Study on recent advances in Virtual and Augmented reality

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Abstract—Virtual engineering is an emerging technology which integrates geometric models and related engineering tools such as design, analysis, simulation, optimization and decision making tools within computer-generated environment that facilitates multidisciplinary collaborative product development. VM use computer aided design models and simulations. It does not use prototype instead of that it use direct design by using different software. It use real tools or other components into projection to simulate the product. The use of VM concepts improves decision-making and quickly achieves anything with high performance and quality at a low cost. This paper aims to elaborate the ideas on virtual and augmented reality.

Keywords— Virtual engineering, Goggles, Software, Virtual reality, Augmented reality, Virtual environment, Applications, Future.

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1 INTRODUCTION

VIRTUAL reality concept was introduced by Jaron Lanier in 1989. In 1990 the concepts of Virtual World and Virtual environments appeared. In virtual reality, we are collaborating with the virtual world but it is not true. Its advance technology is called augmented reality. In augmented reality, the virtual things are projected in the real world. It does not create any other virtual world as virtual reality. The virtual things are mixed in real world for efficient collaboration. This concepts are introduced to save a time and money. The money is wasted in many field because of wrong output. But it is completely reduced while using these concepts. It is an application provision. It is used for many purposes in a proper way for efficient outcome.

2 SOFTWARE

2.1 2d Drafting

2Ddrafting is the computer based generation of two-dimensional digital images of models. These images provide full dimensional information of those model. And also provides different views of objects such as front view, top view, sides view, etc. Now a day there are several software are available in the market for 2D drafting such as AUTO CAD, AUTODESK, DRAFTSIGHT, DOUBLECAD, DELTACAD, AUTODESK INVENTOR, DESIGNCAD etc.

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2.2 3d Modelling

3Dmodeling is the process of creating a mathematical representation of 3D surface of object from specialized software. The product is called a 3D model. It displayed as a 2D image through a process called 3D rendering. The model can also be physically created using 3D printing devices. Software used: PRO/E, SOLIDWORKS, CATIA, 3DCRAFTER, AUTOCAD, DRAFTSIDE and CREO ELEMENTS etc. Assembly already modelled 3D parts are assembled to get final realistic view of object. This also describes the actual location of every part. This also shows the actual location of every part in final object. Software used are same as for 3D modelling. It provide the perfect outcome of the product before it is established in real time.

3 VR GOGGLE

The glasses behave in a similar way to a pair of 3D goggles in that they display to images. Ordinary goggles show a single image but 3D and virtual reality glasses contains polarised lenses to show two images one per each eye. These images appear to give an illusion of depth which is a particular feature of CAVE environment.

The technical name for this technology is called stereoscopy. It consists of a head tracking system to capture the motion of wearers. It is networked with the computer and it tracks the motion and it produces the virtual environment. The tracking should be accurate as it can be or else the illusion breaks down.

These glasses enable the wearer to see the three dimensional images. The goggle of AR or VR is shown in Fig.1.

Fig.1 VR or AR Goggle

4 AUTOMOBILE TECHNOLOGY

During the manufacturing of automobile parts, the augmented reality concept will used to check the parts from any other damages. It also use to find out the impact of accidents. The parts are already programmed into the software. Then, it scan the parts to find out the damages. If any mismatching between the programmed drawing and parts it will clearly indicates. This concept is closely applicable to the aerospace parts manufacturing which parts need so accuracy.

During the servicing of vehicles after a period of time, augmented reality used to find out the repairing parts of the vehicle clearly and quickly. It will also use in assembling section for the parts to be assembled at a sequence way by augmented reality. It will show the arrow mark of the parts which it is going to be assembled. If any other assembling are assembled wrong which is indicated by the red light by light sensor. It scans the parts and find out the oil level low in this below fig.2.

Fig.2 AR in repairing of Vehicle

5 CONSTRUCTION

In the field of construction this concept will used to build a construction economically. Before we construct the building, the prototypes of the building are made by using the augmented reality. We adjust the model and made the different plans easily during the construction. It lead to reduce the material cost and unwanted cost.

It should be used for measurement easily and where we start the operation of building. Without using these scales, mini drafter etc. we can able to measure the dimensions of the required area in a short period of time. It also provide the output of the building prototype for the easy analysis.

Fig.3 VR in Construction

6 DEFENCE

The concept of virtual and augmented reality is efficient in the field of defence. As per the record, 12% of the soldiers are died per year. It should happen only due to lack of training or accidents. While using these VR or AR glasses in the field of military, it will definitely reduce the death rate of our soldiers. It will easily identify the place where the landmine is dig and reduce the accidents. It will also use for providing a training for the soldiers to make them more perfect.

During the training period, the soldiers are prepared for the war by this technology. When they wear the VR glass they are taken into the virtual environment of war zone. In that they can easily identify the usage of each guns and equipment properly. They can virtually use the guns and equipment to attack the soldiers. While during the war, our soldiers absorb the tactics and attacking movements of the enemies. Then, it will help them to attack in real time war zone. At some critical operations in the defence, they arranged the virtual section for planning of the operation. They can made the map blue print in augmented reality and plan the attacking areas. If any problems raised, they make changes in their planning and execute the mission. It really helps to provide a proper planning operation with less damage. It really make efficient ideas for attacking due to this kind of virtual brainstorming session which is shown in fig.4.

Fig.4 Virtual Brainstorming session

These kind of sessions are in a secret camp which is in the dark room.

At real time war, the soldiers wear the glasses to identify the enemies, landmine, weapons etc. First of all, while introducing any other innovation in the field of defence like robots, drones, Rovers etc. are tested virtually. They are tested and modifications are noted to overcome that kind of problems. When the AR is collaborated with AI it will resolve the problems easily through providing the path way to overcome the problems.

7 EDUCATION

This concept will also efficiently used in education purposes. The integrated parts of any subject is learnt easily through collaboration with the each parts. The each parts of the subject are projected through goggles and it will provide the education easier. This also used to send the education to the students efficiently. Especially in the field of medical, the organs or functions of each groups are separately projected and it will lead to provide good understanding of that subject. This technology used to provide good education concept to the students. The AR uses in Education system is shown in the fig.5. In the field of Mechanical Engineering the different types of mechanisms are easily separated through AR and see the function of each mechanism. This will help to improve the learning process of the students. It will also helpful for Electrical field to see the output virtually before any other accidents. In chemical industries, they are using this technology for seeing the output of the reactions. It will lead to reduce the accidents.

Fig.5 AR in Education System

Nowadays, the augmented reality apps are created and it is available in the mobile phone at Google play store. This technology is also used in Restaurants, Hotels etc. for the order of food items after seeing the food items virtually. Not only these areas apart from that the virtual gaming are also available for the entertaining purposes. Especially, chess is played with augmented reality if one person only available.

8 VIRTUAL MACHINING

If a CNC process is done by directly a manpower it leads to error and it may be at risk. So by using this VM technology, we see the outcome of the machine. We develop the virtual CNC and do the machining through it, it acts as a practise to programming a CNC. So, if outcome is sufficient for our need then it is feed to the CNC machine by networking and it is feed to many no. of machines at a same time to reduce the time consuming. So, the operator works by only using the computer. Material handling robot is used for loading and unloading of a job. It shows the outcome of a workpiece. If any error appears in the virtual machining it is to be rectified easily by controlling the programming system.

9 SPECIAL APPLICATIONS

It also used in designing of the automobile parts. If once the vehicle has been made, then the design of the vehicle is changed and see the outcome at that same time to find out the appropriate design. In aeronautics, for analysing the wings this technology is used. Some apps from Google play store also used for just entertaining purposes of augmented reality.

This augmented reality is used in designing of shoes while manufacturing a product. This technology allows to change the different designs of the shoes for the convenient design. We can also able to change the colour of the shoes if it is designed through AR. It is also same for changing the colour in vehicle.

Not, only these above mentioned fields, this technology is used. It can be used just before anything is really going to be applicable. For example: For high expensive rover which is going too introduced in space is first tested virtually and analyse the problem that the rover faced. Then it should be modified and take this into the real product. This definitely reduces the time and cost of the product. This also allows to test the soil, land, rocks of other planet virtually. If chandrayaan 2 is tested through virtually before it is real product of design, we will definitely find out the wrong design and analyse the problem to resolve easily.

CONCLUSION

As the conclusion of this paper, I can say that, we have now reached a point where everyone can use Virtual and Augmented reality. Google and Microsoft launches Microsoft Hololens for the future technology. Now, the technologies are available in our step doors. So, this kind of technology evolve efficiently and it will going to provide a life of future. But it will also cause addiction to the peoples who are all involved in the game. So use this technology in a fair way not in a bad way. It really going to revolutionize the world.

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