Current State of Mobile Supported Augmented Reality (AR) Research

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Abstract

Augmented reality, in which virtual substance is consistently coordinated with presentations of true scenes, is a developing zone of intelligent plan. With the ascent of individual cell phones fit for creating fascinating enlarged reality conditions, the immense capability of AR has started to be explored. This paper reviews the current of mobile supported augmented reality (AR) research. It depicts work acted in various application spaces and clarifies the leaving issues experienced when building expanded reality applications specialized restrictions of mobile phones. Future bearings and territories requiring further exploration are presented and examined. Lastly, the paper looks ahead to what AR technologies may be on the horizon in the future.

Introduction

The term Augmented Reality is used to portray a blend of innovations that empower ongoing mixing of computer generated content with live video show display. During the most recent decade, Augmented Reality pulled in interest from both industry and the scholarly world. Mobile supported Augmented Reality supplements this present reality of a versatile client with computer created virtual substance. The force of the virtual substance and their effect on the perspective on the portable client decide the truth, on account of exceptional designs that change the first view, of the mobile user.

The advances on computer interaction interfaces, mobile computing, mobile cloud computing and gadget to gadget interchanges have empowered new users experiences that upgrade the manner in which we procure, communicate and show data inside the world that encompasses us. We are presently ready to mix data from our faculties and cell phones in heap ways that were unrealistic previously.

Augmented reality is a growing phenomenon on mobile devices, reflected by the increase in mobile computing in recent years.

Literature Review

Previously there were numerous study regarding mobile augmented reality. Some of the papers are discussed below.

In a paper[1], FitzGerald, Elizabeth, et al. examine the state of the art in augmented reality (AR) for mobile learning. They have provided a working definition of AR in their paper and have examined how it is embedded within situated learning in outdoor settings. They have also attempt to classify AR according to several key aspects (device/technology; mode of interaction; type of media involved; personal or shared experiences; if the experience is portable or static; and the learning activities/outcomes). Moreover, they have discussed the technical and pedagogical challenges presented by AR before looking at ways in which AR can be used for learning.

A survey was made in another paper[2] where Chatzopoulos, Dimitris, et al. presented a categorization of the application fields together with some representative examples. Next, they introduced the reader to the user interface and experience in mobile augmented reality applications and continue with the core system components of the mobile augmented reality

systems. After that, they discussed the advances in tracking and registration, since their functionality is crucial to any mobile augmented reality application and the network connectivity of the devices that run mobile augmented reality applications together with its importance to the performance of the application. Lastly, they also presented existing challenging problems.

In a research article[3], the impact of an augmented reality application on learning motivation of students was analyzed by Khan, Tasneem, Kevin Johnston, and Jacques Ophoff.
They measure and understand the impact of an augmented reality mobile application on the learning motivation of undergraduate health science students at the University of Cape Town. They extended previous research that looked specifically at the impact of augmented reality technology on student learning motivation. They also examined the differences in student learning motivation before and after using the augmented reality mobile application and got results which showed that using an augmented reality mobile application, increased the learning motivation of students.

Another survey[4] was made by Mekni, Mehdi, and Andre Lemieux where they analyzed the current state of the art in augmented reality which describes work performed in different application domains and explained the exiting issues encountered when building augmented reality applications considering the ergonomic and technical limitations of mobile devices. In their paper, future directions and areas requiring further research were introduced and discussed.

Current State

The current state of augmented reality for mobile is changing continuously. Currently, an extreme amount of work and research is ongoing in the field mobile augmented reality. AR is now being used in a variety sectors especially in commercial industries ranging from education, architecture, entertainment and games. Besides, Augmented reality is now used in medical training. Its applications range from MRI applications to performing highly delicate surgery. However, the growing application of AR has allured a lot of researchers and companies to spend time and money in this area.

Currently, AR has been used in mobile application for learning. AR has been appeared to have great potential in making the learning cycle more dynamic, meaningful and effective. This is on the grounds that its advanced technology enables users to collaborate with virtual and real-time applications and carries natural experiences to the user. Utilizing AR for educational purposes can enhance interest to students at an individual level, and every students can get more motivation to learn using mobile. Moreover, there are other positive parts of AR, including usability by young children, fun factor, adaptability across age gatherings and subject areas, convenience regarding versatility of equipment, and the vivid and drawing in nature of 3D AR perceptions. **Figure 1** shows how AR is used in learning.

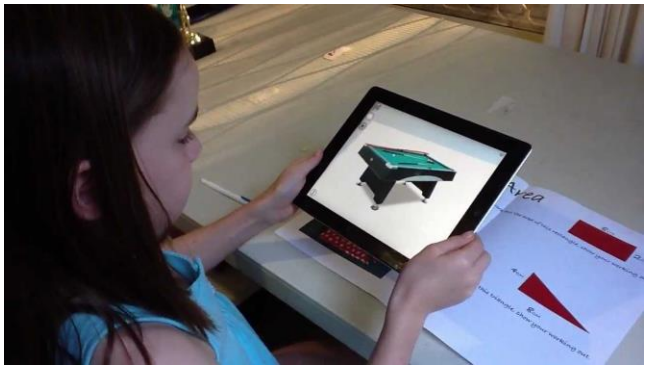

Figure 1: AR used in interactive learning

Besides, Geo-located AR utilizes locational detecting, normally through GPS (Global Positioning Systems), and overlays computerized data on focal points (POIs) including actual places and guide references. Clients who have the proper hardware, normally a GPS-empowered cell phone or tablet PC, can see these POIs. **Figure 2** shows a sample of Geo-located AR.

Figure 2: AR for locational detecting

By the beginning of the 21st century, researchers started working on augmented reality for hearing, touch and smell. Opportunities for portable applications were additionally expanding, as specialists attempted to utilize situational mindfulness and geo-located data recovery. For example, Columbia University's Mobile Augmented Reality System combined a mobile computer and headset with a compass, inclinometer and GPS, which allowed users to see representations of historical buildings in their original locations.

AR is utilized to help solving critical problems. Mobile devices and their encompassing actual climate empower students to produce their own settings for improvement, which can be deciphered or helped through AR. Investigation of a video blog recorded by understudies on a field trip demonstrated that understudies utilized physical and computerized portrayals to cooperate simultaneously and educate one other, prompting the improvement ofco-developed information. Cell phones went about as relevant sensors, empowering representations to be depicted to the students in an arranged way.

In this world of entertainment, AR is playing a bigger role now a days. It is used in games and videos which have been used by millions of people. The use of AR brings the quality of games to a next level. Recent AR based games include PokemonGo, Ingress, Zombies and many others. **Figure 3** shows the some sample picture of AR based games.

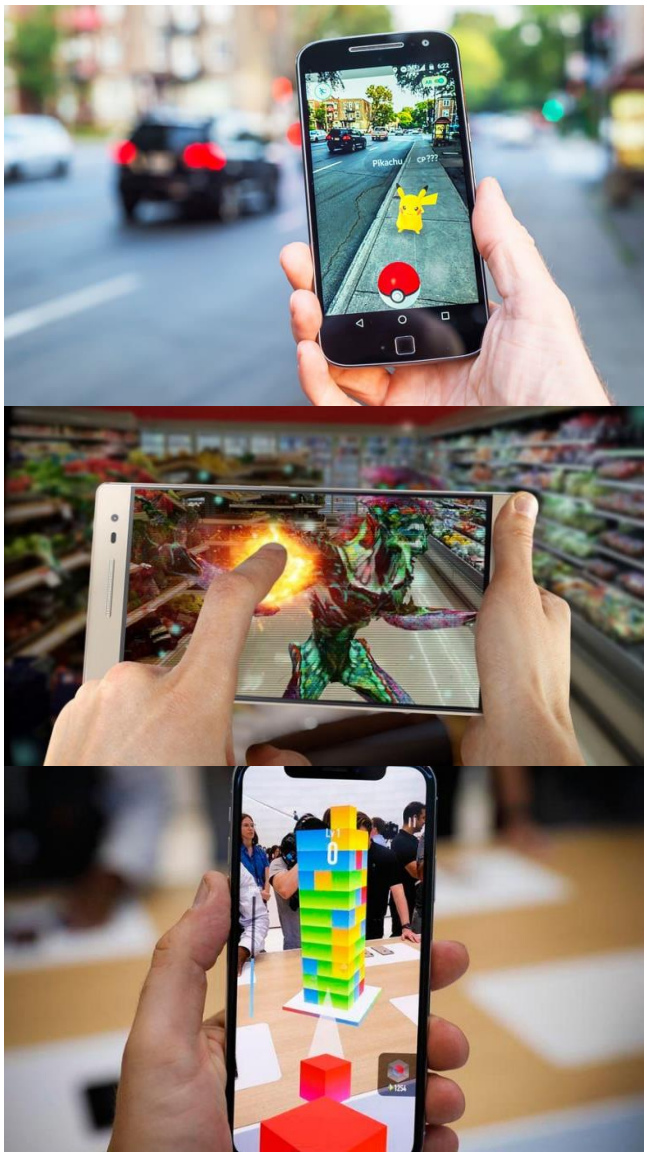

Figure 3: AR used in games

The AR based games have recently got huge response from millions of users and predicted to be the future of gaming industry.

Moreover, AR is rapidly used in commercial industries such as engineering, construction and architecture. Due to the utilization of AR, it becomes more easier and meaningful for the engineers and architectures to design and implement. **Figure 4** shows how AR is used in engineering, construction and architecture.

Figure 3: AR used in engineering, construction and architecture

However, these are the current status of Augmented Reality in industry and in research. There are a lot things that is ongoing using augmented reality but have not been stated here.

Roadblocks

Although, there are lots of advancements in the field of Augmented Reality but still there are some roadblocks which sometimes hinders the development of mobile supported augmented reality. One of the major problem is that there are large of people who uses feature phones and do not use any smart devices. As a result, they cannot access the features of augmented reality.

In spite of the developing interest in augmented reality and the enormous assortment of advances and research, a few roadblocks still exist that must be identified. In this part, the limits that describe the current state of the specialty of augmented reality dependent on the accompanying perspectives: innovation, social acknowledgment, ease of use are arranged.

Significant advances made in every one of the zones depicted in this paper. In any case, there are still constraints with the innovation that should be survived. Augmented Reality framework needs to manage immense measure of data in all actuality. Subsequently the equipment utilized should be little, light, and effectively versatile and adequately quick to show designs. Additionally the battery life utilized by these convoluted AR gadgets is another restriction for AR's employments. Likewise, AR following necessities some framework equipment, for example, GPS to give precise marker, request that they be both exact and adequately dependable. These equipment deterrents should be settled for useful AR use. AR frameworks ordinarily acquire a great deal of data, and need programming to channel the data, hold valuable data, dispose of futile information and show it in an advantageous manner.

Conclusion

In this paper, a complete and detailed survey of the current state of mobile supported augmented reality is provided and we have seen that there are huge advancement and applications of mobile augmented reality.

Although there are some roadblocks or challenges in the field augmented reality, but there is huge opportunity in the future as it will be used in commercial industries rapidly and also in education. This is because Augmented Reality increases engagement and interaction and provides a richer user experience.

In spite of the fact that there is inadequate research right now on the effect of utilizing mobile AR in industry, but there is a good space and huge possibility to explore the potential of AR to improve its uses in industry, education and also in daily life.

References

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[5] https://medium.com/@the_manifest/mobile-augmented-reality-in-2019-6a4f687f900