



## A COMPARITIVE STUDY OF AUGMENTED REALITY WITH AND WITHOUT UX

Ms. GOPIKA K

Master of Computer Application

Kristu Jyoti College of Management and Technology ,Kerala, India

[gopikasreevidya1999@gmail.com](mailto:gopikasreevidya1999@gmail.com)

Mrs. Binny S

Assistant Professor

Department of Computer Application

Kristu Jyoti College of Management and Technology ,Kerala, India

[binnylatheesh@gmail.com](mailto:binnylatheesh@gmail.com)

Mr. Arjun Krishna

Master of Computer Application

Kristu Jyoti College of Management and Technology,kerala, India

[mail@arjunkrishna.in](mailto:mail@arjunkrishna.in)

[arjun12345krishna@gmail.com](mailto:arjun12345krishna@gmail.com)

Ms. MEGHA SENIL

Master of Computer Application

Kristu Jyoti College of Management and Technology ,Kerala, India

[meghasenil14@gmail.com](mailto:meghasenil14@gmail.com)

**Abstract:** *“What most excites me about augmented reality’s future is its role in the arts. It has heaps of potential in this way, to scale cultural experience and make it accessible to broader audiences at lower costs. Imagine, for instance, a live AR performance of Hamlet, that is simultaneously beamed into people’s living rooms across the world.”* <sup>[1]</sup> These are the famous words of Catherine Allen. <sup>[2]</sup>

Augmented reality (AR) refers to technology that incorporates real-time inputs from the existing world to create an output that combines both real-world data and some programmed, interactive elements which operate on those real-world inputs. Even though the UI is an extremely important part of our design, it is very important that we properly differentiate the total user experience from the user interface (UI). Over the past several decades, augmented reality (AR) has established a definite zone in fields like entertainment, marketing, education, and many and many more. The use of AR apps in the enterprise have grown to \$2.4 billion in 2019. So here is a comparative study of

**Augmented Reality with and without UX along with some case studies.**

**Keywords:** *Augmented Reality (AR), User Experience (UX), Virtual Reality (VR), Future scope, Technology, Trends, Case Study.*

### INTRODUCTION

With the existing social distancing norms and worldwide lock downs and travel ban, our world has confined into four walls and especially to various sized digital screens. They range from home theatres, PCs, Laptops, tablets and our small mobile screens. From elder to younger everybody is longing for better experiences from these screens. There has been a huge technological boom in past two years. Developers and investors are working towards enhancing the digital experience. There is a huge demand in the field of education, medicine, gaming and entertainment. Distant education was never thought to come so near to us. Gaming sites is running a race to give their players the best

experiences. AR (Augmented Reality) and VR (Virtual Reality) is a general topic for discussion like never before. Surveys shows that AR and VR based studies increased in the past five years and sufficiently even more in the past two years.

<sup>[3]</sup> According to Growth Enabler's estimates, there are close to 1,500 start-ups in the AR/VR segment worldwide, with the US accounting for nearly 45 per cent, followed by the UK, Israel and Canada. Globally, from 2013 to 2017, the AR segment has received \$2.5 billion in funding, and VR \$2.7 billion.

The average usage of smartphones by Indians is estimated to have gone up 25 percent to almost 7 hours a day as people depend on these gadgets for work or study from home and entertainment amid the pandemic, a report said. The study, commissioned by handset maker Vivo and conducted by CMR, said the average time spent on smartphones in a day has been on the rise with average usage growing 11 percent to 5.5 hours in March 2020 (pre-COVID) from about 4.9 hours on average in 2019. This has grown by another 25 percent to 6.9 hours April onwards (post-COVID), the report titled "Smartphones and their impact on human relationships 2020", said <sup>[3]</sup>.

### DIFFERENCE BETWEEN AR AND VR

<sup>[4]</sup> Augmented reality (AR) is an enhanced version of the real physical world that is achieved through the use of digital visual elements, sound, or other sensory stimuli delivered via technology. <sup>[4]</sup> It holds the promise of creating direct, automatic and actionable links between the physical world and the electronic information. It gives us a simple and immediate user environment to a technologically enhanced physical world. AR goes beyond mobile computing and it act as a connecting link between virtual world and real

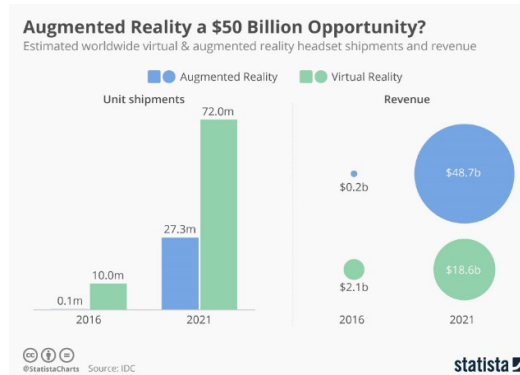
world. An AR system must have the following three characteristics:

- Combines real and virtual
- Interactive in the real time
- Registered in 3D



Fig 1

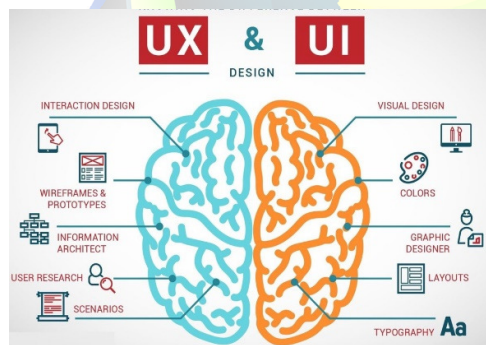
Where as in a Virtual Reality, a user is placed inside a completely computer-generated environment. <sup>[5]</sup> Virtual Reality (VR) is the use of computer technology to create a simulated environment. Unlike traditional user interfaces, VR places the user inside an experience, where, instead of viewing a screen in front of them, users are immersed and are able to interact with 3D worlds. By simulating as many senses as possible, such as vision, hearing, touch, even smell, the computer is transformed into a gatekeeper to this artificial world. The only limits to near-real VR experiences are the availability of content and cheap computing power.



[6] Fig 2

Here we are discussing more about augmented reality and the importance of UX in it. Before that we need an introduction about the difference between UI and UX.

## DIFFERENCE BETWEEN UI AND UX



[7] Fig 3

UI design and UX design are two among the most misunderstood terms in web and app design.<sup>[8]</sup> The “UI” in UI design stands for “user interface.” The user interface is the graphical layout of an application. It consists of the button, users click on, the text they read, the images, text entry fields, and all the rest of the items the user interacts with. This includes

screen layout, transitions, interface animations and every single micro-interaction. Any sort of visual element, interaction, or animation are to be designed.

[8]“UX” stands for “User Experience.” A user’s experience of the app is determined by how they interact with it. Is the experience smooth and intuitive or clunky and confusing? Does navigating the app feel logical or does it feel arbitrary? Does interacting with the app give people the sense that they’re efficiently accomplishing the tasks they set out to achieve or does it feel like a struggle? User experience is determined by how easy or difficult it is to interact with the user interface elements that the UI designers have created.

[8]A UX designer decides how the user interface works while the UI designer decides how the user interface looks. This is a very collaborative process, and the two design teams tend to work closely together. As the UX team is working out the flow of the app, how all of the buttons navigate you through your tasks, and how the interface efficiently serves up the information the user need, the UI team is working on how all of these interface elements will appear on screen.

## INCREASING USERS IN AR

[9] “Be fast, have no regrets... If you need to be right before you move, you will never win”, said Mike Ryan, epidemiologist at WHO, in March. Yes! it’s been 2 years since the pandemic had raised to its peak. But without much regrets we can say that apart from person-to-person connection, we have maintained all other activities perfectly via online. The internet has a great role in it. Here comes the important role of augmented reality



in these days. As we have discussed above, about augmented reality and the vast growth in it, now we can go for its relevance.<sup>[10]</sup> The growing adoption of augmented reality is a reason behind its steady entrance in the education and e-learning industry. According to the findings of Statista, the augmented reality global market size will reach \$198 billion by 2025. The most important thing to clear out here is, AR is not the same as virtual reality. Augmented reality plays with reality but does not add anything. Like, when you use the IKEA app, you can check how a sofa will look at your place.

Interactive learning, 3D model, group interaction etc, all has adopted this idea pretty well. Chromville - a colouring app where as soon as the child colours a figure, it comes to life.

<sup>[11]</sup> The earliest functional AR systems that provided immersive mixed reality experiences for users were invented in the early 1990s, starting with the Virtual Fixtures system developed at the US Air Force's Armstrong Laboratory in 1992. In 1998 augmented reality was first used for navigation in NASA's X- 38 spacecraft. Later in 2000 AR Quake launched which was the first AR game, as well as had head-mounted display, players had to wear a bag that contains a computer and gyroscopes. So, coming back the statistics of last decade, it shows a drastic increase in the use of AR. The convergence of 5G, artificial intelligence (AI), and edge cloud processing will soon make it easier to deliver more seamless, enjoyable, and

cost-effective AR experiences across a variety of connected devices.

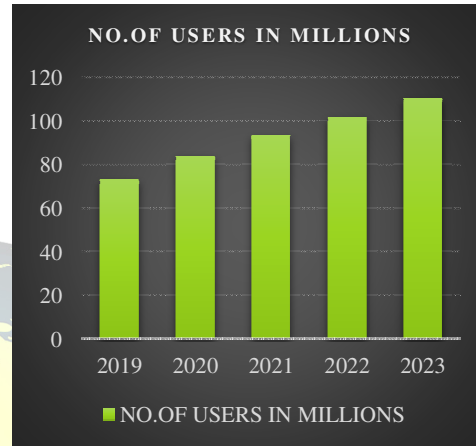


Fig . 4

The above graph (Fig. 4) shows us the number of users using the augmented reality in their daily life. The last finding is a prediction that in coming years the usage of augmented reality will increase approximately to 110.1 million <sup>[12]</sup>.

Now arises the question that whether user experience have any important role in this increasing usage of augmented reality. A good AR experience imbues users into new interactions. This is only possible when people are ready to believe that what they see on the monitor is real. It is important to use the maximum screen space to display the physical world and our app's virtual objects. To help users believe that the AR world is real, UX has a vital role. Many users may have never experienced an AR environment before. When





they come across the first AR experiences, they require proper guidance on how to interact with the system. Onboarding plays a key role in creating a great UX.

Let us give the user a quick tutorial on how to use the AR application. Provide them necessary instructions or tips on how to use specific tools with respect to actual interactions. By doing that, you won't overload users with information, instead they'll be able to interact more efficiently. We can use several methods of visual cues, motion, and animation to help the users. Use graphical and in-app experiences as much as possible. By using some case studies, we can come to a conclusion.

### **CASE STUDY 01 – AUGMENTED REALITY WITHOUT UX.**

<sup>[13]</sup> Augmented Reality (AR) user experience may not be as exciting as a virtual reality roller coaster ride, but the technology is proving itself as a very useful tool in our everyday lives. From social media filters, 3D navigation, interactive guides, to surgical procedures, AR is rapidly growing in popularity because it brings graphical elements into our real world, thus enhancing the things we see, hear, and feel. When compared to other reality technologies, augmented reality lies in the middle of the mixed reality spectrum; between the real world and the virtual world.

So, taking a game without a UX the end user while using it will face many problems. For example, in the case of a game when the user starts playing it without proper manual or guidance on how one can play it. They will fail to go from one level to the other. And also, there will not be any customer care for improving the user needs. This kind of application can be an utter failure only because of UX failure. When done well, UX design is virtually invisible to its users. It is when a UX design feature has been executed poorly that it sticks out like a fox in a chicken coop.



Fig 5



Fig 6

Fig 5 and 6 are some of the funny ux failures.

Now coming back to AR and UX, whether it is a call or Google search, it is very important to look at the functionality in a new way. We cannot just take the smartphone screen and put it in the AR device.

## CASE STUDY 02 - AUGMENTED REALITY WITH UX.

<sup>[14]</sup> Augmented-reality interfaces are an example of non-command user interfaces in which tasks are accomplished using contextual information collected by the computer system, and not through commands explicitly provided by the user. To be able to interpret the current

context and “augment” the reality, an “agent” runs in the background to analyze the many external inputs and act on them, or provide actionable information.

For example, In ‘Waverly Labs’ earpiece called “The Pilot” actively “listens” for another language in order to translate it in real time to English (or the user’s language of choice). The user does not need to tell the earpiece to listen every time a nearby person speaks; instead, the earpiece “agent” constantly interprets the real-world auditory input and starts translating based on the context of the situation. Other apps, such as Ingress, display an associated “portal” as soon as users approach a landmark. Similarly, the parking-assistance system does not require any additional input or commands from the user; it offers actionable information based on the vehicle’s current state (reverse gear) and position relative to surrounding obstacles.

<sup>[11]</sup> As a type of non-command UX, AR interfaces provide excellent opportunities for improving user experience. To see why, consider an airplane mechanic who crawls around inside the guts of an aircraft for an inspection and needs to check for how long a certain part has been in service. With a traditional screen-based user interface, the mechanic would have to somehow “save” the part’s number (by remembering it, taking a picture of it on a smartphone, or writing it down on a piece of paper) and then access a phone or computer-based system to determine

for how long that part has been in operation. But with an AR technology like HoloLens or Google Glass, the service record could be displayed right on top of the item, with a little to no commands from the user.

The information overlaid over the physical world would help the mechanic check the records of any suspected part in situ, without the need of any external device or implement. The operation could be repeated rapidly, with any other part and will allow quick interception and diagnosis of other problems before they worsen or cause an accident.

<sup>[14]</sup> Note that we assumed a well-designed user interface in our example of aircraft repair: we said that the mechanic would see “useful information” displayed next to each part. It’s easy to imagine a poorly designed system that would overwhelm the mechanic with too much information, or with a confusing display, making the necessary information hard to spot. As always, good user experience only comes from close attention to users’ needs, and any new UX technology opens up even more opportunities for careless design. We’re sure that there will be many lousy AR systems shipped in the coming years — that’s why UX professionals have long-term job security, despite changes in technology.

## CONCLUSION



Fig 7

There is been a huge success in Augmented Reality in the recent years and this is an opportunity for a uninterrupted, less-effort, yet greater user interaction with the real world. As more technologies use this growing trend, augmented reality application may certainly grow to include much more than what it does now, but by understanding the users’ needs and wish, developers and designers will then be able to create a successful and efficient augmented reality.

Make sure and look back on what companies have done in the past, and avoid the mistakes they have made. Prioritize all aspects of the user experience and then you’ve already taken a step in the right direction.

## REFERENCES

1. <https://www.digitalbodies.net/augmented-reality/10-augmented-reality-quotes-on-the-coming-ar-revolution/>
2. <https://www.nngroup.com/articles/augmented-reality-ux/>



**International Journal of Advanced Research Trends in Engineering and Technology**  
**(IJARTET)**  
**Vol. 8, Special Issue 1, August 2021**

3. <https://www.thehindubusinessline.com/info-tech/its-real-arvr-market-to-grow-76-over-5-years/article10010306.ece>
4. <https://www.informat.com/articles/article.aspx?p=2516729>
5. <https://www.marxentlabs.com/what-is-virtual-reality/>
6. <https://www.firstpost.com/tech/news-analysis/indian-smartphone-users-average-screen-time-spiked-by-25-percent-to-6-9-hours-during-covid-19-pandemic-vivo-9109311.html>
7. Augmented Reality Principles and Practice  
By Dieter Schmalstieg, Tobias Hollerer · 2016
8. <https://uxplanet.org/what-is-ui-vs-ux-design-and-the-difference-d9113f6612de>
9. [https://www.google.com/search?q=ar+vr+market+size+statista&sxsrf=ALeKk026aze32WylQIzGFGcq8McNAy1Kow:1627232802571&source=lnms&tbn=isch&sa=X&ved=2ahUKEwj326fJ2v7xAhUSX30KHdM8DkoQ\\_AUoAnoEC\\_AIQBA&biw=1280&bih=587#imgrc=2e37ugHhSkdo8M](https://www.google.com/search?q=ar+vr+market+size+statista&sxsrf=ALeKk026aze32WylQIzGFGcq8McNAy1Kow:1627232802571&source=lnms&tbn=isch&sa=X&ved=2ahUKEwj326fJ2v7xAhUSX30KHdM8DkoQ_AUoAnoEC_AIQBA&biw=1280&bih=587#imgrc=2e37ugHhSkdo8M)
10. <https://habr.com/en/post/488454/>
11. [https://en.wikipedia.org/wiki/Augmented\\_reality](https://en.wikipedia.org/wiki/Augmented_reality)
12. [https://www.google.com/search?q=uiux&sxsrf=ALeKk02dscq9uR7TGB-Qh1alovFVChldw:1627235072672&source=lnms&tbn=isch&sa=X&ved=2ahUKEwjvuwOD4\\_7xAhWV7XMBHeekDLkQ\\_AUoAXoEC\\_AIQAw&biw=1280&bih=587#imgrc=VbYbi9lTCXOfHM](https://www.google.com/search?q=uiux&sxsrf=ALeKk02dscq9uR7TGB-Qh1alovFVChldw:1627235072672&source=lnms&tbn=isch&sa=X&ved=2ahUKEwjvuwOD4_7xAhWV7XMBHeekDLkQ_AUoAXoEC_AIQAw&biw=1280&bih=587#imgrc=VbYbi9lTCXOfHM)
13. <https://dev.plat4m.com/blog/post/case-study-improving-ux-with-ar-interactive-guide>
14. <https://www.nngroup.com/articles/augmented-reality-ux/>
15. <https://www.isglobal.org/en/healthisglobal/-/custom-blog-portlet/a-pandemic-year-in-10-quotes/3098670/0>
16. <https://www.emarketer.com/content/us-virtual-augmented-reality-users-2021>
17. [https://www.google.com/search?q=role+of+ux+in+ar&sxsrf=ALeKk02FfFE9aFJ84ZTOiJolRFPmdOscQ:1627219745829&source=lnms&tbn=isch&sa=X&ved=2ahUKEwjRmq\\_3qf7xAhVKgtgFHVbKAMoQ\\_AUoAXoECAIQAw&biw=1280&bih=530](https://www.google.com/search?q=role+of+ux+in+ar&sxsrf=ALeKk02FfFE9aFJ84ZTOiJolRFPmdOscQ:1627219745829&source=lnms&tbn=isch&sa=X&ved=2ahUKEwjRmq_3qf7xAhVKgtgFHVbKAMoQ_AUoAXoECAIQAw&biw=1280&bih=530)
18. [https://www.google.com/search?q=ar+vr+market+size+statista&sxsrf=ALeKk026aze32WylQIzGFGcq8McNAy1Kow:1627232802571&source=lnms&tbn=isch&sa=X&ved=2ahUKEwj326fJ2v7xAhUSX30KHdM8DkoQ\\_AUoAnoEC\\_AIQBA&biw=1280&bih=587#imgrc=2e37ugHhSkdo8M](https://www.google.com/search?q=ar+vr+market+size+statista&sxsrf=ALeKk026aze32WylQIzGFGcq8McNAy1Kow:1627232802571&source=lnms&tbn=isch&sa=X&ved=2ahUKEwj326fJ2v7xAhUSX30KHdM8DkoQ_AUoAnoEC_AIQBA&biw=1280&bih=587#imgrc=2e37ugHhSkdo8M)