offering (Hardware, Software), Device Type (AR, VR Devices), Application (AR Application, VR Application) and Region - Global Forecast to 2028**

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## **Abstracts**

The augmented reality market is expected to reach USD 71.2 billion by 2028 from 25.1 billion in 2023, at a CAGR of 23.2% during the 2023- 2028 period. The virtual reality market is expected to reach USD 29.6 billion by 2028 from 12.9 billion in 2023, at a CAGR of 18.0% during the 2023- 2028 period.

The retail and e-commerce sectors are witnessing a significant uptick in the adoption of Augmented Reality (AR) technology. This phenomenon can be attributed to a confluence of factors that are reshaping the way consumers engage with products and make purchasing decisions. One of the primary drivers behind the growing demand for AR in retail and e-commerce is the desire to provide customers with immersive and interactive shopping experiences. AR allows consumers to visualize products in their real-world environments before making a purchase, bridging the gap between online and in-store shopping experiences. This capability addresses a longstanding challenge of online shopping – the inability to physically interact with products. By superimposing virtual products onto the physical world, AR empowers consumers to assess factors such as size, color, and fit more accurately, leading to informed purchase choices and reduced product returns.

AR technology serves as a valuable tool for overcoming the limitations of physical retail spaces. Retailers can create virtual showrooms, allowing them to showcase a wider range of products than could be displayed in a brick-and-mortar store. This expands product offerings and enhances customer choices, contributing to an enriched shopping

journey. Personalization also plays a crucial role in the adoption of AR in retail and e-commerce. AR applications can analyze customer preferences and provide tailored recommendations, leading to a more personalized shopping experience. This not only increases customer satisfaction but also drives sales by presenting customers with products that align with their individual tastes and needs.

The entertainment factor associated with AR is yet another driver. AR-enhanced shopping experiences are inherently engaging and shareable, creating a sense of excitement and novelty that draws in customers. Social media platforms amplify this effect, as users share their AR-powered shopping experiences, inadvertently promoting the brand and its products.

As AR technology continues to advance, its integration with retail and e-commerce is expected to become more seamless and sophisticated. This aligns with the overarching trend of enhancing customer convenience and engagement through technology. The growth in demand for AR within the retail and e-commerce sectors underscores the industry's commitment to redefining the shopping experience and leveraging innovative tools to meet evolving consumer expectations.

“Hardware segment of virtual reality market to have the highest CAGR in the forecast period from 2023-2028.”

Virtual Reality (VR) technology relies on a combination of hardware components to create immersive, computer-generated environments. These components work together to track the user's movements, display 3D visuals, and provide a realistic sense of presence. The hardware segment of the virtual reality market is to grow at a CAGR of 19.1% in the forecast period from 2023-2028. Virtual Reality (VR) relies on a multifaceted hardware ecosystem: sensors like accelerometers, gyroscopes, and magnetometers track head movements and orientation; semiconductor components, including CPUs and GPUs, power the computational muscle behind rendering lifelike 3D graphics; displays, often OLED or LCD, provide stereoscopic visuals through VR headsets with lenses to enhance focus; projectors can expand VR into larger spaces; position trackers, such as external sensors or inside-out tracking cameras, pinpoint the headset's location; and cameras, both external and front-facing on headsets, capture real-world elements or track hand and controller movements. This comprehensive hardware synergy enables immersive VR experiences by delivering accurate motion tracking, compelling visuals, and a heightened sense of presence in virtual environments.

“Asia Pacific to record highest CAGR in Virtual reality market during the forecast period.”

Asia Pacific, encompassing China, Japan, India, South Korea, and the rest of the region, is undergoing significant shifts in technology adoption and advancement as an emerging economy. The presence of numerous display panel manufacturers in Asia Pacific is driving the adoption of cutting-edge technologies in the region.

Key contributors to the growth of the AR & VR market in Asia Pacific include the consumer electronics, retail, BFSI, healthcare, transportation, and sports and entertainment industries. These sectors hold immense potential for AR & VR due to rising consumer awareness and the increasing integration of new technologies, particularly in countries like China, India, and South Korea. High growth rates are anticipated in the healthcare, commercial, and consumer segments within the AR & VR market in Asia Pacific. The influx of market players is expected to further stimulate market expansion, particularly in the thriving commercial and consumer sectors. The availability of affordable VR headsets in APAC countries is facilitating accelerated market growth in the region.

E-commerce is gaining substantial traction among retailers in Asia Pacific, with China emerging as the world's largest e-commerce market. The robust demand for AR and VR devices and software from the commercial sector is anticipated to be a significant driver for the AR & VR market in Asia Pacific. Asia Pacific is a coveted market for manufacturers of cell phones, tablets, laptops, and televisions, with companies like Samsung and LG based in South Korea, and Sony, Sharp, and Panasonic headquartered in Japan. The region demonstrates the highest demand for consumer products such as smartphones, tablets, laptops, and TVs, propelled by the rapid growth of emerging economies like China and India, as well as positive growth trends in other Asia Pacific countries including Taiwan, Indonesia, Singapore, and Malaysia.

Beyond China, countries like Japan, South Korea, and India are proactively managing the pandemic with pre-emptive measures such as lockdowns and social distancing. Many Asia Pacific based companies have transitioned to remote work arrangements to mitigate the virus's spread. Market players rooted in Asia Pacific are expected to thrive, driven by the increased utilization of head-mounted displays (HMDs) in the healthcare and enterprise sectors.

“Consumer Applications in augmented and virtual reality for region Europe is expected to have the highest market share in the forecast period.”

The consumer segment consists of gaming and sports & entertainment applications. The entertainment applications include museums (archaeology), theme parks, art galleries, and exhibitions. AR technology offers remarkable results in terms of visual effects when used in gaming and sports broadcasts. The gaming sector has been an early adopter of new technologies; the recent additions to the list are 3D technology and AR. These technologies can be used to enhance the gaming experience.

In some AR games, players can create virtual objects and characters, and link those to defined locations in the real world. The players can then easily interact with those digital objects in the real world.

Virtual reality (VR) technology finds its primary utility in consumer-centric applications, with gaming and entertainment taking the lead. It spans diverse gaming platforms including PC gaming, gaming consoles such as PlayStation and Xbox, online gaming, and mobile gaming on smartphones and tablets. In these gaming realms, VR plays a pivotal role in elevating the user's gaming experience by immersing them in virtual worlds. To facilitate this immersion, a range of VR devices such as Head-Mounted Displays (HMDs), gesture control interfaces, and specialized controllers are readily available, empowering users to navigate and interact seamlessly within virtual environments. As the VR gaming market establishes itself, it is poised for rapid expansion, driven by increasing demand, the evolution of advanced VR hardware, and the declining costs associated with VR devices.

Beyond gaming, VR has seamlessly integrated into the entertainment sector, making appearances in films, television productions, musical experiences, artistic creations, literature, museums, galleries, and even theme parks. With a significant presence in cinematic history, VR has become familiar to audiences worldwide. Iconic films like TRON: Legacy, The Matrix, The Lawnmower Man, Disclosure, and Vanilla Sky have featured VR as a central theme, cementing its cultural presence. Today, companies like Oculus, New Deal Studio, and Jaunt are actively developing VR-based short films and immersive content, accessible through VR HMDs or specialized eyewear. Popular HMDs such as Samsung Gear VR, Oculus Rift, PlayStation VR, and HTC Vive have found their niche in diverse consumer applications, including virtual tours, museum experiences, and much more.

“Germany is expected to have the highest CAGR for virtual reality in the forecast period.”

Germany is expected to have the highest CAGR for the virtual reality market in the forecast period of 2023-2028. The consumer industry in Germany has been a pivotal driver of the nation's economic growth through its trade activities. Furthermore, ongoing innovation efforts within the automotive sector are set to further stimulate the expansion of the AR & VR market in Germany. Notably, Germany earned its position as one of the world's fastest-growing economies in 2017, strengthened by a combination of factors including increased government spending and austerity measures.

Germany's economic resilience is fortified by various measures, including governmental spending and fiscal discipline. In a concerted effort to boost the communication industry, key entities such as the Federal Ministry of Education and Research, the Federal Ministry of Economic Affairs and Energy, and the European Commission have initiated programs that provide funding for diverse AR/VR projects and advancements, with a particular focus on industrial and healthcare equipment applications. Germany ranks among the leading countries, alongside the US and China, in researching AR/VR technology.

The presence of AR companies such as Ubimax GmbH and REFLEKT GmbH significantly contributes to the growth of the AR market in Germany. Ubimax, a prominent AR solution provider in Europe, plays a pivotal role in various industrial applications, including order picking, quality checks, and assembly lines, and has also been involved in meta-glasses development. Government-backed initiatives supporting AR projects have propelled the rapid growth of the German AR market.

In May 2023, Meta partnered with BMW to seamlessly integrate real-time IMU (Inertial Motion Sensors) data from a BMW vehicle's sensor array into the tracking system of our Project Aria research eyewear. This integration of extra data enables the system to precisely determine the location of the glasses in relation to the car.

In February 2023, ENGAGE XR Holdings Plc, a virtual reality (VR) technology company and provider of virtual communications solutions in the metaverse, announced its partnership with Kia Germany to open the automaker's first flagship dealership in the metaverse.

In November 2022, META announced a VR relaunch in Germany, next-gen XR power from Qualcomm. Qualcomm's Snapdragon 8 Gen 2 could serve as a blueprint for new XR chips and provide a decent performance boost for future standalone headsets.

In February 2022, Harman International, Samsung Electronics' subsidiary acquired

Apostera, a German-based automotive technology company, to beef up the company's capabilities in augmented reality and virtual reality software solutions for vehicles.

The break-up of the profile of primary participants in the augmented and virtual reality market-

By Company Type: Tier 1 – 15%, Tier 2 – 50%, Tier 3 – 35%

By Designation Type: C Level – 45%, Director Level – 35%, Others – 20%

By Region Type: North America- 45%, Asia Pacific – 12%, Europe – 35%, RoW – 8%,

The major players in the augmented and virtual reality market with a significant global presence include Google (US), Microsoft (US), Sony Group Corporation (Japan), META (US), SAMSUNG (South Korea), HTC Corporation (Taiwan), Apple Inc. (US), PTC Inc. (US), Seiko Epson Corporation (Japan), Lenovo (China), Wikitude, a Qualcomm company (Austria), EON Reality (US), MAXST Co., Ltd. (South Korea), Magic Leap, Inc. (US), Blippar Group Limited(UK), Atheer, Inc (US), Vuzix (US), CyberGlove Systems Inc. (US), Leap Motions (Ultraleap) (US), Penumbra, Inc. (US), Nintendo (Japan), PSICO SMART APPS, S.L. (Spain), Xiaomi (China), Panasonic Corporation (Japan), Scope AR (US), Continental AG (Germany), Virtually Live (Switzerland), SpaceVR Inc (US), Intel Corporation (US), 3D Cloud by Marxent (US), WayRay AG (Switzerland), Craftars (Romania), Talespin Reality Labs, Inc. (US), BidOn Games Studio (Ukraine), appentus technologies (India), ByteDance (China), and DPVR (China).

## Research Coverage

The report segments the augmented and virtual reality market and forecasts its size based and region. The report also provides a comprehensive review of drivers, restraints, opportunities, and challenges influencing market growth. The report also covers qualitative aspects in addition to the quantitative aspects of the market.

## Reasons to buy the report:

The report will help the market leaders/new entrants in this market with information on the closest approximate revenues for the overall augmented and virtual reality market and related segments. This report will help stakeholders understand the competitive



landscape and gain more insights to strengthen their position in the market and plan suitable go-to-market strategies. The report also helps stakeholders understand the pulse of the market and provides them with information on key market drivers, restraints, opportunities, and challenges.

The report provides insights on the following pointers:

Analysis of key drivers (Controlled environment agriculture (CEA) practices and the adoption of SSL technology receive robust backing from governments), restraints (High installation and setup cost), opportunities (Integration with sustainable architecture), and challenges (Limited regulations and standards) influencing the growth of the augmented and virtual reality market.

Product Development/Innovation: Detailed insights on upcoming technologies, research & development activities, and new product launches in the augmented and virtual reality market

Market Development: Comprehensive information about lucrative markets – the report analyses the augmented and virtual reality market across varied regions.

Market Diversification: Exhaustive information about new products, untapped geographies, recent developments, and investments in the augmented and virtual reality market

Competitive Assessment: In-depth assessment of market shares, growth strategies, and product offerings of leading players like Sony Group Corporation, HTC Corporation, META, ByteDance, Google, and many more.

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9.2.1.1.1 Evolving landscape of augmented reality smart glasses to drive market

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10.3.1.1.1 Gaming & entertainment

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10.3.2.1.2 Education & training

10.3.2.1.3 Travel & tourism

10.3.2.1.4 Advertising

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10.3.4.1.1 Surgery

10.3.4.1.2 Patient care management

10.3.4.1.3 Fitness management

10.3.4.1.4 Pharmacy management

10.3.4.1.5 Medical training and education

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#### **11.2.1 US**

11.2.1.1 Presence of leading tech giants to contribute to market growth



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11.2.2.1 Thriving tech industry to propel market

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11.2.3.1 Advancing commercial & consumer sectors to stimulate market expansion

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## 11.3.1 GERMANY

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\*Details on Business Overview, Products/Solutions/Services Offered, Recent Developments, and MnM View (Key strengths/Right to Win, Strategic Choices Made, and Weaknesses and Competitive Threats) might not be captured in case of unlisted companies.

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## About

According to the new research report on "Augmented Reality and Virtual Reality Market by Offering (Hardware & Software), Device Type (HMD, HUD, Handheld Device, Gesture Tracking), Application (Enterprise, Consumer, Commercial, Healthcare, Automotive), and Geography - Global Forecast to 2023", the augmented reality (AR) and virtual reality (VR) market, the AR market is expected to grow from USD 11.14 Billion in 2018 to USD 60.55 Billion by 2023, at a CAGR of 40.29% between 2018 and 2023, whereas the VR market is expected to grow from USD 7.90 Billion in 2018 to USD 34.08 Billion by 2023, at a CAGR of 33.95% between 2018 and 2023. The increasing demand for AR devices in healthcare, growing demand for AR in retail and e-commerce, and rising investment in the augmented reality market are the major drivers for the augmented reality market. The high penetration of head-mounted displays in gaming and entertainment, huge investments in the VR market, advancement of technology and digitization, and availability of affordable VR devices are the major drivers of the VR market.

### Major players in the augmented reality and virtual reality market are

Sony (Japan),

Oculus (US),

Samsung (South Korea),

Google (US),

PTC (US),

HTC (Taiwan),

Microsoft (US),

Wikitude (Austria),

DAQRI (US),

Zugara, (US),

Blippar (UK),

Osterhout Design Group (US),

Magic Leap (US),

Upskill (US),

Continental (Germany),

Visteon (US),

Eon Reality (US), and

Vuzix (US).

### **Head-up displays to witness high growth in the AR market during the forecast period**

Head-up displays (HUDs) for the augmentation of images are presently used in automotive, and aerospace & defense sectors for training purposes; the AR market for HUDs is still in the developing phase and is likely to commercialize in the near future. The AR HUDs are likely to be used mainly for navigation in airplanes and automotive. The information such as the roadmap and the speed along with the other necessary details in the line of sight would be displayed at the windscreens and would help the driver to drive safely. The use of head-up displays for applications such as automotive, and aerospace & defense would help the market to grow at a higher rate.

### **Consumer application to lead the augmented reality and virtual reality market**

The consumer application has been studied on the basis of gaming, sports, and entertainment sections. The augmented reality market has witnessed a high growth and leads the market owing to its use in apps. The AR gaming apps have seen widespread adoption in the last 2 years and are expected to be the major drivers for the growth of the augmented reality market. However, the consumer application leads the VR market due to the high demand for HMDs in gaming and entertainment.

## **APAC expected to hold a major share of the augmented reality and virtual reality market during the forecast period**

APAC comprises China, Japan, India, South Korea, and Rest of APAC. Being an emerging economy, APAC is witnessing major changes in the adoption of new technologies and advancements. Owing to a large number of display panel manufacturers in the region, APAC witnesses an increasing adoption of latest technologies. The rising investments in commercial and defense applications and its security applications would also boost the growth of the AR and VR market in this region. Also, the growing healthcare and automotive market in Japan would drive the growth of AR technology.

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