

Systematic Study and Proposed Future Trends on VR and AR

Merwyn Dsouza

Abstract— Augmented reality (AR) and virtual reality (VR) are reality technologies that either improve or replace a real-world experience with a virtual one. Augmented reality (AR) enhances your environment by adding digital features to a live view, usually via a smartphone camera. Virtual reality (VR) is a fully immersive experience in which a virtual environment replaces the real one. While both virtual reality and augmented reality are intended to provide the user with a simulated environment, each notion is distinct and has diverse applications. Because of its potential to build informative overlays that add relevant, real-world scenarios, augmented reality is increasingly being employed by businesses, in addition to entertainment scenarios.

Index Terms— Virtual Reality-VR, Augmented Reality-AR, Trends, Challenges.

1 INTRODUCTION

Virtual Reality (VR) and Augmented Reality (AR) are both terms for interactive digital experiences. The costs of using these technologies have dropped dramatically in recent years, and in the case of augmented reality, most smartphone users already have the necessary hardware in their pockets. Smartphones aren't the only devices that can use augmented reality, but they do make it possible.

Without incurring the costs of unnecessary equipment purchases, you can design specialised apps. AR can be used on tablets, computers, smart glasses, sensors, cameras, range finders, and other regularly used and traditionally isolated equipment. This conflation of data on a superimposed layer allows the user to accomplish more, in a safer and more efficient manner than ever before.

2 LITERATURE SURVEY

2.1 Virtual Reality (VR)

A computer-generated environment with scenes and objects that looks realistic and make you feel like you are immersed in your surroundings. This environment is recognized through a device called a virtual reality headset or helmet. With VR, you can immerse yourself in video games as if you were one of the characters, learn how to perform heart surgery, and improve the quality of your sports training to maximize performance. This may seem very futuristic, but its origins are not as recent as we think. In fact, many believe that one of the first virtual reality devices is called Sensorama. It's a machine with a built-in sheet that plays 3D movies, emits scents, generates vibrations, and makes the experience as vibrant as possible. The invention dates back to the mid-1950s. The next few years of technological and software development have led to progressive developments in both device and interface design. The most famous component of virtual reality is the head-mounted display (HMD). Humans are visual creatures, and display technology is often the biggest difference between immersive virtual reality systems and traditional user interfaces. For example, an automated virtual CAVE environment actively displays virtual content on a room-sized screen. While fun for college and large lab people, consumer and industrial

wearables are in the Archetypal Old West. With a variety of new hardware and software options, the future of wearables is expanding, but still unknown. While concepts such as the HTC Vive Pro Eye, Oculus Quest, and Playstation VR are leading the way, some players such as Google, Apple, Samsung, and Lenovo can surprise the industry with new levels of impressiveness and ease of use. HMDs are in the limelight when it comes to virtual reality technology, as it's easy to buy a helmet-sized device that works on the living room, office, or factory floor, no matter who comes to the top. A compelling virtual reality application needs more than graphics. Listening and seeing are the center of a person's sense of space. In fact, people react faster to auditory cues than to visual cues. Accurate ambient noise and spatial characteristics are essential to creating a truly immersive virtual reality experience. These give the virtual world a strong presence.

2.2 Augmented Reality (AR)

An experience for designers to enhance parts of the user's physical world with computer-generated inputs. Designers create inputs ranging from sound to video, to graphics to GPS overlays and more in digital content which responds in real time to changes in the user's environment, typically movement. AR is one of the biggest technology trends right now, and it's only going to get bigger as AR ready smartphones and other devices become more accessible around the world. AR let us see the real-life environment right in front of us trees swaying in the park, dogs chasing balls, kids playing soccer with a digital augmentation overlaid on it. With advances in AR technology, these examples are not that different from what might already be available for your smartphone. Augmented reality is, in fact, readily available and being used in a myriad of ways including as Snapchat lenses, in apps that help you find your car in a crowded parking lot, and in variety of shopping apps that let you try on clothes without even leaving home. The most famous example of AR technology is the Pokemon Go mobile app, which was released in 2016 and quickly created an unavoidable sensation. In the game, players find and capture Pokemon characters that appear on real-world sidewalks, fountains, or in their bathrooms. Games

aside, in our daily lives there are as many AR uses as Pokemon GO's Pikachu. Here are some examples:

- The augmented navigation system uses augmented reality to overlay the route on the actual road view.
- During a soccer match, broadcasters use AR to draw lines on the field to show and analyze movements.
- Furniture and household goods giant IKEA offers an AR app (called IKEA Place) that lets you see what furniture looks like and fits in your space.
- Army fighter pilots display an AR projection of altitude, speed, and other data on the helmet visor. So you don't have to waste your concentration to look down.
- Neurosurgeons may use AR projections of the 3D brain to assist with surgery.
- At historic sites like Pompeii in Italy, AR can bring the past to life by projecting views of ancient civilizations on top of today's ruins.
- Ground personnel at Singapore Airport will wear AR glasses to check information about cargo containers and reduce loading time.

3 EXISTING SYSTEM

3.1 Differences of Virtual with Augmented Reality

Despite being a generation that originated many years ago, many human beings are nevertheless unexpected with the idea of Virtual Reality. It is likewise pretty not unusual place to confuse the time period Virtual Reality with augmented reality. The predominant distinction among the two is that VR builds the sector wherein we immerse ourselves via a particular headset. It is completely immersive and the whole lot we see is a part of an surroundings artificially built via pixels, sounds, etc. On the opposite hand, in augmented reality (AR), our personal international turns into the framework inside which gadgets, pixels or comparable are placed. Everything we see is in an actual surroundings and it is able to now no longer be strictly important to put on a headset. The clearest and maximum mainstream instance of this idea is Poke'mon Go. However, there's additionally a aggregate of each realities referred to as combined reality. This hybrid generation makes it possible, for instance, to look digital gadgets within side the actual international and construct an enjoy wherein the bodily and the virtual are nearly indistinguishable.

3.2 Comparison of VR | AR

Virtual Reality and Augmented Reality are facets of the equal coin. You ought to consider Augmented Reality as VR with one foot within side the actual international: Augmented Reality simulates synthetic gadgets within side the actual surroundings; Virtual Reality creates an synthetic surroundings

to inhabit. In Augmented Reality, the laptop makes use of sensors and algorithms to decide the placement and orientation of a digital digicam. AR generation then renders the 3-D photos as they could seem from the perspective of the digital digicam, superimposing the laptop-generated pixels over a user's view of the actual international. In Virtual Reality, the laptop makes use of comparable sensors and math. However, in place of finding an actual digital digicam inside a bodily surroundings, the placement of the user's eyes are positioned within side the simulated surroundings. If the user's head turns, the photos react accordingly. Rather than compositing digital gadgets and an actual scene, VR generation creates a convincing, interactive international for the user.

4 FUTURE TRENDS OF VR AND AR



Fig 4.1: Future Trends of VR and AR

4.1 2022 Virtual Reality Trends

There is a lot of noise and buzz about virtual reality, and we're here to help you sort it out into five different points that will give you a complete view of what's going on in the sector.

- 1) **An increase in business apps:** If you think virtual reality is just a tool for games, think again in 2022. Yes, virtual reality remains a dominant force in the gaming sector, but it is also a valuable tool for businesses around the world. Training, remote collaboration, tests, and prototyping are among the most common uses of VR in the workplace, but there are lots of more innovative applications. Thousands of these solutions are currently in development, and virtual reality's impact will be enormous.
- 2) **Increased user acceptance:** Users have typically been unwilling to utilize and invest in VR due to misconceptions about the technology, lack of availability, and expense. But things have swiftly changed. Today, virtual reality has a reputation for being cutting-edge and fashionable, as well as quite valuable for enterprises. According to a survey of workers who were asked which technologies they would prefer to utilize at work, the majority favoured immersive technology.
- 3) **Significant hardware upgrades:** If you've been following the VR headset market, you've definitely ob-

served how products have become more affordable, powerful, and comfortable to use. The most popular headgear right now (Oculus Quest 2), for example, is only USD 299. This trend will continue in 2022, with models like Pimax's "Reality 12K" and Panasonic's MeganeX releasing and shaking up the market with their impressive specifications. Another major advancement is the HTC Vive wrist tracker, which will be released soon and will not restrict hand movements while offering accurate tracking.

- 4) **Development has never been easier:** Businesses have found it relatively simple to develop VR products, and this year could be even easier. For one thing, the number of development businesses is increasing year after year, making working with a top VR company for app design quite easy and affordable. Additionally, because the leading tools they employ (Unity and Unreal engines) are releasing crucial new capabilities for VR, creators may work faster and more effectively. Unreal Engine 5, for example, now supports OpenXR, a standard for simultaneously developing apps for different VR platforms. As a result, a corporation can use several headsets with the same software solution.
- 5) **Additional VR-specific services:** We've discussed how virtual reality is assisting organisations in improving their internal operations, but it's also crucial to note how it is assisting them in making money. In example, a whole new market of virtual reality services for consumers and enterprises is emerging, with early adopters making significant profits. One of these forerunners is the fitness company Liteboxer, which offers a premium virtual reality boxing simulator.

4.2 Trends in VR Headset Design



Fig 4.2.1: Present VR Headset Design

- Made with Polythene Plastic of different grades.
- Encapsulated body and two-piece clip design.

- No face Padding.
- Does not have CPU and GPU Chipset.
- Simulated renders are only viewable within the headset.
- Audio and Camera hardware is missing.
- Connectivity using Bluetooth pairing.



Fig 4.2.2: Future VR Headset Design

- Made with environment friendly materials.
- Fibre glass body and one-piece design.
- Added face padding for comfortable and intact fit.
- Added AI CPU chipset with Integrated GPU for quicker responsive time and immersive response.
- Contains nano neodymium magnets with stereo immersive sound dual drivers and ANC Support.
- Contains micro AI camera for realtime scanning and AR rendering of surroundings.
- Connectivity using Bluetooth, Wi-Fi and NFC.

4.3 The Big VR Story of 2022 is Metaverse

While our list of trends gives you a good idea of what's going on in the industry, there is one trend we didn't mention that deserves more attention: the Metaverse. In July 2021, Mark Zuckerberg, the CEO of Facebook, announced the development of the Metaverse and renamed his firm to Meta. Hundreds of large brands (including Microsoft, Disney, and Tencent) declared their participation in the Metaverse in the months that followed. If you're unfamiliar with the Metaverse, it's a virtual environment accessed through virtual reality where users can work, play, and engage in many of the same activities as they do in real life. While old VR apps were isolated programmes that users had to stop before starting a new one, the Metaverse connects all apps and services, allowing for a seamless and uninterrupted experience.

While the Metaverse was created in the year 2021, 2022 should be the year when it truly begins to flourish and take shape. On the one hand, Meta is collaborating with hundreds of other businesses to build a single global Metaverse. On the other hand, hundreds of businesses are investigating the notion and developing their own Metaverse – a network of connected VR apps for internal usage. One of the first advantages discovered for the Metaverse is improved collaboration. Users are given digital avatars and can collaborate more realistically. Furthermore, the digital world is an excellent environment for visualising knowledge and learning, as well as exploring complex themes and objects. We should also remark how well it simulates numerous job and living scenarios, as well as items and services for sale.

4.4 Who Will Benefit from Virtual Reality in the Future?

So we know where virtual reality is headed in the short term, but what about in the long run? We want to look into the far future of virtual reality and make some predictions based on industry trends – how will it be used in 10-15 years?

- **Tracking the entire body:** Virtual reality apps currently track our heads and possibly our hands (if controllers or gloves are used). We may see full-body tracking in the future, with people donning a special suit or just wearing sensors attached to their clothing. VR simulators will not only examine users' knowledge, but also the precision of their movements, which could be highly useful in safety training (e.g. operating with heavy equipment).
- **Immersive films:** In the future, virtual reality headsets and glasses may be used to replace or supplement television sets and movie theatres. People will be able to enjoy their desired entertainment directly in front of their eyes without having to travel or purchase a large screen for their home. Making movies more immersive could help the entertainment industry contribute to this trend. They could allow individuals to see events from multiple perspectives and possibly affect character choices. With their *Bandersnatch* film, Netflix experimented with this format (though not in VR).
- **Intelligent personal assistants:** Virtual assistants (e.g. Siri, "Ok Google") currently aid us on our phones, but VR has the potential to further develop them. These helpers will take on a more human-like appearance and behaviour. These assistants could accompany people through their regular jobs and activities if they wear VR glasses. The implications for all businesses are huge: if AI is advanced enough, these systems may teach knowledge, provide customer support, and even help monitor work quality.
- **Physical activity playpens:** One of the existing VR limitations is that apps must be designed for very careful and limited user movement (unseen hazards

should not cause the user to move too much). However, in ten years, everyone may have a playpen where they could use VR while still physically moving around – running, crouching, jumping, and so on – without risking their health. This would be big for the gaming and fitness industries, who would jump at the possibility to provide their customers with a far more interesting experience.

5 CHALLENGES FOR AR | VR INDUSTRY

- **Affordability**
The high price is discouraging regular and ordinary usage.
- **No or very little demand from the customer side**
For companies venturing into and adopting virtual reality, there is virtually no competition in the market. This discourages the development of VR and AR systems and its acceleration in adoption. Mostly, the technology is adopted by tech enthusiasts and early adopters. This is improving even as adoption moves beyond gaming and entertainment. There is also lacking viable business models. Companies are lacking viable cost-effective business models and strong industry standards and vision to drive the industry are lacking.
- **Technology is unproven**
Not just content-wise, but there is a low application of technology in real life with only a handful of total users globally. There is also a handful of AR–VR content platforms and not as much of VR content is available. That said, many people don't care about VR because they do not use it on a day-to-day basis. Many people have no idea of AR–VR and what it is capable of, and AR–VR is not reaching the target audience money-wise. There are only a few demonstrations and examples of use-cases.
- **Customers lacking options**
Low adoption means there are not many headsets or AR–VR systems out there, and this then limits customer options, especially in the high-end device categories.
- **Health concerns**
Virtual reality is not proven to have serious long term health effects but the studies containing proof for any benefits are few. The technology also requires improving for customers to stop experiencing temporary side-effects such as blurred vision, nausea, headache, and queasiness.

6 CONCLUSION

In terms of what each technology aims to achieve, virtual reality and augmented reality are inverse mirrors of one another. Virtual reality digitally recreates a real-life setting, while augmented reality overlays virtual elements in the real world.

Virtual Reality and Augmented Reality are on their way to becoming popular. Things are already changing, and we will soon be living in a world that is more virtual than real.

REFERENCES

- [1] Timothy Jung and M Cluadia tom Dieck. Augmented reality and virtual reality. *Ujedinjeno Kraljevstvo: Springer International Publishing AG*, 2018.
- [2] Jianghao Xiong, En-Lin Hsiang, Ziqian He, Tao Zhan, and Shin-Tson Wu. Augmented reality and virtual reality displays: emerging technologies and future perspectives. *Light: Science & Applications*, 10(1):1-30, 2021.
- [3] Tao Zhan, Kun Yin, Jianghao Xiong, Ziqian He, and Shin-Tson Wu. Augmented reality and virtual reality displays: perspectives and challenges. *Iscience*, 23(8):101397, 2020.

IJSER