IOT IN CAD 4.0 WITH AUGMENTED REALITY GLASS

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Abstract. This product absorbs the power of our smart phone to endow with the augmented reality (AR) experience. The sensor data fusion and camera allow the software to accurately recognize and trail the surroundings. Radial target image can be easily identified and trailed with the help of our smartphone, thereby creating a link between the holographic image and the target image is possible. This software allows us for the viewing of our own 3D CAD models in augmented reality. The software makes it achievable to sight any CAD models in accurate three dimensions (3D), to size, and in the real context of our own situation. Through mirror, lightweight stereoscopic lenses, and combiner glass, stereo image can be focussed on display before our eyes. As a result, virtual 3D holographic image is generated, which can be viewed from any angle.

1. Introduction

Computer Aided Design (CAD) is the tool, which plays main vital role in every mechanical and automobile organization. Every product should be designed by design engineer as per organization requirement. But visualizing the CAD structure in a computer screen is not sufficient for uneducated peoples and also it is traditional method. Augmented reality gives better solution of these problems. Augmented reality (AR) is a type of technology which makes blend between a real world and computer graphics coexisting in the same place. It has proven in many different areas, such as engineering, medical and education. There are some smart glasses gained attention by most of the peoples who loves AR experience. In any mechanical organization customer satisfaction is not only depends upon quality, time and budget of the components. Now a day’s customers expecting from organization how they different from others. Those cultures will be come when, through only these types of technical interactions with our customers and their feedbacks. When compared to smart glasses, augmented reality glasses much cheaper than that. Augmented reality glasses give better experience of our own customers. Here both software (UNITY software) and hardware (AR glass) gives better AR experience in many industrial and non-industrial fields. Here it is manufactured only for mechanical and automobile organization’s development. But it is also used for some other fields such as civil construction, architecture planning, education and medical. In civil construction it is used for constructional design and showing that to clients in a virtual 3D view for customer satisfaction. The organization will be developed through these types of activities. In architectural it is similar to constructional design but here we can place our Computer Aided Design (CAD) structure in real and
we can transport or change the colour of the particular product as per the requirement. In medical field it is used as a tool for patient education, both for treatment and disease prevention. Through this patient can learn about taking medicines or contacting doctors when specific symptoms occur on their body. Most of the students having smart phone now a day. So, there is no need to any new equipment for AR experience. They just installed this software in their smart phone is enough to achieve AR experience.

2. Literature review

2.1. Mehdi Mekni and E Lemieux, 2014.
The author explained about augmented and virtual reality in a mobile technology. These projects used for various applications in all over the domain such as medical, military, robotics, games, entertainment, manufacturing etc., here the author conclude as it is a future based project in architecture, engineering and construction.

2.2. Petar Pejić and Taško Rizov, 2014.
Augmented reality gives rapid development in manufacturing industry. For example, author gives real time pictures of the actual application in both mechanical and architectural field. Here the author says it is an emerging technology in education. Students can easily identify the actual 3D structure of 2D diagram which is being the textbook also they can get real time experience.

2.3. Jorge Bacca and Silvia Baldiris, 2016
Author referred 32 studies published in indexed journals and he gives an overall literature of the augmented reality and virtual reality in education. Both AR and VR gives better experience to the students who want to know about actual structure of what they are studying in their textbook. Author describes the level of augmented reality in education in the period of 2014.

2.4. Philipp A. Rauschnabel and Alexander Brem, 2016
Here author compared augmented reality in mobile technology and wearable gadgets such as Microsoft hololens, google glass and smart glass. AR gadgets gives better experience than the mobile technology when application like a mechanical, architecture and medical. By using this method customer intention can be reduced.

2.5. Abrar Omar Alkhamisi and Muhammad Mostafa Monowar, 2013
Author describes augmented reality growth and future applications in a various field. Study explains about how to get customer attention, fulfilling their expectation and economic growth compared to competitive companies in the market. Also, it deals about various applications such as medical, education, news and sports.

3. Augmented reality and virtual reality

3.1. Augmented reality (AR)
AR is a field of view (FOV) where it mixes of both real world and virtual world through software. It gives better augmented experience of software user’s when compared to virtual reality. It is the current research of all over the software developing organizations. Through this we can scale, rotate any designed CAD part as per our requirement.

3.2. Virtual reality
Virtual reality is the field of view (FOV) where it consists only graphical world through software. It is the traditional method of viewing any CAD parts with the help of computers. It is only possible when user know about that particular software. Best example of virtual reality is games. Every game developed under the virtual reality platform.
4. Smart glass
It is a type of glass which is used to provide better augmented experience for users. There are few glasses developed for AR experience such as, google AR glass, AR Microsoft hololens and some other AR glasses like a game glass.

4.1. Google glass
It is a device which can be wearable by peoples. It is accessed by human’s voice or touch control. It can be identified by GPS location also it gives current status of flight, train, time, temperature and location.

4.2. Microsoft hololens
Compared to google glass, it gives real time AR experience of the actual object in a particular place. Industrial peoples referring hololens compared to google glass for purchasing.

4.3. AR Glass
It is not like a smart glass, but it is cheaper than that cause of there is no need of importing programs into this. It has basic construction and simple principle of working to achieve AR experience. But it needs smart phone to achieve AR vision as shown in figure. Here it gives very much support to augmented reality view for users.

5. Procedure of software development

5.1. CAD Design
Computer aided design is the use of computers to create, modify or analysis and design. There are number of designing software’s available for both constructional and mechanical fields. But augmented software can read any 3D CAD models as well as poly modal objects. Through this we can achieve augmented experience when we designed in any CAD software.

5.2. FBX Conversion
This software can accept any 3D object which is designed in any designing software. But the main condition is importing file format should be in a film box (FBX) format. In figure. We can easily understand the basic difference between field vision of both CAD and FBX format files. Because of unity is game developing software and it can read only FBX, 3Dmax and some other formats.

Figure 1. converted file from CATPart to FBX
5.3. Development of license and target image through Vuforia developer

Here the process of buying license and target image which is user will scan in future for occurring holographic image. Vuforia developer website providing unity license and database for user’s target image. Actual screen shot of Vuforia website as shown in figure. Here the format of image file (JPG) converted to unity file format. Then we can import both our license and target data base easily in a unity software.

![Vuforia website](image)

Figure 2. screen shot of Vuforia developer website

5.4. Unity software

Here only the maximum process taken for achieving augmented reality experience in user’s smart phone. First, we have to switch the platform either android, iOS, mac or windows. Next step is importing both license and target image into the software. After completion of importing file we can import our CAD file. Check whether target image can read by unity software or not. Then develop unity software for corresponding CAD modals. Actual screen shot of unity software as shown in figure. At finally install software in user’s smart phone and the augmented view CAD modal will be show in real world.

![Unity software](image)

Figure 3. Screen shot of unity software

6. Principle of AR glass working

The angle between Smartphone’s display and mirror is 40º inclination. The Fresnel lens placed right angle (horizontal) to the mirror. The combiner glass placed same as like that of mirror but in opposite side. First, the Smartphone’s vision passed on the mirror. The wave of Smartphone is wide in initial condition. Now the wide wave reflects on the Fresnel lens and the wave becomes straight with each
other. Thus, the straight wave passed on the combiner glass now the clear augmented experience we can be attained.

7. Conclusion
Through these types of activity, we can improve our customers in our organization, knowledge in education, information about true 3Dview of organs in medical field and make our own construction and present that in front of our customer in augmented view. In future everywhere artificial intelligence will be come. That time we should know about these types of concepts and softwares.

References
[1] Abrar Omar Alkhamisi and Muhammad Mostafa Monowar ‘Rise of Augmented Reality: Current and Future Application Areas’, International Journal of Internet and Distributed Systems, 2013, 1, 25-34.
[2] Bacca, J., Baldiris, S., Fabregat, R., Graf, S., and Kinshuk ‘Augmented Reality Trends in Education’, Educational Technology & Society, 17 (4), 133–149.
[3] Petar PEJIĆ, Taško RIZOV, Sonja KRASIĆ and Bojana STAJIĆ (2014) ‘Augmented reality application in engineering’, SMAT2014-AEM37.
[4] Philipp A. Rauschnabel, Alexander Brem and Young K. Ro (2016) ‘Augmented Reality Smart Glasses: Definition, Conceptual Insights, and Managerial Importance’, research gate, Article · July 2015
[5] Mehdi Mekni and André Lemieux (2014) ‘Augmented Reality: Applications, Challenges and Future Trends’, ISBN: 978-960-474-368-1