

How Augmented Reality Helps us in Modern Education?

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Abstract:

The Morden world is made of two different parts: the real world and the digital world. We are in real world at this very moment, and we also live in the digital world. As you would assume, we are spending our most of the time working on the digital world. Still, it is in the early stage, the idea of augmented reality has evolved from the realm of science-fiction to everyday life. Researchers are working on technologies that have the potential to alter the way we solve problems and interact with our environment to suit the demands of consumers and industry. These themes cover a most topics, from e-commerce to education to medical to boosting the freedom of the crippled. Throughout this article, we will look at how augmented reality is being used in a various domains and sectors in like Education, Medical, Military, Industry, Entertainment, Retail, and public safety.

Indexed Terms: Augmented Reality, Augmented Reality in Education, Augmented Reality in Industry and Augmented Reality in Medical.

1. INTRODUCTION

An augmented reality concept in which a real-world environment is augmented with additional features and overlaying computer-generated components on top of it. It is therefore possible to engage with one another and digitally modify both the worlds real and the augmented environment. By superimposing digital objects or information over real-world objects or environments, an augmented reality experience allows you to immerse yourself in the digital world. The information is provided through data that is transmitted to the device through the internet. It is the placing of images or data over the real environment to produce a more realistic vision that is known as Augmented Reality (Doerner et al., 2022). It is important to remember that the technology itself is not new. At the very least, it has been in existence since the 1990s. In his science fiction story

Pygmalion's Spectacles, published in 1935, Stanley.G. Weinbaum created the notion of augmented reality, which portrays eyewear that allow humans to experience virtual senses of sight, smell, and touch(Arena et al., 2022). Harvard University's Bob Sproul and Ivan Sutherland created the world's first actual augmented reality application HMD that can be used to view computer graphics from above. The AR market, according to Markets will rise at an annual growth rate of 72.7 billion of dollars by 2024, indicating an increasing trend. The tremendous rise in computational power found in mobile devices and personal computers in recent years, on the other side augmented reality had made a popular consumer technology, particularly in the younger demographic(Selvakumarasamy & Dekson, 2013). Using a computer-generated diagram and Head-Mounted Display onboard the plane, Boeing researchers Thomas and David developed an HMD in 1990 that displayed the plane's

electronics. However, today in the year 2022, smartphones, desktop computers, and HMDs with internet capabilities are the most prevalent platforms via which anyone can enjoy augmented reality (Barsom et al., 2016).

2. Augmented Reality in Education

In the past, psychologists have concluded that students can concentrate on given task between 10-15 minutes. Today, the total average time span attention of an individual, be it a student, an adolescent, or an adult, is less than eight seconds, according to the American Psychological Association. This problem caused by a plethora of distractions, including notification pings, information overload, and other frequent pings (Kaviyaraj, on, & 2022, n.d.). Furthermore, because many augmented reality updates are conducted through cloud servers, the instructional content that pupils receive is always up to date and pertinent. In addition, because it

provides an immersive experience, augmented reality may be the best antidote to the future difficulty of the education sector is updated through cloud servers. In contrast to traditional education, which relies on printed textbooks and physical gear to impart knowledge, augmented reality provides students with engaging learning experiences. Students can also be stimulated during this process by using augmented reality applications that can interest students in the topic for an extended period while also increasing their attention span (Kaviyaraj, on, & 2021, n.d.). Here is a list of augmented reality applications that can be useful:

2.1 Interactive Textbooks

There were not enough visuals in printed textbooks to keep students' attention, whereas interactive textbooks can make a difference by bringing concepts and stories to life with visuals.



Fig 1. AR Textbook

A revolution in education is coming from AR enabled textbooks that can be scanned via tablet and mobile devices (Selvakumarasamy et al., n.d.).

2.2 Learn with AR Models

2.2.1 Object Modelling

With AR, it is easy to create new designs by combining common objects or design patterns.



Fig 2: Screwdriver Model

Traditionally, students of mechanical engineering or architecture must draw and sketch illustrations from scratch. In this way, students are urged to use their time in labour for creating illustrations rather than sketching and improving their critical thinking.

While field excursions to museums and planetariums may have been beneficial, the immersive quality of AR can improve the learning experience. Students can find and learn more about augmented reality markers embedded in physical environments, surfaces, or even artefacts.

2.2.2 Field trip



Fig 3: AR in Museum

By exploring and learning more about AR markers embedded in physical spaces, surfaces, or even things as a result, education becomes more of an adventure, in which students participate in activities rather than simply listening to their professors' lectures.

3. Augmented Reality in Medical

Every area of human life will be revolutionised in today's technology, and healthcare will reap significant benefits as a result. In general, there are two types of healthcare education: formal and informal education. The first is concerned with theoretical knowledge, and the second is

with the application of such knowledge in the real-world. Medical students who are share their expertise and abilities to the field of practise are successful (Tang et al., n.d.). The prevailing financial calamity has made it clear that health-related research must be reevaluated. Medical organisations will benefit from the effective use of technology by creating a more pleasant working environment. With the AR technology, it is demonstrated that it is possible to provide better treatment to patients. Because of the huge and rapid advancements, it is bringing to the healthcare sector, this cutting-edge technology is no longer exclusive to the entertainment industry.



Fig 4: AR in Medical

It has demonstrated tremendous potential for guiding difficult medical procedures using augmented reality and mixed reality. Combining augmented and mixed reality is becoming increasingly more popular in medical education and surgical planning as well as training. Because Augmented Reality increases the learning process, healthcare professionals are dealing with a system that is extremely volatile, delicate, and difficult to work with the human body. Certain situations can be mimicked and recreated to assist students in learning with virtual items that resemble the properties of the human body and organs, hence eliminating the needs to employ a real patient in the classroom. As a result, there is no chance of losing one's life. As a result of AR in healthcare education is becoming more popular, as it gives realistic, low-risk, and cost-effective experiences while also delivering real-time feedback to students. AR offers a variety of applications in healthcare domain, and it is becoming more increasingly popular. It has the capacity to dramatically reshape the healthcare industry. Few examples are

- An Advance operation rooms
- Effective vein detection
- Facilitates innovative drug Information
- Help in study of anatomy

4. Augmented Reality in Military

As technology advances, the development of tactical AR systems is fundamentally changing the soldier's way to obtain information and perform operations in the field. Armed forces must stay up with the new technological advancements because

the defence industry develops on a continual basis. Several countries' militaries were among the first to see the possibilities of augmented reality technology (AR) (Amaguaña et al., 2018). Increases in data and graphics processing capabilities will result in a corresponding increase in the number of military applications for augmented reality (AR) (Livingston et al., 2002).

A. Defence Training

Defence cannot work well unless it has received proper training. Soldiers cannot be deployed into a genuine combat situation unless they have received enough training. When it comes to defence, the first and most important application of AR was in soldier training. An HMD with augmented reality capabilities aids soldiers in conducting reconnaissance on enemy hideouts by superimposing blueprints, satellite pictures, or footage from a drone right into their field of view.

B. Drones

Aerial vehicles, or drones, are proven to be a highly effective military asset in recent years. Drone is an unmanned aircraft which can be controlled from a distance without the need for a pilot. In conjunction with augmented reality software, such as Vuforia Studio, drone technology may be used as a potent surveillance tool, supplying military forces with real-time intelligence.

C. Pilots

When comes to the development of pilots, defence training is necessary to success. Aircraft for the military are exceedingly expensive, with the cost of a single plane reaching into the billions of rupees. Before a pilot take to the sky, they must go through

attentive training in a safe atmosphere. Augmented reality, when used in concurrence with virtual reality, can assist pilot training in a variety of ways. Flight controllers can gain understanding of weather patterns, pilots can better examine navigation systems, and pilots can even fly through tough terrain using AR overlays on their screens during flight training, pilots use AR to practise their take-offs and landings, which are two of the most crucial tasks a pilot performs. Ground maintenance staff can also be trained with the use of this technology. A second area in which augmented reality and virtual reality can be beneficial in pilot training is in the performance of complex tasks such as mid-air refuelling or flying in formation. These two activities are incredibly difficult to complete in real life if they are not first practised in a simulation.

D. Navy

The world's fleet will be able to meet some one-of-a-kind needs use of AR technology. It is the responsibility of a bridge officer, for example, to keep their eye on ship's course and ensure that it is always safe. Before, these officers would obtain the information they required over the radio from the control room to validate what they could observe directly on the ground. This strategy is inefficient and time-consuming. Bridge Officers will be able to acquire information in real time in the future with the help of AR enabled devices, rather than needing to speak directly with the crew.

This will relieve them of some of their responsibilities while also improving the overall safety of the ships. Goggles with augmented reality capabilities would allow navy personnel to integrate pictures from the actual environment with data from sensors, such as radars and sonar, to improve awareness. AR technology would also be beneficial to the deck gunnery teams on the ship.

5. Augmented Reality in Industry

Industrial augmented reality, or AR, can increase productivity, safety, efficiency, and accuracy on production floors by using goggles, glasses, and smartphone apps to overlay augmented information on a worker's real-world view (Fraga-Lamas et al., n.d.). AR can be used in a variety of settings, including manufacturing, transportation, and logistics. The added advantage of augmented reality is that it does not necessitate the need of specialised gear. The development of AR applications for mobile and tablet devices has been made possible by advancements in computer vision and machine learning technology. Industrial organisations are already utilising mobile solutions for augmented reality (Sureshkumar et al., n.d.), making it easier for them to implement the technology. In the industry, augmented reality has already acquired traction. A few examples of applications that are often used (Janet et al., 2021).



Fig 5: AR in Industry

A. Assembly

Using augmented reality sensors and real-time data processing capabilities, staff can increase their efficiency while also gaining insight into challenging processes. This is noticeable during the process of assembly. Workplace augmented reality systems can overlay blueprints or simple assembly instructions, enabling staff to work more efficiently. Making the drawings of bolts, cables, and part numbers visible to an employee can help to reduce the amount of time spent on training and the errors made throughout the assembly process (Suresh Kumar et al., 2019).

B. Training programs

Because of its real-time capabilities, augmented reality does not have to be limited to live encounters. The recording of training modules can be used to assist manufacturing staff in learning how to execute their tasks using an augmented reality (AR) headset. When communicating sophisticated topics that are difficult to express using normal video or text formats, the technology enables an enhanced method of communication. Additionally, (Anandraj et al., n.d.), Augmented Reality allows you to instruct learners in their preferred manner of learning at a large scale using a variety of different methods. In most cases, each training module only needs to be created once.

C. Maintenance and Repair

Augmented reality systems make it possible to perform maintenance without a technician onsite with expert knowledge. MRO applications for AR are among the most interesting in the industrial sector. Any person with an AR headset can receive instructions from the expert, who will circle important objects and guide them through the steps (Gattullo et al., n.d.).

D. Product design and development

Conceptualizing and prototyping can be gradual resource-intensive processes to do. Engineers can develop digital overlays to preview what features would appear like when placed next to objects in real-world using augmented reality. Augmented reality

enables visibility into the final product throughout the design phase, allowing you to make modifications and upgrades at a low cost to the product during the development process (Applied & 2018, 2018).

6. Augmented Reality in Entertainment

Many people feel that the enjoyable experiences we have today (movies, video games, and music) will become more realistic, immersive, and participatory than they have ever been before. One of the significant contributors to the transition is augmented reality (AR) technology (Mahmood et al., n.d.). Whole new dimension to entertainment is introduced by augmented reality, which encourages the audience to become active participants in the event rather than passive observers. With Augmented Reality, viewers may interact with the show and become more engaged by integrating the actual world with the virtual. Creating exotic environments, immersing the audience in the plot, and offering additional information on what is happening on stage are just a few instances of what augmented reality can do to make a show something to be remembered [18].

A. Games

The popularity of Pokémon GO prompted game developers all around the world to create a slew of augmented reality (AR) games. Among the many types of games are quests (like Temple Treasure Hunt), shooters (like Real Strike), and horror games (like Zombie Go). In most AR games, the gameplay takes place in real world, with virtual items and characters being activated by geolocation or unique AR markers, like QR codes, to appear and interact with the player.

B. Music

AR enhanced music is not a brand-new concept, over the past two years we have seen musicians using AR or VR as marketing tool for their music. Bjork, Michael Jackson, 2 Chainz and various other musicians have all turned to immersive experiences as a way for them to

offer fans something more than just music. Imagine, the entire crowd could connect to augmented reality technology to have a completely different concert experience. Imagine witnessing lyrics flying over the air or the experience of being inside of your favourite music video as the singer is singing live.

C. TV

The future of movies and television will be more immersive and exciting than any time in recent history. AR used in interactive television to give more information on top of what the user is already watching. The breadth of the project goes well simply enabling specific effects or providing the "wow" factor while an audience is viewing a movie. Some even believe that television will eventually become an extension of the internet and the massive amounts of video content that people are already consuming on the internet. The distinctions are becoming increasingly muddled, and time will tell if one will be improved because of the other or whether the technology will eventually become extinct.

7. Augmented Reality in Retail

The influence of Augmented Reality on retail has been enormous, and the industry has reaped a slew of benefits because of the technology (Parekh et al., 2020). From streamlining the process to making purchasing more convenient for people (both online and offline), AR in retail is an all-new different ballgame.

The following are the most significant advantages of AR in retail shopping that have been recognised by more consumers (Perannagari & Chakrabarti, 2020).

A. Personalization of user content

Often, retailers may tailor material to exceed the expectations of their customers. You may notice retailing stores filtering out content for you so that you may quickly find things that are relevant to your needs without wasting time. This has been accomplished in a variety of ways. Another technology known as VR, or Virtual Reality, is also used to enhance the experience of the user. Retailers work together to create full AR and VR retail solutions.

B. Ease of trials/try-outs

When you are waiting outside for your turn to the trial rooms, it is tedious and more time-consuming. So, there are virtual mirrors where you can find out what size the clothes you like are and then see how that stuff looks and fits your body on a digital screen in front of you. This is an incredible example of augmented reality's application in shopping. You may do the same thing when purchasing online as well. Consider the following scenario: you are shopping for a pair of goggles, and the app scans your whole face to place the goggles on your digital reflection like lens cart.



Fig 6: AR In Retail Shopping

When it comes to business transformation with the help of augmented reality, big names in the corporate world are doing some very spectacular work. To provide the preferences of users, marketers have come up with some very appealing benefits of AR for shopping both offline store and online. Listed below are a few companies that have established themselves as leaders in augmented reality applications. They are,

- IKEA
- Vespa
- Adidas
- Teleshop
- Sephora

8. Augmented Reality in Public Safety

As crime changes and technology advances, AR is becoming the go-to solution for law enforcement organisations seeking to improve the effectiveness of training and emergency response. Creating realistic, complex training scenarios in real world may be more expensive and a time-consuming endeavour for government organisations. To overcome these difficulties, agencies are turning to AR to provide responders with realistic-looking circumstances in a life-like virtual training environment, rather than traditional training methods. Robbery, accidents, fire, and rescue are all examples of emergencies that necessitate a quick response and easy access to intelligence about a site (Services & 2018, n.d.). Augmented Reality devices can provide real-time information such as building blueprints or suspect information that is visibly overlaid into real world, allowing responders to make more educated judgments in a less stressful environment (Welch et al., 2019).

9. CONCLUSION

The purpose of this article was to give the overview of how augmented reality is helping us in various sectors/domain from e-commerce to education in modern world, and here we discussed and simplified the major areas in our day-day life with necessary augmented reality applications,

which will make our daily tasks more informative and entertainment apart from these applications augmented reality can be used in other sectors in future augmented reality can be mostly used in every sector.

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