special project report

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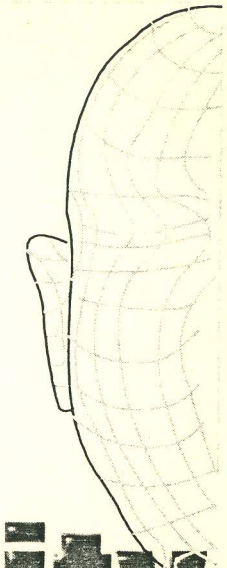
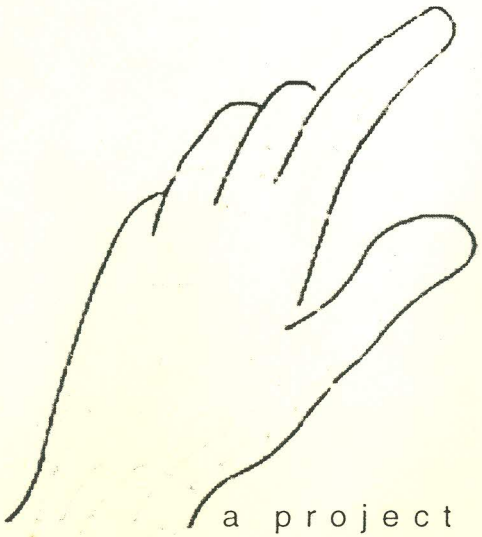


INVESTIGATING

Virtual Reality



a project by : ram ganesh

guided by : prof.ravi poovaiah

Acknowledgement

First and foremost i wish to thank my guide Prof.Ravi Poovaiah for guiding me in this project. And Prasad , with whom I developed the concepts, and Raj,Kamal, Manoj, Bapu, Prakash all my friend in IDCand all e/web friends who have helped me

special thanx to

Introduction

"And, as imagination bodies forth The forms of things unknown, the poet's pen Turns themto the shapes, and gives to airy nothing A local habitation and a name..."

William Shakespeare

Shakespeare wasn't describing virtual reality, but his words capture the essence. Virtual reality or VR, allows human imagination to create shapes and sounds out of invisible electrons racing through circuits. Like the poets to whom Shakespeare alludes, science fiction writers have long imagined the virtual worlds, that we can now explore, due to the development of this sophisticated technology. Virtual reality is a new poet's pen, a computer tool that turns imagination and thought into simulations, virtual worlds, habitats of airy nothing that appears real to our senses. These worlds are places where we can both work and play.

Immersion and interactivity are the two criteria on which VR simulations are based. Immersion refers to the ability of participants to believe they are 'present' in the virtual world and can navigate through and function within the simulation as if it was physical reality. Interactivity

Introduction

pertains to the participant's ability to manipulate objects encountered within a simulation, depending on the hardware and software. You may be most familiar with the recreational examples of VR. However, VR technology is being applied in professional fields as well. This project describes examples of such applications in the fields of medicine, architecture and engineering, the military, science and financial analysis. What does the future of VR technology hold?

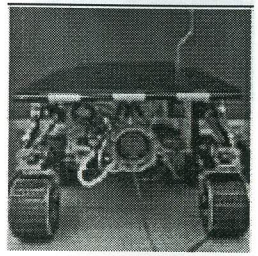
In addition to research that is being done here I have given as concept by with VR can be put to practical use in , taking advantage of the communication network and collaborative nature of the work cops under take...

These are some of the decriptive samples I studied where VR has been used in various fields.

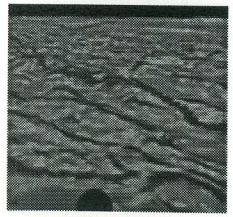
science

These are examples of VR being in the fields of scientific data analysis. These helps the scientists to have a deep understanding of raw data hwich now is in form of a 3D world.

Mars Rover was actually simulated using VR models where all paramenters of Mars were fed in



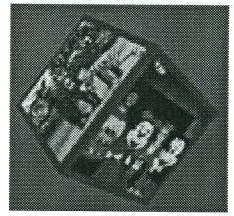
Choose your own part of the Croatian territory and fly over it in virtual environment.



entertainment

VR is being used in simulated world games. This gives the gamer a unique opportunity to play in a 3D space and have lifelike characters.

Here is a VR of a *'snowman greeting'*, with customary holiday wish for kids from 'Out of the Blue Design'.



X-mas in Orlando is a 3D interactive photo cube of "Christmas in Orlando" vacation pictures. This could replace the photo album!

entertainment

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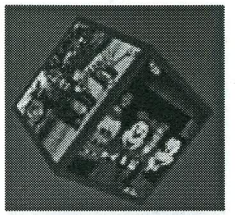
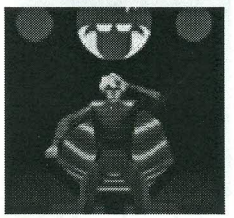


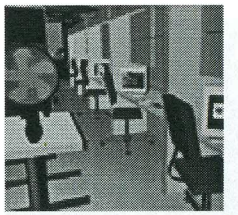
Games:

This is a popular 3D game called 'Monks of Doom'.

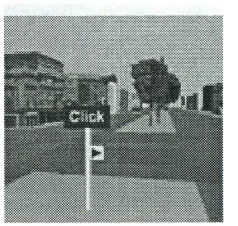


architecture

VR is used to simulate the actual architecture of labs and houses, and even in city planning.



This walkthrough of the Mobile Aeronautics Education Laboratory incorporates both models of the lab and educational activities from the lab.

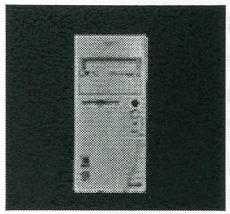


City Architecture: This walkthrough of the streets of Ireland. This VR was developed for promoting tourism

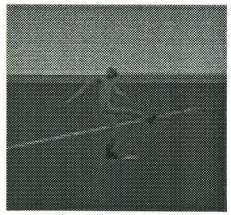
product demo

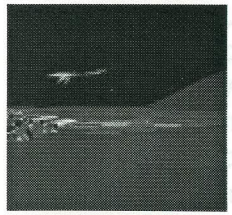
VR is being used in making 3D products and used in the companies website, which gives the consumer a fair idea of the look of the product.

Here is a VR of a computer CPU which allows the user to examine the product before buying it.



games

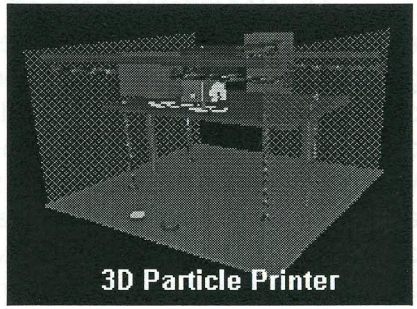


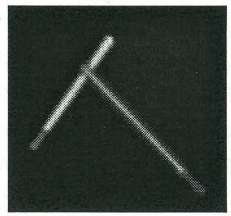


VR has always been used to simulate the real game field, here the makers have success fully managed to reproduce a field with correct textures.

miscellaneaous

VR is also used in a lot of other applications like the ones that are classified here.





This VR file is the smallest VR I have ever come across, it is smaller than most of the images, an astonishng 2k only.

virtual reality in...

Military:

Future military operations will take place in increasingly hostile environments. As technology advances, many non-military operations are extending into hazardous environments as well, such as the ocean bed, the interior of volcanoes, and outer space. Efficient deployment of teleoperated and telemanaged models will be essential for successful interaction with these environments. Autonomous models, where the machine is capable of acting without human intervention, is far from being achievable in unstructured environments such as battlefields, bomb disposal scenarios, weapons handling, and hazardous materials management. For the foreseeable future, controlled systems will depend on human intelligence and perception.

The effectiveness of human-machine systems is often determined by the quality of the human-machine interface. Unfortunately, most existing Visual Models are equipped with standard monoscopic video (MV) displays as the main source of information to the operator. MV displays eliminate all binocular depth cues (i.e. eye convergence and disparity), as well as several monocular depth cues (i.e. texture gradient). The loss of these important depth cues results in situations where the location of objects in the remote scene is ambiguous. While motion parallax or multiple views can sometimes resolve these ambiguities, operating conditions may render these options unfeasible.

A related problem is the difficulty in estimating absolute sizes with a MV system. It is difficult to determine whether an obstacle/target is too steep to climb, or if a depression is deep enough to present a hazard or is the target carrying weapons. One British study reported that using standard MV systems made bomb

Human Engineering Research and Consulting (HERC) recently investigated the benefits of using 3-D, or stereoscopic VR for operation applications in the Canadian Armed Forces. SVR provides an immediate and compelling sense of depth, which can greatly simplify teleoperation tasks requiring delicate manipulation.

Stereoscopic VR Application Research

These VR systems use several cameras to pick up images from many slightly different perspectives, one for each eye of the operator. The display system must channel these two different images to the appropriate eyes. The most practical system, employing standard television equipment, uses an alternating field approach. The images from the left and right cameras are displayed alternately on the monitor. Special glasses are equipped with liquid crystal shutters that switch from opaque or clear. These shutters are electronically synchronised with the monitor, so that the left eye only sees the image from the left camera, and the right eye only sees the image from the right camera.

Since 1987, Prof. Paul Milgram of the Department of Industrial Engineering at the University of Toronto and David Drascic, under contract for the Defence and Civil Institute of Environmental Medicine (DCIEM), have conducted a number of experiments at the University of Toronto to investigate the benefits of SV for novice operators attempting typical defence-oriented telerobotic tasks. In one experiment, subjects performed a positioning task related to bomb disposal operation that required careful alignment of the VR in depth. The difficulty of the task was varied by changing the precision requirements. The results indicate that operators need considerably less training to become proficient at this type of telerobotic task, and can perform faster and with fewer errors when using an SVR display.

At the lowest level of difficulty, it was found that the benefit of SVR faded as subjects repeated a single task again and again. However, whenever the task changed, the advantages of SVR were once again immediately apparent. At the highest levels of difficulty, the performance advantages of SVR were found even after subjects had performed the same task many times. Since defence-related teleoperation tasks, such as bomb disposal, encounters, chase, terrorist ambushes and hazardous materials management, are all characterised by an unpredictable and changing environment, cops will not have the luxury of repeating a task several times. Thus even for very simple tasks, it is reasonable to expect the benefits of SVR to be significant and important. For difficult tasks, it can mean the difference between success and failure and even life and death

Using several tasks related to bomb-disposal teleoperation, experiments show that even expert operators perform better when using SVR. More importantly, the operators strongly preferred SVR to Audio/Video input, judging it highly desirable for a variety of tasks, and rating it more usable and more comfortable to use than a comparable MV display.

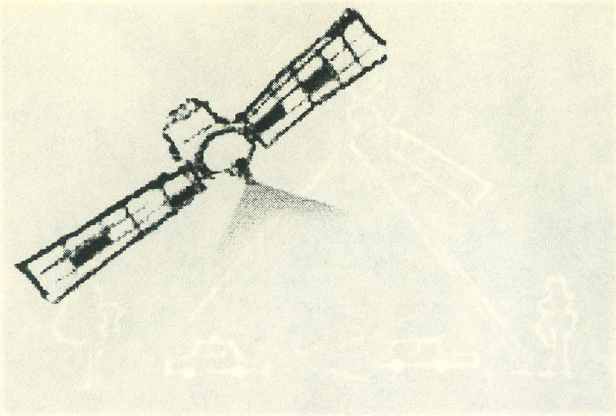
Ectending the concept to a typical present day scenario we get to test it out on Emergency Management Personnel, typically people who handle Terrorist attacks, Suicide Bombers, and Bomb disposal squads and also paramilitary troops.

Application of VR in real life suituation

Based on the study undertaken, a hypothetical suituation was taken and VR was applied to it. Here the suituation is where the cops and criminals are engaged in a shoot-out. The criminals are in a hiding place and the cops are in team. Each one is having a head gear and a transmitter. There is a centralized control where computations take place and orders are issued. And the communication between this center and the cops take place by wireless communication.

Since the line of vision of different cops will be different - all the field of visions (FOV) of them are captured and rendered in a VR environment. Since a lot of FOVs are captured - sufficient data can be created to model a VR, so the cops have a edge over the criminals as the cops can switch between different point of views. For this purpose Stereoscopic visions were studied.

The following pages describes the concept of this application. An actual VR model was created to simulate the scenario.

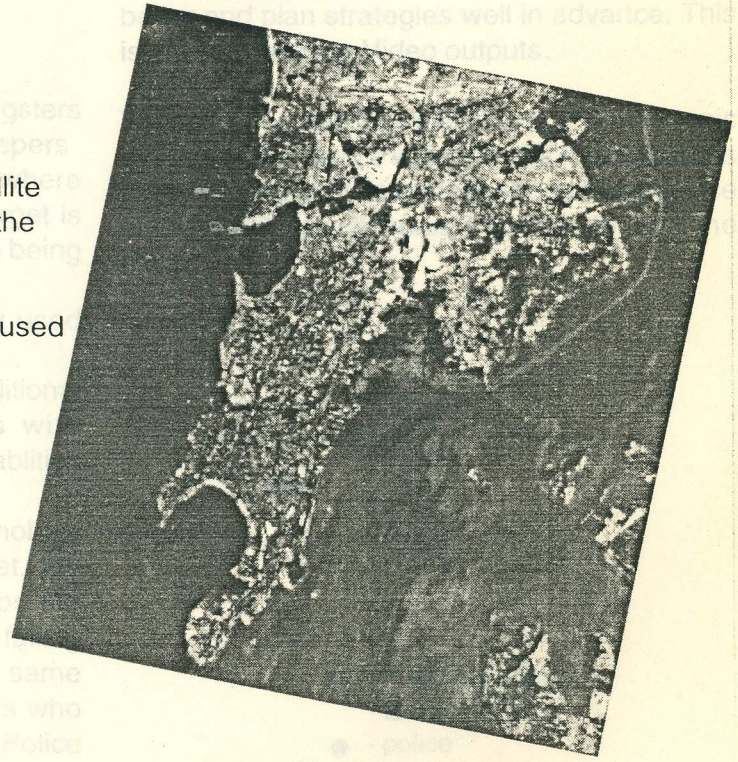


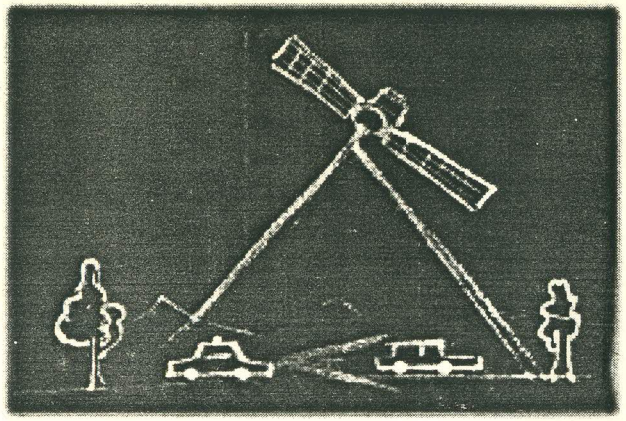
virtual reality...

It is a small device that can track down gangsters for crisis management.

It is based on the **remote sensing technology** where with the help of the transmitter the target is followed, the satellite keeps the track while being with touch to the user on the land.

The **Geostationary satellite** is basically used in such types of operations.





Virtual transparency model..

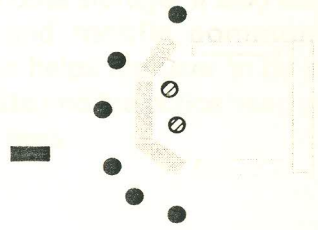
How does it work ?

It is a small device that can track down gangsters for crisis management and aid the lawkeepers
It is based on the **Virtual Reality Model** where with the help of the various inputs the target is followed, the satellite keeps the track while being with touch to the user on the land.
The **Geostationary satellite** is basically used in such types of operations.
A hand held computing device with the additional capability of **rendering VR models** with additional transmitters and navigating capablities

1) The concept is based on the laser technology where the lasers is fired on to the target, the **satellite** than reads the lasers and keeps the record and tracks the object the **laser** is falling on. This data is send back to earth to the same device the user is using and to the others who have similar kind of encoded devices. e.g. Police head quarters and other police officers involved in the **mission**.
Thus on the display of the device the name and the mapping of the place is seen.

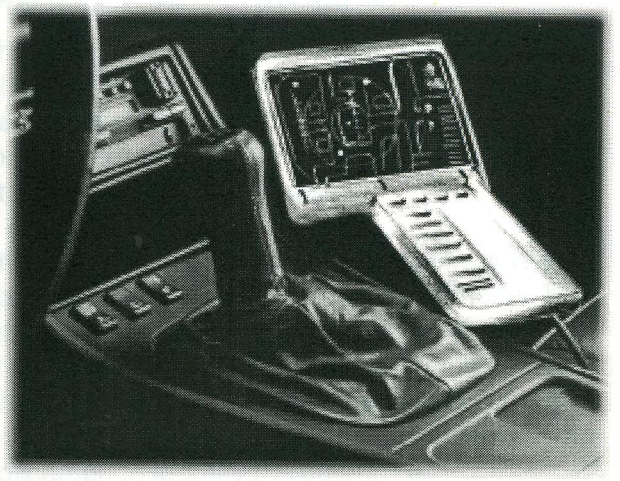
This helps the police to understand the situation better and plan strategies well in advance. This is an alternative to Video outputs.

The following concept introduces the electronic eye, a sensor device which tracks the culprit it is hiding. The data is stored in the computing device of the CTD, which helps the user to *see* the culprit.



⊘ - criminal (target)
- lasers / FOV
● - police
▬ - police vehicles

Concepts ...



This device was developed to help the **policeman** to be in **constant touch** with the target.
The target can be a gangster, the one who creates fear and uncanny conditions in a public place.
Here the people around are exposed to a dangerous situation, so the police have run behind the criminal in order to catch him and **restore peace**.

The device is called the **Virtual visual model** and should be easily held in hand/worn as headgear . It can be carried in a pocket when not in use.

It can also be attached or kept in the police **emergency vehicle**, so that can be brought in use while chasing the culprits.

The device has a **transmitter**, and computing facility for data storage. It also has the facility of wireless and **mobile communication**. The transmitter helps the user to be in contact with the **satellite** and the police head quarters of that particular area.

theproduct...

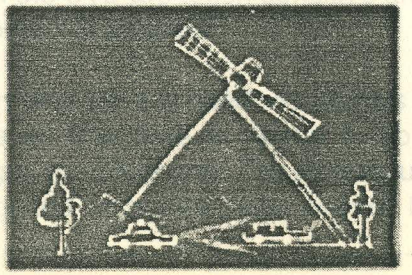
it is a small device that can track down gangsters for crisis management.

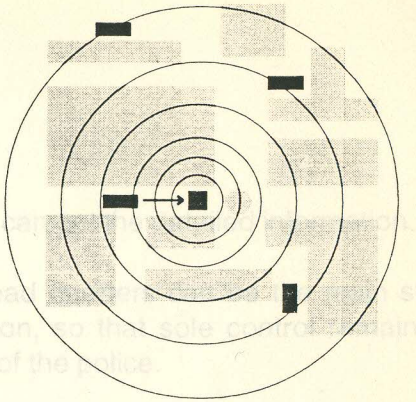
the sensor plays the game . . .

This helps the policeman to track the culprit even when he is out of his sight. **The information sensed by the sensor is directly proportional to the number of hits fired and the distance at which it hits the target.**

This can very well go when **a data base** is built up of all the criminals existing in the city. This information can be stored in the **head quarters** of all the suburbs, and accessed by the satellite. Thus information sensed by the CTD when match to the data base available helps the policemen to identify the culprit.

When the same information is **transmitted** to all the devices in a particular area, **helps the policemen to create a ambush and catch the culprit**. (as shown in the diagram).





■ - criminal (target)
⟶ - lasers / flash
▬ - police vehicles

ready for ambush

virtual reality models

The device is designed for the cops in the city with a view that they can create a ambush in order to attack and capture the target.

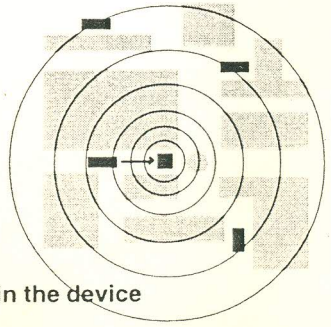
The device is integrated with telecommunication system, the display screen is a Virtual Reality world ,touch and voice sensative so that the cop doesn't really waste time in making the complicated operations but with the movement of curzors zeros in on the suspect.

The cops are also provided with wireless mikes that allows him to create contact with all his co-ordinates in that perticular ambush, which are tracked with the help of the satellite.

The police vehicles that are seen in the display board of the CTD are touch sensitive and thus a easy contact is possible.

The can also be activated via signals through satellite so that time is saved in conveying messages via telephone. The device just starts beeping and activates, who soever has this device can get the detailed information.

The head quarters can be the main station of operation, so that sole control remains in the hands of the police.



display screen as seen in the device

- criminal (target beeps)
- lasers / flash
- police vehicles with their devices

Conclusions

This project is undertaken to study & investigate VR and a proposal to use VR in real life situations. In addition to tracing the electronic developments that laid the groundwork for VR technologies. Once that understanding is established, then study turns to the specific software considerations and classification of VR. A real life model was taken and VR was applied to it.

References:

All the VR models & text which I have taken for study were taken from the following Internet sites. And the URLs are:

http://hiwaay.net/~crispen/worlds/cafe/2/cafe.wrl
http://www.lunatic.de/en/wow/tvs/ort.htm
http://www.cnet.com/Content/Builder/Authoring/Vrml/index.html?dd
http://www.intervista.com/3D/index.html
http://vrml.fornax.hu/lunar/
http://vrml.sgi.com/worlds/
http://www.intervista.com/vrml/gallery.html

my team


FREE
Microsoft
Internet
Explorer
NETSCAPE
Now!
GET
SHOCKWAVE
COSMO
PLAYER
Cosmo
Player 2.0
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WorldView