

Research Travelogue on Applications of Augmented Reality

Mrs. P.Menaka¹, M. Aishvariya Sri² and U. S. Swetha³

¹Assistant Professor, Department of IT, Dr. N.G.P. Arts and Science College, Coimbatore, Tamil Nadu, INDIA

²Student, Department of IT, Dr. N.G.P. Arts and Science College, Coimbatore, Tamil Nadu, INDIA

³Department of IT, Dr. N.G.P. Arts and Science College, Coimbatore, Tamil Nadu, INDIA

¹Corresponding Author: menaka@drngpasc.ac.in

ABSTRACT

Augmented reality (AR) is an interactive experience of a real-world environment where the objects that reside in the real world are enhanced by computer-generated perceptual information, sometimes across multiple sensory modalities, including visual, auditory, haptic, somatosensory and olfactory. AR can be defined as a system that incorporates three basic features: a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects. This paper aims to provide an overview of current technologies and implementations of augmented reality as well as to describe the main application domains and outlining benefits. It also briefly describes about the powerful real time implementations of augmented reality and also its benefits.

Keywords-- Augmented Reality, Ikea, Sephora, Healthcare, Education, Space Exploration

I. INTRODUCTION

AR allows the user to see the real world, with virtual objects superimposed upon or composited with the real world. Therefore, AR supplements reality, rather than completely replacing it. R can be defined as a system that incorporates three basic features: a combination of real and virtual worlds, real-time interaction, and accurate 3D registration of virtual and real objects. The overlaid sensory information can be constructive (i.e. additive to the natural environment), or destructive (i.e. masking of the natural environment). This experience is seamlessly interwoven with the physical world such that it is perceived as an immersive aspect of the real environment. In this way, augmented reality alters one's ongoing perception of a real-world environment, whereas virtual reality completely replaces the user's real-world environment with a simulated one. Augmented reality is related to two largely synonymous terms: mixed reality and computer-mediated reality.

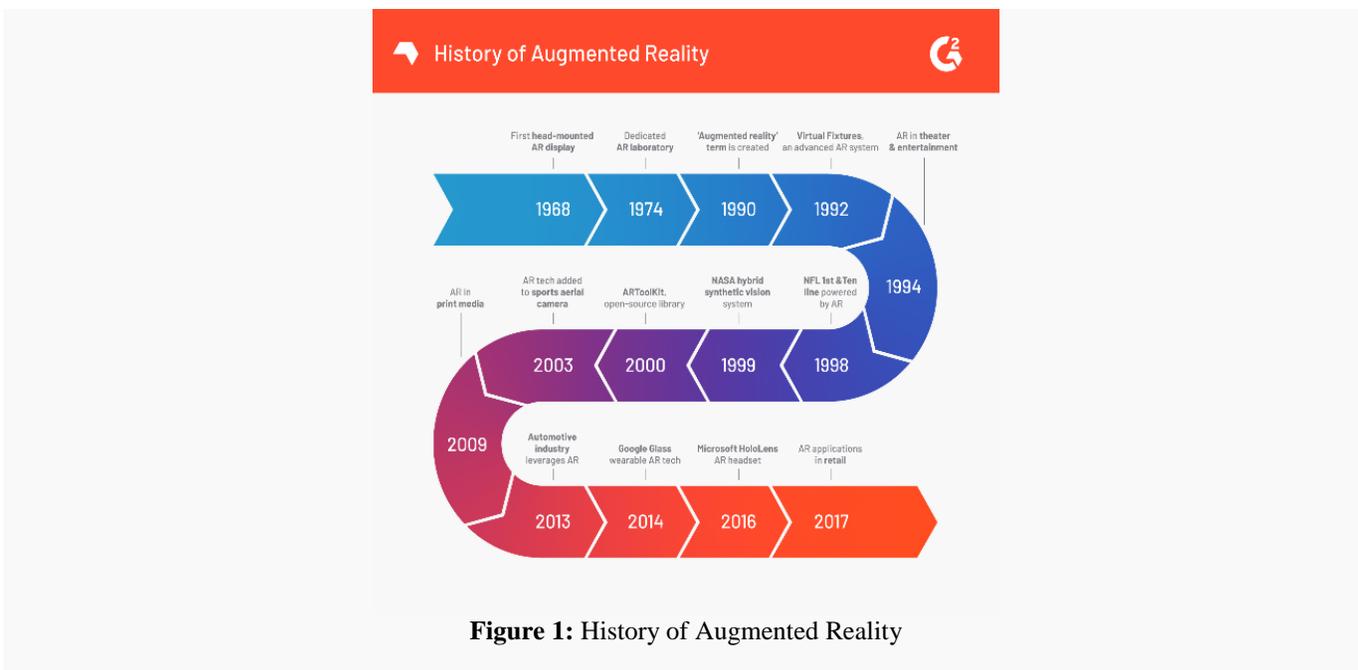


Figure 1: History of Augmented Reality

II. POWERFUL REAL-WORLD APPLICATIONS OF AUGMENTED REALITY (AR) TODAY

The growth of augmented reality (AR) applications in recent years can be attributed to solutions that allow consumers to visualize products and imagine what it might feel like to own the product or experience the service before actually purchasing it. As augmented technology becomes more sophisticated and the cost-saving and business applications expand, the demand and investment in AR will increase. In 2017, AR Kit was launched by Apple, and Google released AR Core for Android, both powerful tools for developers to create AR apps. It is predicted that there will be 1 billion augmented reality users by 2020. After a quick definition of augmented reality, let's take a look at augmented reality that's already used for real-world applications.

i. Award-Winning Airport App

The Gatwick airport passenger app just won a number of awards for its creative use of AR technology. With the help of more than 2,000 beacons throughout its two terminals, passengers can use the AR maps from their mobile phone to navigate through the airport. As the app matures, it might eventually help improve traffic flow in the airport.

ii. Ikea Place

For those who have purchased furniture and discovered once it was delivered it didn't work in the space, the Ikea Place app will help you avoid that predicament in the future. The app was built using Apple's ARKit technology, and it allows you to scan your room and design the space by placing Ikea objects in the digital image of your room to create a new environment with the new products.



Figure 2: IKEA Place AR app

iii. Sephora Virtual Artist and Rolex

Cosmetic company Sephora uses AR technology to allow customers to try out different looks and eye, lips and cheek products as well as colors right on their own digital face. This is a powerful way to boost sales and to give customers a fun way to try out new looks. Another company that uses augmented reality to inspire purchases is Rolex. The company has developed a virtual try-on experience where prospective customers can try out different styles and models (this is me testing the app).

iv. Augmented Reality in Healthcare

There are some incredibly exciting applications for augmented reality in healthcare from allowing medical students to train in AR environments to telemedicine options that enable medical professionals to interact with patients. In critical situations, augmented reality applications can deliver real-time information to the treatment area to support diagnosis, surgery and treatment plans.



Figure 3: Vein Visualization through AR app

AccuVein is a handheld device that can scan the vein network of a patient that leads to a 45% reduction in escalations. Surgeons can plan procedures before making the first cut, models can be made of tumors, and AR diagnostic tools can model disease conditions. Deloitte Research asserts that AR will disrupt the business model and operations of healthcare.

v. AR for Fun

Rather than increase sales, sometimes AR is just created for fun or to engage with customers such as the Bic Drawy Book app or teeth brushing games from Georgia-Pacific's Dixie brand. From gaming to construction to AR in browsers that provide detail for what the camera displays, augmented reality apps are being developed at a rapid pace to enhance many industries. As additional ideas get developed, we can expect augmented reality applications to touch many more aspects of our

lives. While Pokemon Go was not the first AR video game, it has been one of the most popular since its 2016 launch, with more than 1 billion downloads as of February 2019. As 5G technology use increases, AR advances will continue to change how people entertain themselves. According to a Deloitte study, millennials and Generation Zers (those around 14 to 36 years old) plan to use 5G to stream more video, play more online games with social features, and immerse themselves in more AR digital worlds.

vi. AR in Engineering

Common applications for AR in engineering include production, training, and support. In the pump industry, AR helps technicians simulate complicated pump installations in water and wastewater operations rather than relying on a repair manual.

vii. AR in Space Exploration

A Lockheed Martin platform that combines machine learning and augmented reality may soon help humans reach Mars. If a mechanical problem arises on Mars, on-site astronauts might not receive repair instructions from Mission Control on Earth for over 40 minutes. This platform includes an AR visor that displays an overlay of data, such as thermal, gas mixtures, and other vital information, atop a physical space, which can help astronauts find their own timely fixes.

viii. AR in Military and Defence

Nothing can replace the intense and grueling physical aspects of training soldiers for combat. But augmented reality is enabling the military to add a layer of training that can help produce better soldiers. These apps improve situational awareness and train users to process information quickly and safely. For example, tactical augmented reality (TAR) provides tactical mapping during a military operation to help soldiers find friends and identify foes.

ix. AR in Education

AR is increasingly being adopted in educational settings, often to help students with complicated subjects. For example, students struggling with geometry can use AR to see and manipulate 3D geometric forms. Another application of augmented reality in education includes teaching global perspectives through virtual field trips, enabling students to interactively engage with other cultures. While AR and similar technologies such as VR are becoming more popular in education, less than 10% of schools currently use augmented reality in the classroom, according to Project Tomorrow. Some reasons cited for the slow adoption of AR in education include:

- Bulkiness of AR equipment.
- Quality of AR educational content.
- Concerns over its academic value.
- Lack of proper funding

AR creates opportunities for teachers to help students grasp abstract concepts. By using the interaction and experimentation that AR technologies offer, teachers can enhance classroom experiences, teach new skills, inspire student minds, and get students excited about exploring new academic interests.

III. BENEFITS OF AR

AR can have a significant impact on learning environments:

- **Student engagement and interest:** Student interest skyrockets with the opportunity to engage in creating educational content. AR technologies can allow them to add to curriculum content, create virtual worlds, and explore new interests.
- **Learning environment:** Classes that incorporate AR can help students become more involved. An interactive learning environment provides opportunities to implement hands-on learning approaches that can increase engagement, enhance the learning experience, and get students to learn and practice new skills.
- **Content understanding:** Lack of quality content focused on education, rather than entertainment, is a noted concern among teachers hesitant to use augmented reality in education. However, existing AR technology enables teachers to create immersive educational experiences on their own to help ensure their students understand curriculum content.
- **Collaboration:** As AR content is digital, it is easily shared. For example, a group of teachers can work with their students to continually refine the content. A collaborative learning environment provides students with increased motivation to learn because they are actively engaged in the educational content creation process.
- **Memory:** AR is an excellent tool for bringing lessons to life and helping students remember essential details. For example, instead of just presenting photographs on a projector showcasing life in Colonial America, a teacher can use AR technology to create memorable interactive stories.
- **Sensory development:** AR technology can help teachers create lesson plans with multisensory experiences. Students benefit from immersive virtual content that incorporates an experiential learning style in which students carry out physical activities instead of watching a demonstration. This approach can help with sensory development.

IV. CONCLUSION

Augmented Reality is just starting to break out of its infancy, because of this the possible applications in the future are tremendous. From different ways of researching and analyzing, most of the information convince that AR technology is applicable in many Fields. Augmented reality applications can enhance the learning process, learning motivation and effectiveness. Augmented Reality make our world fully digital and we can interact with the real objects digitally, the technology has halfway reached its goals and in no time it can make this real world fully digital with.

REFERENCES

- [1] R.T. Azuma, Y. Baillet, R. Behringer, S. Feiner, S. Julier, & B. MacIntyre. (2001). Recent advances in augmented reality. *IEEE Computer Graphics and Applications*, 21(6), 34-47.
- [2] F. Zhou, H. Been-Lirn Duh, & M. Billinghurst. (2008). Trends in augmented reality tracking, interaction and display: a review of ten years of ismar. In: *Proceedings of the 7th IEEE/ACM International Symposium on Mixed and Augmented Reality*, pp. 193-202.
- [3] R.T. Azuma. (1997). A survey of augmented reality. Presence: *Teleoperators and Virtual Environments*, 6(4), 355-385.
- [4] J-M. Normand, M. Servières, & G. Moreau. (2012). A new typology of augmented reality applications. In: *Proceedings of the 3rd Augmented Human International Conference*, pp. 18.
- [5] J. Carmigniani, B. Furht, M. Anisetti, P. Ceravolo E. Damiani, & M. Ivković. (2011). Augmented reality technologies, systems and applications. *Multimedia Tools and Applications*, 51(1), 341-377.
- [6] J.M. Braz & J.M. Pereira. (2008). Tarcast: taxonomy for augmented reality casting with web support. *The International Journal of Virtual Reality*, 7(4), 47-56.
- [7] R.T. Azuma, Y. Baillet, R. Behringer, S. Feiner, S. Julier, & B. MacIntyre. (2001). Recent advances in augmented reality. *IEEE Computer Graphics and Applications*, 21(6), 34-47.