

A Survey on Virtual reality platform and its Applications

Akrati Bhat, Gunjan Bhagwat, Jagannath Chavan

Abstract—In this paper we present a survey about Virtual Reality, Augmented reality and its applications. The design of the system is based on a mobile device, processor, sensors and various other hardware. The inserted objects must appear stable in the display and must not have any noise, jitter and drift as the user moves around and examines the scene with the Google cardboard. Computer systems with large scale virtual reality demands more memory for computation but cannot offer that much for computation. In this paper, the ways to tackle such cases and various other applications of virtual reality and augmented reality are discussed. The dynamic loading of the image consists of various noisy data as well, which can distort the image. Therefore a static model of the building is considered and implemented. In civil engineering, the new way to visualize the construction and management can be added through the use of three-dimensional (3D) model which, facilitates the interpretation and understanding of target element of maintenance and construction and of 4D models (3D + time) through which the evolution of construction steps and deterioration of materials can be visually demonstrated and understood.

Index Term: Three dimension, four dimension, deterioration, Google cardboard, processor, sensors.

I. INTRODUCTION

Virtual reality and Augment reality slowly and steadily comes into our daily life. Before, virtual reality was tied to gaming but as the technology increases it has various other applications. The basics of virtual reality was first time introduced in “The Ultimate Display”, a seminal paper by van Sutherland [1]. The challenge set was as the screen is a window, which is having the capability as one can see a virtual world. The world must look like a real world which can act real, sound real, and feel real. The motivation for such a research from the evolutionary perspective is to overcome the limitations of standard human-computer interface; from a revolutionary perspective, virtual reality technology by presence simulation, opens door to new technology.

1.1 Objective

With the increase in computer processing power and in the quality of camera with the decrease in price and size of other sensors like global positioning system (GPS) allow

quite compelling systems to be built. The building automation was very expensive previously, but with the use of virtual reality technology the building blue prints can be easily made without huge expenses. This will be a cost effective way of envisaging real circumstances that enhance effective communication of design and idea without manufacturing physical samples.

1.2 Previous work

Limitations of existing systems or the awareness of technological advances relating to the particular are involved in particular systems which competitors are developing. Automation systems projects” originate from many reasons: to achieve greater speed in accessing the devices, better accuracy and more real-time, faster device access, integration of business areas, reduced cost and better security. The sources also vary project proposals originate with department managers, senior executives and systems analysis. When the request is made, the first systems activity, the preliminary working begins. The activity has some parts: feasibility study and request approval. The existing technology is also good and implemented but not as much user friendly and less costly. We develop the automation system that must user friendly. The user can easily interact with it the realistic view provide great likeness of user as he/she can see virtual view of his/her home and can easily interact with it by simple touch. So we develop the system that provides application i.e. the mobile device gives the virtual view of the home with current status of all appliances that is to achieve user friendliness. We use and unity 3D interface for that purpose. So the system will made fully static system. Here we are going to make a 3D model (blueprint) of the system which will reduce the overall costing [1].

2. TECHNICAL APPROACHES

2.1 Virtual reality

The meaning of the word Virtual reality comes from the combination of two different words ‘virtual’ and ‘reality’. ‘Virtual’ means which doesn’t exist in almost or nearly as described, but not completely or according to strict definition and ‘reality’ means is what we experience as a

Akrati Bhat, Computer Engineering, SKN SITS, Lonavala, Pune, India, 9096349106.

Gunjan Bhagwat, Computer Engineering, SKN SITS, Lonavala, Pune, India, 9987978550.

Jagannath Chavan, Computer Engineering, SKN SITS, Lonavala, Pune, India, 7350137371.

human being. Computer as a tool in almost every human activity domain have been marked. With the introduction of human friendly interfaces have contributed a lot in the development of such technology [1].

- What is virtual reality?

"What is virtual reality" in technical terms is straightforward. Virtual reality is the term used to describe a **three-dimensional, computer generated environment** which can be explored and interacted with by a person. That person becomes part of this virtual world or is immersed within this environment and whilst there, is able to manipulate objects or perform a series of actions.

- Virtual environment

Many people who work with virtual reality prefer to use the term 'virtual environments' instead. This is a response to a perceived negativity to this technology which has often turned out to be true. There are people who view virtual reality with little enthusiasm and dismiss it as 'science fiction', seeing it as having no practical application in the real world.



Fig (2.1) Sample of Virtual Reality

2.2 Augmented reality

Augmented reality is a concept related to virtual reality with the difference in the way of taking input. Augmented reality takes real world environment as input and performs operations on it. Various other computer generated sensory input such as sound, video, graphics or GPS data are also used. Augmented reality enhances one's perspective while as virtual reality replaces the real world with a simulated one. Artificial information about the environment and its objects can be overlaid on the real world.

Augmented reality uses hardware components such as: processor, sensors, and display and input devices. Modern computing devices, mobile devices (smartphones, tablet computers) etc. consists of these elements which includes camera, sensors (accelerometer, GPS etc.) making them suitable for AR platform. The applications of augmented reality is in the field of military training [4], medical system [5,6,7], engineering and consumer design [8], robotics [9], as well as manufacturing, maintenance and repair [10,11].



Fig (2.2) Example of Augmented Reality working

2.3 Virtual Prototype (VP)

Construction of digital product model ('virtual prototypes') which is a computer aided design process and which is realistic graphics simulation is called as Virtual Prototyping. Various fields such as aerospace and automobile are extensively and successfully using this technology [2]. For instance a 3D model of an automobile can be created which will be seen, analyzed, manipulated by all the team members. Hence, they can better identify the problem at an early stage without wastage of time and money. There have been a limitations in this field also, as, every construction project differs from each other in terms of their conditions, requirements and constraints. Product development uses the method Virtual Prototyping. To validate the design computer-aided design (CAD), computer-automated design (CAutoD) and computer-aided engineering (CAE) software are used, before making any physical prototype.

3. VIRTUAL ENVIRONMENTS

The most common virtual environment being used is 3D (three dimensional) environment in various fields such as: architecture, construction, engineering etc. Different layers of design drawing are shown which are complex, frequently, therefore creates hindrance in understanding it. 3D visualization provides a better platform for shared understanding of every individual in a team. The end users of the application are non-technical people, for them the complexity of the model need to be reduced. Therefore a reduced level of complexity is preferred. Various graphical techniques like CAD are used for this purpose. For specific goals, different types of fertility can be achieved by both 2D and 3D visualization. The real field scenarios can be very expensive in terms of management and cost estimation as it may be logistically difficult, dangerous or too difficult to control. The real world input may also contain many noisy data which should be processed before using it. Being present and interacting with real objects or virtual objects via visual is nevertheless same experience for the operator. Building automation or construction planning has been considered as a critical process in early phases of project. There were many shortcomings of traditional communication tools as there were the need to make a physical blueprint of the construction site and now with the use of modern digital technology various techniques have been simulated and a new innovative construction process planning technique in order to enhance the construction

sequence visualization and finished product. The latest development is in the field of four dimensional (4D), which is related to graphical presentation of construction plan. Four dimension graphics is the combination of 3D graphics images and time. 4D visualization provides a better and a efficient means of communicating spatial and temporal information [3].

4. APPLICATIONS OF VIRTUAL REALITY

Virtual Reality is now-a-days used in various fields such as:

- Military simulators
- Telecommunication
- Building Automation
- Remote sensing
- Medical applications
- Entertainment industry etc.

➤ *Military simulator*

Virtual reality has been adopted by the military – this includes all three services (army, navy and air force) – where it is used for training purposes. This is particularly useful for training soldiers for combat situations or other dangerous settings where they have to learn how to react in an appropriate manner. One of the earliest uses of simulators in a military environment was the flight trainers built by the Link Company in the late 1920's and 1930's. These trainers looked like sawed-off coffins mounted on a pedestal, and were used to teach instrument flying. The darkness inside the trainer cockpit, the realistic readings on the instrument panel, and the motion of the trainer on the pedestal combined to produce a sensation similar to actually flying on instruments at night. The Link trainers were very effective tools for their intended purpose, teaching thousands of pilots the night flying skills they needed before and during World War II.

➤ *Telecommunication*

Telecommunications is another field which has utilized virtual reality technology, in particular mobile communications which enables easy access to a variety of VR based projects. The main challenge is that of dealing with a medium which mainly relies upon tone of voice, intonation, gesture and body language as compared to spoken words. In fact, spoken words only account for a very small percentage of the overall communication.

➤ *Entertainment*

The entertainment industry is one of the most enthusiastic advocates of virtual reality, most noticeably in games and virtual worlds. But other equally popular areas include:

- a) Virtual Museums, e.g. interactive exhibitions
- b) Galleries
- c) Theatre, e.g. interactive performances

- d) Virtual theme parks
- e) Discovery centers

Many of these areas fall into the category 'edutainment' in which the aim is to educate as well as entertain.

➤ *Building Automation*

Virtual Reality technology is also used in building automation. A Virtual prototype is made, which is less complex to understand and can be easily understood by a non-technical person.

➤ *Medical*

Medical is one of the biggest adopters of virtual reality which encompasses surgery simulation, phobia treatment, robotic surgery and skills training. One of the advantages of this technology is that it allows healthcare professionals to learn new skills as well as refreshing existing ones in a safe environment. Plus it allows this without causing any danger to the patients.

5. ORIGINS AND PERSPECTIVES

In the late 1950's the idea of virtual reality came into picture. But the public really became aware of it in early 1990's. In the mid 1950's, a cinematographer named Morton Heilig envisioned a theatre experience that would stimulate all his audience's senses, drawing them in to the stories more effectively. A single user console in 1960 called the Sensorama that included a display, fan, speakers was made.

CONCLUSION

At the present time a good commercial products choice exists for visual tracking, and user input interface. But all of them have more drawbacks than uses. Virtual Reality technology have proved itself as a better technology than others. Virtual Reality was introduced and used for only gaming purpose, but as the technology increased, Virtual Reality became a part of various applications such as military, robotics, education, research etc. VR is offering its presence simulation to the users as an interface metaphor to a synthesized world. VR has reduced the complexities of various fields and has removed the difficulties associated with achieving the key goal. There is a need that successful virtual reality applications must combine new input and output devices in ways that provide not only such an illusion of existence of synthetic objects. After considerable achievements done by Virtual Reality now we can finally say that Virtual Reality is here, and will exists foe ever. As a conclusion, we can say that given the complexity of VR, the importance of human factors, and the lack of standard solutions, the secret of successfully implementing professional VR applications is to set realistic expectations for the technology.

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AUTHORS



Akrati Bhat, she is an engineering student of Computer at SKNSITS, Lonavala, Pune, affiliated under Savitribai Phule Pune University. She has done survey on the topic "Localization and Positioning". Her interest is in the field of Networking and Artificial intelligence but she's a versatile writer capable of delivering a paper on almost any topic.



Gunjan Bhagwat, she is an engineering student of Computer at SKNSITS, Lonavala, Pune, affiliated under Savitribai Phule Pune University. Her interest is in the field of Artificial intelligence. She has a good hand in coding. Gunjan has a strong knowledge of literature and the ability to write accurately in a deadline-oriented atmosphere.



Jagannath Chavan, he is an engineering student of Computer at SKNSITS, Lonavala, Pune, affiliated under Savitribai Phule Pune University. His interest is in the field of Artificial intelligence. He has a great interest in the field of animation. Jagannath writes in a brisk, entertaining style that is effective for both consumer publications and academic essays.