

## Virtual Reality -living the “CAVE” Again

Nikhil Chawla<sup>1</sup>, Nidhika Gupta<sup>2</sup> and Kavita Choudhary<sup>3</sup>

*ITM University, Gurgaon, India.*

### Abstract

Virtual reality is an artificial environment that is created with software and presented to the user in such a way that the user suspends belief and accepts it as a real environment. Virtual reality comes, naturally, from the definitions for both ‘virtual’ and ‘reality’. Virtual and reality though being contradictory together can revolutionize the world. Virtual reality is a simulated environment of our present physical world. From virtual reality in 1860s with 360° art "BaldarsarePesuizzi" to “Oculus Rift HMD” in 2012 the world has gone through a drastic upliftment and a lot is yet to experience. Presently hardware technologies such as Head Mounted Display (HMD), Binocular Omni Orientation Monitor (BOOM), Cave Automatic Virtual Environment (CAVE), Data glove, Control devices and software technologies such as Multiverse, Virtual Reality Studio, Sense8 World Tool Kit and Autodesk Cyberspace Development Kit are widely used. In this paper, we will be covering future impact of virtual reality like the ideal interface to interact with virtual world through brain-computer link. Computers will read thoughts and brain would be RAM. Human clones (Avatars) with human level artificial intelligence will be present with life in them.

**Keywords:** Gesture Recognition, CAVE, Augment Reality and Head Mounted Device.

### 1. Emergence

Although Virtual reality is a buzz word today, it had humble origins way back in the 1950s. A US Navy radar technician Douglas Engelbart thought of displaying digital information on a screen more like a radar. The idea gained ground in the 1960s when both computer and graphics technologies were evolving fast. These interactive

technologies laid the foundation on which VR emerged. As more powerful and speedier computers emerged over the next three decades, VR took several giant leaps. Computer generated graphics replaced videos and models facilitating the use of VR in different fields. The flight simulators and radar systems were the early products of virtual reality. The entertainment industry picked up VR alongside the military industry. In the 1970s Hollywood had started using computer generated special effects to produce stunning film Star Wars was perhaps the first film to use VR technology. The digital game industry soon found that VR environment could be used to produce computer games. The creation of newer computer applications led to the emergence of games like Nintendo. In the 1980s computer generated scientific visualization had moved to animation. Animation however was costly. Besides, it was not interactive. It was at this stage that VR really came in to its own. The need for use of VR was felt in media, sports, entertainment, health, education, business, films, and fashion, construction, engineering and programming languages. And so we find today that the scope of VR in the modern world is virtually infinite. Flow of journey:

- Virtual reality can trace its roots to the 1860s when a 360° art SALA DELLE PROSPETTIVE by Baldassare Peruzzi began to appear through panoramic murals.
- In 1960s the Sensorama was developed which gave the player an experience of riding a motorcycle and 3D view of the city.
- This was followed by the development of visual flight simulator for the air force by Thomas A. Furness III.
- In 1968 the first VR and AR HMD was developed but failed due to weight.
- Later in 1977 a VR system named Aspen movie map was created at MIT which facilitated the user to take a virtual tour through the city of Aspen, Colorado.
- VR was then popularized in 1980s with the innovation of goggles and gloves system.
- In 1991, a virtual reality system to "drive" Mars rovers from Earth was developed.
- In 2012, Oculus Rift a HMD was developed by Palmer Luckey.

## 2. Factors Influencing Virtual Reality

Virtual reality is all about the knowledge how to "fool the user's senses" and this was not easy to do. Sufficient good solution has been found. It has been researched that sight contributes 70% of the five senses. Hearing, smell, touch and taste contribute 20%, 5%, 4% and 1% respectively. By research it has been proved that human vision provide passed to our brain and capture most of our attention. Visual system has become the focus of research. Most of our I/O devices, hardware and software which are working on virtual reality are fooling our vision system and our senses. Virtual reality hardware are broadly classified as primary user input, tracking, visual, auditory, haptic and olfactory. All these are interfaces. Keyboard, Mouse, Joystick, 3D Pointing

Devices like Space ball, CyberWand ,Ring Mouse, EGG and Whole-hand and body input devices like 5<sup>th</sup>Glove,Handmaster ,ArmMaster and TCAS Dataware are some primary interface input devices used to interact with virtual reality. Tracking interfaces include Head and Body Tracking devices like PolhemousIsoTrak II and FastTrak, Flock of Bird,VideoDesk and Eye Tracking devices like BioMuse and DPI Eyetrackey to interact with virtual world.visual interfaces are most important. Tactile (touch) and Kinesthetic (force) are haptic interfaces and olfactory interface like electronic nose are used to explore depth of virtual reality. Software packages like Multiverse, Virtual Reality Studio, Sense8 World Tool Kit (WTK) and Autodesk Cyberspace Development kit are available to interact with virtual reality.

### **3. Applications**

The nature and scope of applications of VR technology are abundant. If today architects and builders take prospective clients on virtual tours of their buildings before they are built, automotive and airline industries put to use VR technology to design machinery by minimizing unnecessary physical trial runs.VR -related technologies now combine virtual and real environments. We use motion trackers to monitor the movements of dancers or athletes for subsequent studies in immersive VR. 'Augmented Reality' technologies enable the viewing of real environments with superimposed virtual objects. Telepresence systems like telemedicine, telerobotics, take the viewer in to a real world that is captured by distant video cameras and allow for the remote manipulation of real objects via robot arms and manipulators.

### **4. Future Scope**

World has seen the revolution brought by television, cell phones and internet and in near future world will be ruled by virtual reality. Future belongs to virtual reality. BOOM, HMD, CAVE, 3D glasses are some recent technologies which will change the way we think about our future. HMD is a display device providing a 3D format. CAVE is among one of the recent technologies of Virtual reality. It provides a illusion to the user of “being” in the virtual world or environment. It is immersive Virtual reality technology. Presently it is used in military, gaming, hospitality, architecture, medicine. University likes University of Illinois at Chicago use CAVE for teaching purpose and in future all the Educational institutions will use this technology. Architecture interactive is using Virtual reality Show room. Cave,Neuro gaming and hepatic gaming which are future of gaming industry will completely wipe out present gaming technology. Google sensic smart android HMD has gaming application and the oculus rift will even replace the big set up of cave and provide immersive technology in gaming .Oculus Rift Virtual reality is among one of the recent developments in the Virtual reality area. In Future Virtual reality will be having application in each and every field. Presently in architecture and Construction field we have “walk through” but in the near future client, home builders, real-estate developer and city planner will

use Virtual reality to make various changes in project. Virtual reality will be greatly assisting the planning board of government. Virtual reality has a vital role in the art field presently we can “Virtual” visit several of actual art galleries and museum via the internet. Recently Guggenheim and other museums conducted special exhibits of Virtual reality art works and in the near future work of art may become a physically navigable, interactive, and immersive expense. One will actually travel into Virtual reality painting, models or art work and will become a part of it and can interact with it. In business field 3-D visualization of the stock market is already present. In future education and training field will totally depend upon Virtual reality. A trainee will experience his job, work and experiments before he/she will actual face it with Virtual reality. Students will also be able to enter into books and interact with it. In engineering field Virtual reality has helped a lot. In the aerospace industry the new Boeing 777 was a fast aircraft to be designed and tested with Virtual reality technology.

## 5. Analysis: Present V/S Future

<u>Present Status</u>	<u>Future Status</u>
Presently virtual reality technology is mostly based on our vision system. Virtual reality devices like BOOM, CAVE and HMD etc. helps to interact with virtual environment through 3D-visualisation.	In near future, more attention will be paid on auditory, haptic and olfactory interfaces so as to increase the realism of virtual reality and to make it more user-friendly.
3D and 5D movies and games have given a glimpse of virtual reality. Virtual reality like CAVE is used to educate and train students and employee but it's too costly.	Neurogaming, Haptic gaming, Virtual tours, Virtual museums and Virtual theatres etc will change the entertainment industry.
Virtual reality is used in military field in flight, tank etc simulations and used in medical field to learn new skills and used in diagnostics tools such as MRI etc.	Virtual wars will substitute the real ones. Virtual reality would be successfully used in robotic surgery, surgery simulation and skills training.
Virtual reality is presently used in business for online shopping and in 3D visualisation of stock market. construction site.	Telepresence would change the routine business trends. “Virtual walk through” technology will be present with real estate and manufacturing companies.

## **6. Technological Development**

- 2010-2015: video-realistic graphics based on general-purpose stable rendering systems.
- 2015-2020: integrated persistent worlds.
- 2015-2020: global physics with unlimited world complexity and simulation of most physical aspects.
- 2015-2020: sufficiently good non-human and domain specific human AI. Programmatic sound. Most aspects of reality can be simulated sufficiently well. Realistic simulations of all senses (through brain-computer interface).
- 2030+ : good human-level artificial intelligence.
- 2045+ : uploading and life in virtual reality.

## **7. Impact of Virtual Reality**

The effect of Virtual reality on society is a topic of heated debate these days. It has its own votaries and opponents. Even as this debate ranges, it is clear that VR is bound to play an increasingly greater role in life both private and public. Those who favor VR say it is way too more personal than for example email, messaging, the good old handwritten letter and a phone conversation. It also finds acceptability across age, cultures, and language barriers. It is thus described as a social leveler. They say that people will interact driven by interests they share rather than geographical position. The votaries of VR also say VR will make communication far too effective, productive and rewarding. It enables people to find their own special field or discipline. Besides, it is a medium that gives people total freedom of expression. We now come to the cons. The opponents of VR opine that it will limit inter-personal human relationships which are an inescapable aspect of human social life. They also feel that interaction should not be substituted for community.

## **8. Conclusion**

Virtual reality is still rapidly growing and generating great expectations, but the beginnings of a mature phase are apparent. Researchers define specific selection or use criteria. Efforts increase to integrate the once new technology with other technologies. As technological progress becomes more gradual, investigators focus their attention on unfulfilled hopes. Certainly future belongs to virtual reality and it has to patch up the loopholes present in current technology. Virtual reality finds a lot of applications in military, education, entertainment, business, medicine and construction etc fields. Fidelity, compactness, accessibility, economicalness etc are some factors on which work should be done.

**References**

- [1] Mazuryk T and Gervantz M, "Virtual Reality" <http://www.cg.tuwien.ac.at/>.
- [2] Arena D, Fox J and Bailenson N, Journal of Media Psychology 2009 volume 21 issue III.
- [3] Magnen N, "Virtual Reality software and technology" [www.infoscience.epfl.ch/Magnenat\\_Thalmann\\_Thalmann\\_Ency\\_99](http://www.infoscience.epfl.ch/Magnenat_Thalmann_Thalmann_Ency_99)
- [4] Gobbetti E, Scateni R, "Virtual Reality: Past, Present and Future" <http://www.crs4.it>