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Augmented Reality and its Application in AR Cloud

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Abstract - Augmented reality is a technology that enables virtual and real objects to interact with one another in the real world. Although augmented reality applications are employed in a variety of fields, education is by far the most essential [1]. AR technology combines real things with virtual information to boost students' connection with physical environments while also facilitating their learning. Virtual reality gadgets, which are still under development, allow Learners to learn difficult topics in a playful way and enjoyment. Learners can study more about the virtual environment by interacting with objects in it. The two types of data or instruction accompaniment one other in different way, emerging in an advancement of the practical in nature [3]. As a result of this book, a thorough evaluation of the many applications of augmented and virtual reality is provided. Each of these new technologies will be reviewed for its progress over the previous several years, with an emphasis on the most significant categories and the most active nations on these technologies, as part of a comprehensive scoping assessment being carried out in this research. Lastly, we'll take a look at these technologies' prospects and the areas that still need to be explored in order to be completely integrated [2].

Keywords: History of Augmented Reality, Augmented Reality Technology in Education, AR Development Tools, AR Cloud, Virtual Reality, AR SDK.

1.INTRODUCTION

Nowadays, rapid technological advancements have a direct impact on people's lives. People's lives will be affected, but so will the educational system and the environment in which they learn [1]. Using effective and real-world data, Augmented Reality (AR) is one sort of technology. Some of these technologies include 3D modelling and real-time tracking. Its goal is to register or appeal to the actual world after the duplication or replication of virtual materials and statistics, such as text, photographs, 3D models, music... and so on Data or instruction that is both theoretical and practical in character is complemented by each other in a variety of ways [3]. A sophisticated kind of virtual reality known as augmented reality has just been developed. Its cross-disciplinary administrative architecture shows that teaching and learning seem to be its primary focus. It's true that augmented reality may make it easier to examine and better absorb stuff, while keeping your memory in check. When it comes to Virtual Reality, the trials are more detailed, but AR is still based on real-world situations. [4].

2. HISTORY OF AUGMENTED REALITY

In 1968, Harvard Professor and computer specialist Ivan Sutherland created the first head-mounted display, dubbed "The Sword of Damocles".

Fig-1: When Myron Kruger founded the University of Connecticut's 'Videoplace' lab in 1974, it was solely dedicated to virtual reality.

Tom Caudell, a Boeing researcher, created the term "augmented reality" in 1990. One of the earliest fully functional augmented reality structures, Virtual Fixtures, was developed by Louis Rosenburg at the Armstrong Research Lab of the United States Air Force (USAF). It was Julie Martin's Dancing in Cyberspace show in 1994 that ushered augmented reality into the entertainment industry.[5].

As of 1998, Sportsvision has shown its first live NFL match, which features the synthetic 1st & Ten visual framework, or "yellowyard mark." The technique, which laminates a yellow line on top of the broadcast, may be immediately recognized by onlookers. A free open-source software library was built by Hirokazu Kato in 2000. This package may be used to construct augmented reality applications by other intitutors. Video tracking is used by the library to overlay virtual images on top of the actual environment.

To take use of the new Skycam technology, which offers viewers an overhead view of the field with graphics placed on top, Sportvision upgraded the 1st & Ten graphic in 2003. In 2009, Esquire Magazine used augmented reality for the first time in print [5] to keep the pages alive. Researchers have had access to repair instructions that were previously only available in the service manual because to Volkswagen's MARTA app (Mobile Augmented Reality Technical Assistance), which was released in 2013. As of 2014, Google Glass was the first pair of augmented reality glasses that could be worn by users for immersive learning.

Fig-2: A more sophisticated wearable AR gadget, the HoloLens, was released by Microsoft in 2016 and costs more than Google Glass. It isn't something you'd wear on a daily basis.

IKEA's augmented reality software, IKEA Place, was debuted in 2017, and it revolutionized the retail business [5].

3. AUGMENTED REALITY TECHNOLOGY IN EDUCATION

Augment 3B: An ARCore-based app called Augment allows users to see 3D models in Augmented Reality in their full dimensions and frameworks in real time. Students used Augmented Reality technology in their technical drawing class in the 2015–2016 academic year to gather data for their research. An instructional tool of current times, Augmented Reality, has been discovered by the survey's pre- and post-tests to be well-understood and appreciated by the pupils.

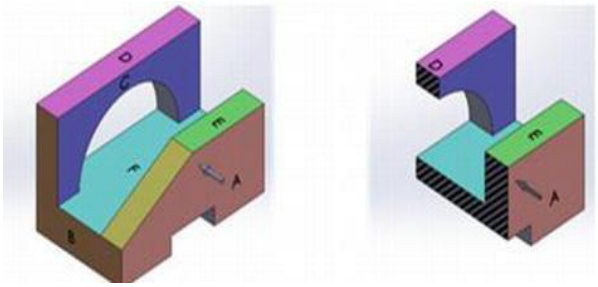

Fig-3: 3D modelling and Augmented Reality technologies are used in the technical sketching.[1]

Google Translate: This app currently provides text translations in almost 103 languages, offline translations in 52 different languages (augmented reality translations in 30 languages), and augmented reality translations in 52 different languages (according to Google), with the goal of making life easier for its users.

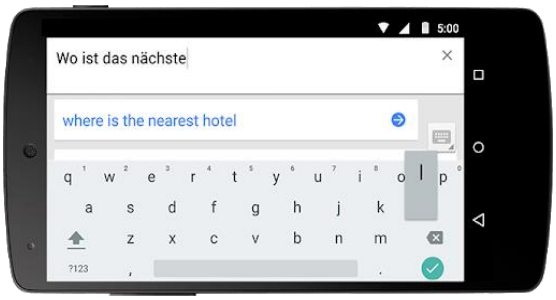

Fig-4: Google Translator

Wikitude: Wikitude world browser app, this application is also employed in geography teaching, according to research in the literature. Wikitude is a complete augmented reality development platform utilized by big companies, shops, and publishers to create a variety of engaging experiences.

Fig-5: Wikitude world browser app

Spyglass: The Spyglass app enable users to make use of their cellphones as a compass, gyroscope, star tracker, and more [1]. Spyglass is an iPhone, iPad, iOS, and Android software with an advanced compass and GPS navigation system. Spyglass can be used as a compass and GPS navigation device for driving, flying, or hiking off the beaten path, in the fields or woods, at sea, or in the air [4].

Fig-6: Locating with Spyglass technologies

4. AR DEVELOPMENT TOOLS

Foreign AR SDK: It was published in 2017 by Apple's ARKit augmented reality developer kit. Researchers can create augmented reality applications for iPhones and iPads using this collection of technologies. Allowing two devices to measure the same virtual products simultaneously enhances the AR complexity of ARKit. [3]. ARCore, Google's augmented reality software foundation, is identical to Apple's ARKit. In order to introduce digital items to the world, cloud software and device technologies may be improved. The three primary capabilities are: motion capture, perception of the surrounding environment, and perception of the light source. Vuforia is now the most popular SDK. [3] SDKs are available for each platform so that the primary identifying functionality may be used on iOS, Android, and UWP.

Domestic AR SDK: The foreign AR SDK is difficult to utilize for domestic researchers. No results and language barriers are the most difficult challenges to overcome [3].

The localization capabilities of the domestic AR SDK are better than those of the foreign counterparts. The most popular AR SDKs in China right now include Baidu AR, NetEase Insight AR, Vision+EasyAR, Liangfengtai HiAR, Tianyan AR, Taixu AR, and Magic AR.

5. AR CLOUD

The early research done on grid computing had a significant impact and helped pave the way for cloud computing. Since 2007, there has been an increase in the marketability of using cloud computing. Cloud computing was one of the top ten purposeful technologies developed for the IT industry in 2010, according to Gartner. Cloud computing is expected to have significant growth over the next several years and emerge as a notable component of conventional computing. The AR cloud is the foundation upon which the digitalization of the whole world rests [3]. Charlie Fink postulated that, as a result of the development of AR cloud technology, the whole planet would evolve into a shared space screen that will enable a large number of people to collaborate and interact in real time. The present augmented reality experience is analogous to playing a game that is played on its own and may bring about compounding, association, and sharing. The AR cloud is traditionally seen as the continuation of the search, and in the not-too-distant future, a great number of people will be seeking for unexpected things to happen in the AR world.

The administration of AR cloud requires a real-world 1:1 data set (creating a data set that is unchanging with the real world, including real-world position synchronise data, scene visual features, and can be upgraded and enlarged in real-time changes), the ability to quickly locate (the terminal device should be able to gain this cloud from any location with a network, and can quickly and delicately locate), and the ability to update and enlarge in real-time changes [6]

6. CONCLUSIONS

This study includes a comprehensive analysis of augmented reality settings and applications that are routinely used in the design of learning and teaching environments in the educational sector as part of the digitalization strategy. These settings and applications can be found in the education sector. As a consequence of the developer's study, different tools and resources have started to be used in teaching techniques as a direct result of the introduction of technology into learning environments. When seen in this light, it is clear that the use of mobile learning tools and apps in educational settings has lately experienced an increase in its breadth [1].

The fast development of mobile technology has led to the emergence of new media environments that are more interactive. These environments provide consumers an increasing variety of services. One of the locations where this reciprocal engagement is given and that may link items in virtual surroundings with actual ones is in the field of technology known as "augmented reality," or AR for short. With the use of these technologies, virtual things may be superimposed on actual photographs. The components of AR tools include a camera, a computer infrastructure, a marker, and physical objects [1]. In the next years, there will be an increase in the prevalence of the use of augmented reality technology, in particular in the context of mobile intelligent terminals. Despite the fact that mobile devices are not as water resistant as helmet-mounted displays, the former are far more widespread. The simultaneous introduction of the ARKit and ARCore development platforms makes it possible for augmented reality technology to be technologically integrated with smart mobile devices. Individuals are able to participate in a human-computer contact that is more natural with the technology [6].

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