VIRTUAL REALITY SYSTEM

Research Paper—Information Technology

*Anusha. G

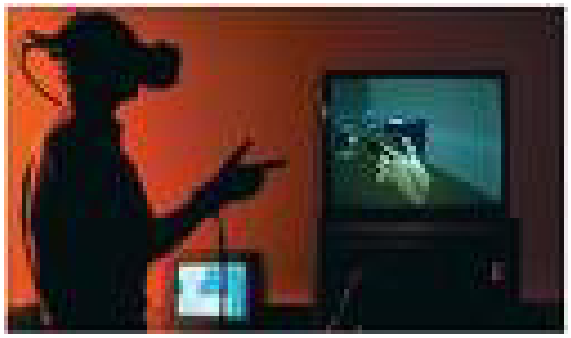
1. WHAT DOES VIRTUAL REALITY MEAN?

Virtual reality (**VR**) is an artificial environment created with computer hardware and software and presented to the user in such a way that it appears like a real environment. It is a synthetic technology combining three-dimensional video, audio, and other sensory components to achieve a sense of immersion in an interactive, computer-generated environment. To enter a virtual reality, a user dons special gloves, earphones, and goggles, all of which receive their input from the computer system,and in this way, at least three of the five senses are controlled by the computer.

2. VIRTUAL REALITY HISTORY

The term *virtual reality* first appeared in the late 1980s in Jaron Lanier's Virtual Programming Languages Incorporated (VPL), which introduced the first commercial system for controlling computer simulations through a dataglove and a stereoscopic Head-mounted Display (HMD). An artist himself, Lanier introduced Virtual Reality as a medium for shared self-expression. Over the past decades, two major streams of VR emerged: the one stream based on the HMD and the other stream based on the room-size projection of graphics for unencumbered interaction.

The helmet-based stream of VR emerged from military flight simulators. Frederick P. Brooks founded the virtual worlds laboratory at the University of North Carolina. Brooks began designing virtual worlds for solving problems in medicine, physics, and engineering. The other stream of Virtual Reality (VR) development came from the art world. Another environment, Psychic Space, allows participants to explore an interactive maze where each of footsteps corresponds to a musical tone, all produced with live video images that can be moved, scaled, rotated, without regard to the usual laws of cause and effect. Virtual Reality telepresence allows NASA operators in Houston to move a Moon Rover across the lunar landscape while feeling as if they were actually present in the vehicle on the Moon. Research in VR continues to explore the issues of what gives humans the ontological confidence to declare something to be real.



VIRTUAL REALITY 3D MOUSE

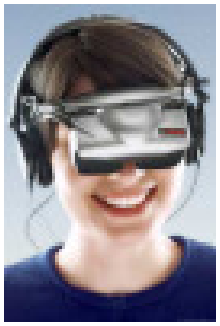
3. COMPONENTS OF VIRTUAL REALITY SYSTEMS

In its most basic form, virtual reality systems consist of a computer and software—known as the reality engine—and input and output sensors. A sensor is a device that responds to some physical stimulus. A human eye, for example, is a sensor that responds to light rays. Virtual reality input/output devices include

* B.Tech (III), Jyothishmati College of Technology and Science, Karim Nagar (AP)

head- and ear mounted equipment for hearing and seeing and gloves for controlling the virtual world. The fourth component is the user, who directs the chosen environment and reacts to it.

REALITY ENGINE : Reality engines are based largely on the same components that make up a personal computer (PC), although much more computing power is required for the reality engine than is available in a standard PC. Virtual reality images are made with tiny dot like segments of a picture known as pixels, or picture elements. Each pixel itself is made up of hundreds of thousands of dots. Realistic images can be either opaque, in which all the viewer sees is the virtual world, or see-through, in which the virtual image is projected or superimposed onto the outer world. To incorporate the total experience, the reality engine also may use haptic enhancement. Haptic experiences are those that involve the participant's senses of touch and pressure. Haptic cues, however, are complex and expensive and have been used primarily for military and research applications. Input devices are also important in VR systems. .



A HEAD-MOUNTED DISPLAY

HEAD MOUNTED DISPLAY (HMD): Head-mounted display (HMD) units use a small screen or screens (one for each eye) that are worn in a helmet or a pair glasses. Unlike a movie, where the director controls what the viewer sees, the HMD allows viewers to look at an image from various angles or change their field of view by simply moving their heads. HMD units usually employ cathode-ray tube (CRT) or liquid crystal display (LCD) technology. CRTs incorporate optic systems that reflect an image onto the viewer's eye. Although more bulky and heavy than LCD displays, CRT systems create images that have extremely high resolutions, making a scene seem that much more realistic.

A DATA SUIT TO PROVIDE USER INPUT

Major HMD applications include military, governmental (fire, police, etc.) and civilian/commercial (medicine, video gaming, sports, etc.).

AUDIO UNITS: The audio portion of virtual reality is transmitted through small speakers placed over each ear. Audio cues may include voices, singing, thud like noises of colliding objects—in short, any sound that can be recorded. Sounds that seem to come from above, below, or either side provide audio cues that mimic how sounds are heard in the real world. Three-dimensional (or omnidirectional) sound further enhances the virtual reality experience.

GLOVES: Gloves in virtual reality allow the user to interact with the virtual world. For example, the user may pick up a virtual block, turn it over in a virtual hand, and set it on a virtual table. Wired with thin fiberoptic cables, some gloves use light-emitting diodes (LEDs) to detect the amount of light passing through the cable in relation to the movement of the hand or joint. The computer then analyzes the corresponding information and projects this moving hand into the virtual reality. Magnetic tracking systems also are used to determine where the hand is in space in relation to the virtual scene. Some gloves use haptic enhancement to provide a sense of touch and feel.Virtual reality gloves may use either air pressure (such as strategically placed inflated air pockets in the glove) or vibrating transducers placed next to the skin (such as a voice coil from a stereo speaker or alloys that change shape through the conduction of electrical currents) to simulate tactile experience.

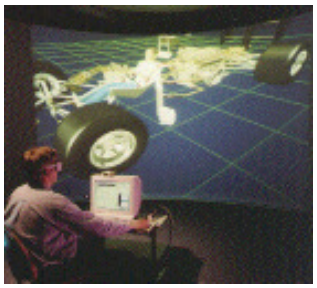
THE NINTENDO POWER GLOVE USED IN VIRTUAL REALITY GAMING

4. TYPES OF VIRTUAL REALITY SYSTEMS

Although it is difficult to categorise all VR systems, most configurations fall into three main categories and each category can be ranked by the sense of immersion, or degree of presence it provides.

Non-Immersive (Desktop) Systems: Non-immersive systems, as the name suggests, are the least immersive implementation of VR techniques. Using the desktop system, the virtual environment(VE) is viewed through a portal or window by utilising a standard high resolution monitor.

Semi-Immersive Projection Systems: Semi-immersive systems are a relatively new implementation of VR technology and borrow considerably from technologies developed in the flight simulation field. A semi-immersive system will comprise a relatively high performance graphics computing system which can be coupled with either a large screen projector system , multiple television projection systems .



A SEMI-IMMERSIVE WIDE-SCREEN PROJECTION SYSTEM IN USE WITH SHUTTER GLASSES

The major components of an HMD. This illustration shows the two screens capable of producing stereo images and speakers located to provide stereo sound.

Fully Immersive Head-Mounted Display Systems: All fully immersive systems will give a sense of presence that cannot be equaled by the other approaches discussed earlier, but the sense of immersion depends on several parameters including the field of view of the HMD, the resolution, the update rate, and contrast and illumination of the display.

5. VIRTUAL REALITY IMMERSION

Immersion is the state of consciousness where an immersant's awareness of physical self is diminished or lost by being surrounded in an engrossing total environment; often artificial. The term is also cited as a frequently-used buzzword, in which case its meaning is intentionally vague, but carries the connotation of being particularly engrossing.

CLASSIC VIRTUAL REALITY HMD

According to Ernest Adams, immersion can be separated into three main categories:

Tactical immersion: Tactical immersion is experienced when performing tactile operations that involve skill. Players feel "in the zone" while perfecting actions that result in success.

Strategic immersion: Strategic immersion is more cerebral, and is associated with mental challenge. Chess players experience strategic immersion when choosing a correct solution among a broad array of possibilities.

Narrative immersion: Narrative immersion occurs when players become invested in a story, and is similar to what is experienced while reading a book or watching a movie. Staffan Björk and Jussi Holopainen, in *Patterns In Game Design,* divide immersion into similar categories.They call them **sensory-motoric immersion**,

cognitive immersion and **emotional immersion**, respectively. In addition to these, they add three new categories:

Spatial immersion : Spatial immersion occurs when a player feels the simulated world is perceptually convincing. The player feels that he or she is really "there" and that a simulated world looks and feels "real". **Psychological immersion :** Psychological immersion occurs when a player confuses the game with real life.

Sensory immersion : The player experiences a unity of time and space as the player fuses with the image medium, which affects impression and awareness.

THE CAVE

New technologies are currently under development which claim to bring realistic environmental effects to the players' environment - effects like wind, seat vibration and ambient lighting.Examples: There is a motion simulators of the Virunga Mountains in Rwanda to meet a tribe of Mountain Gorillas or a ride that takes a journey through the arteries and heart to witness the build up of plaque and thus learn about cholesterol and health.

6. ADVANTAGES OF VIRTUAL REALITY SYSTEMS

Virtual reality has also been used extensively to treat phobias (such as a fear of heights, flying and spiders) and post-traumatic stress disorder. This type of therapy has been shown to be effective in the academic setting, and several commercial entities now offer it to patients.

7. DISADVANTAGES OF VIRTUAL REALITY SYSTEMS

For use of digital and computer visualization techniques: Do not convey the true three-dimensional nature of objects; do not convey the non-visual and aural feelings of touch, smell, etc.; less beneficial than really being in the field; lack the serendipitous nature of discovery.

Multiple styles of access e.g. CDROM and websites: CD-ROMs can only provide a finite limited amount of information; visiting a website can be difficult and depends on many factors, such as availability of computers, load on the network, number of connections, reliability of service provision, etc.

For Designed to be interactive like computer games: It is easy for students to wallow, or obsess over particular sites, which raises the problem of time management.

8. CONCLUSION

Finally, it can be concluded that the Virtual Reality System makes man get immersed in a world of entities that gives the feeling of reality when in fact they are not actually present. Virtual Reality is often used to describe a wide variety of applications, commonly associated with its immersive, highly visual, 3D environments. The development of CAD software, graphics hardware acceleration, head mounted displays; database gloves and miniaturization have helped popularize the notion.

REFERENCE

* www.webopedia.com/TERM/V/**virtual_reality**.html * www.webopedia.com/TERM/V/**virtual_reality**.html* www.agocg.ac.uk/reports/**virtual**/37* www. scienceclarified.com/Ti-Vi/**Virtual-Reality**.html* www.artificialeyes.tv/reblog* www.articlesbase.com/.../**virtual-reality**