



# **SNS COLLEGE OF TECHNOLOGY**

**Coimbatore-35**  
**An Autonomous Institution**



Accredited by NBA – AICTE and Accredited by NAAC – UGC with ‘A+’ Grade  
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

## **DEPARTMENT OF INFORMATION TECHNOLOGY**

### **16IT AUGMENTED REALITY AND VIRTUAL REALITY**

**III YEAR – V SEM**

**UNIT 3 – INTRODUCTION TO VIRTUAL REALITY**

**TOPIC 1 – Fundamental Concept and Components**





# GENESIS OF VIRTUAL REALITY



- The term 'Virtual reality' (VR) was initially coined by Jaron Lanier, founder of VPL Research (1989).
- At that time it was basically used in flight simulation to train pilots.



# WHAT IS VIRTUAL REALITY ?



**A computer system used to create an artificial world in which the user has the impression of being in that world and with the ability to navigate through the world and manipulate objects in the world.**

**It is also known as synthetic environment, cyberspace, artificial reality, simulators technology, etc.**



# TYPES OF VIRTUAL REALITY

- Adventure Games
- Window on World System
- Projected
- Semi-immersive
- Immersive



# ADVENTURE GAMES



Textually described virtual world where the user perceives the virtual environment through mental images based on the words read (like reading a novel)



# WINDOW ON WORLD

3d virtual environment graphically displayed on a desktop computer monitor, known as desktop VR or Window on World (WoW)



# PROJECTED



- 3d environment projected onto a screen enables a single user to demonstrate concepts to a group of people.
- A CAVE, where several screen are used to surround the user with images, is the most advanced form of projected VR in use today.





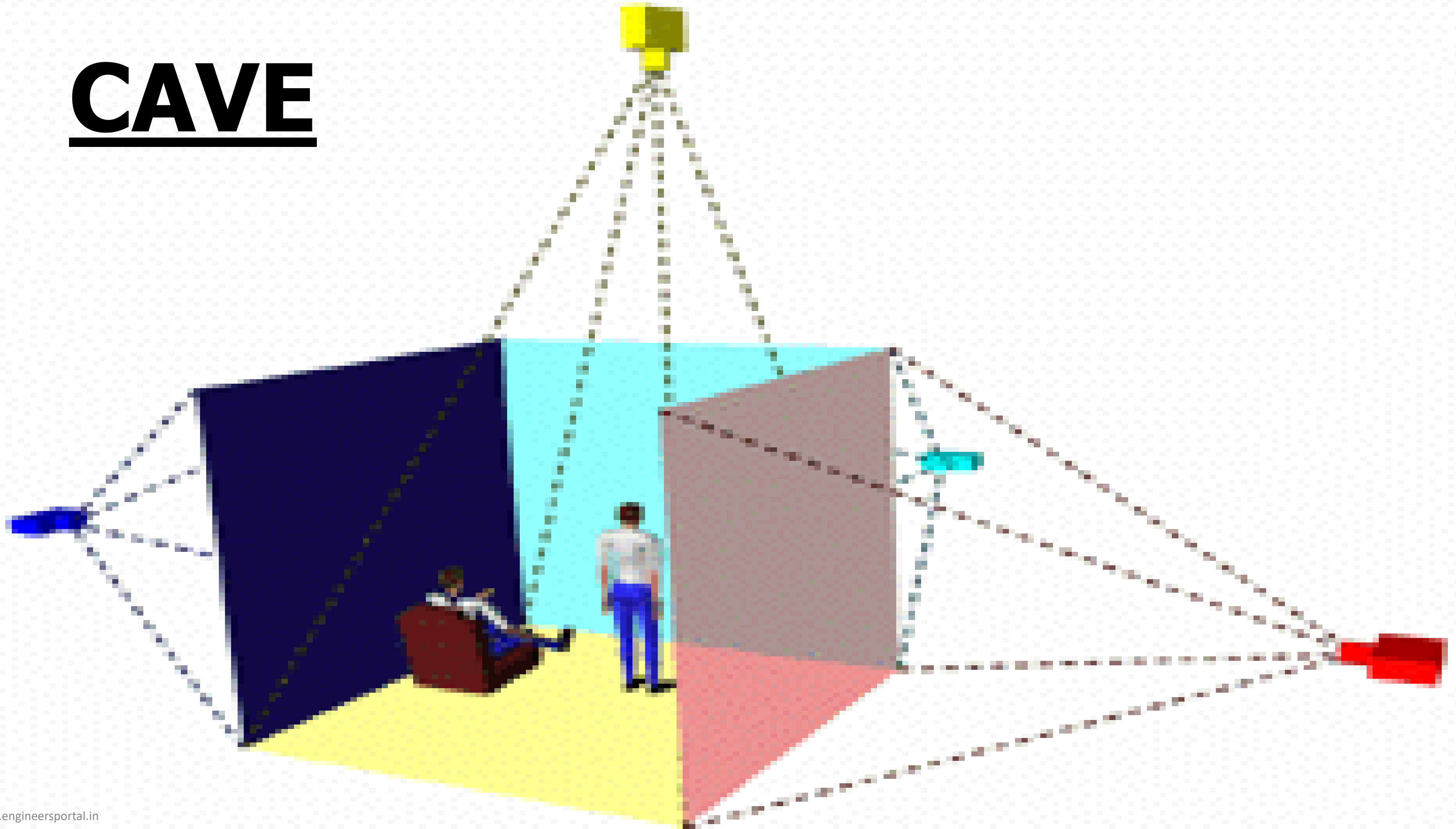
# DEVICES USED IN VR TECHNOLOGY



## Cave

- Head Mounted Display
- Gloves
- 3D Mouse
- Space Ball
- Video camera and shadows
- Voice recognition
- Biological sensors
- Full body suits

# CAVE





# WHAT IS A CAVE ?



- Cave Automatic Virtual Environment
- Cave involves the concept of a room with graphics projected from behind the walls.
- The images on the walls are usually in stereo to give a depth cue.
- It is easy for several people to be in the room simultaneously and therefore see images together and it is easy to mix real and virtual objects in the same environment.



# HEAD MOUNTED DISPLAY



- HMD is a helmet or a face mask that holds the visual and auditory displays.
- In HMDs, projectors feed real time images to small screens attached inside a kind of helmet that the user wears .
- In modern HMDs, stereo pictures are standard.



# PINCH GLOVE



Pinch glove enables natural interaction with objects. It uses hand-signs to execute actions. It continuously tracks the motion of the user's hand & limb and accordingly gives signal to the transmitter.



# 3D MOUSE



A 3D mouse has two parts as vertical & horizontal part. Each part has some buttons. With different combinations of these buttons the user can produce different positions in the 3D environment.



# INPUT PROCESS

It controls the input devices used such as keyboard, joystick, 3D position trackers (glove, wand, body suit), voice recognition system, etc. Some glove systems can also add gesture recognition.

The object is to get the coordinated data from the input devices to the rest of the system.



# SIMULATION PROCESS



This is the core of a Virtual Reality program. It handles the interactions, simulation of physical laws & determines the world status.

It is a discrete process which is iterated once for each time step or frame. This process finally decides the actions to be taken place in the virtual world.





# RENDERING PROCESS

It creates sensations which are output data to the user or other network processes. There are separate rendering processes for the following -

- Visual Rendering
- Auditory Rendering
- Haptic Rendering



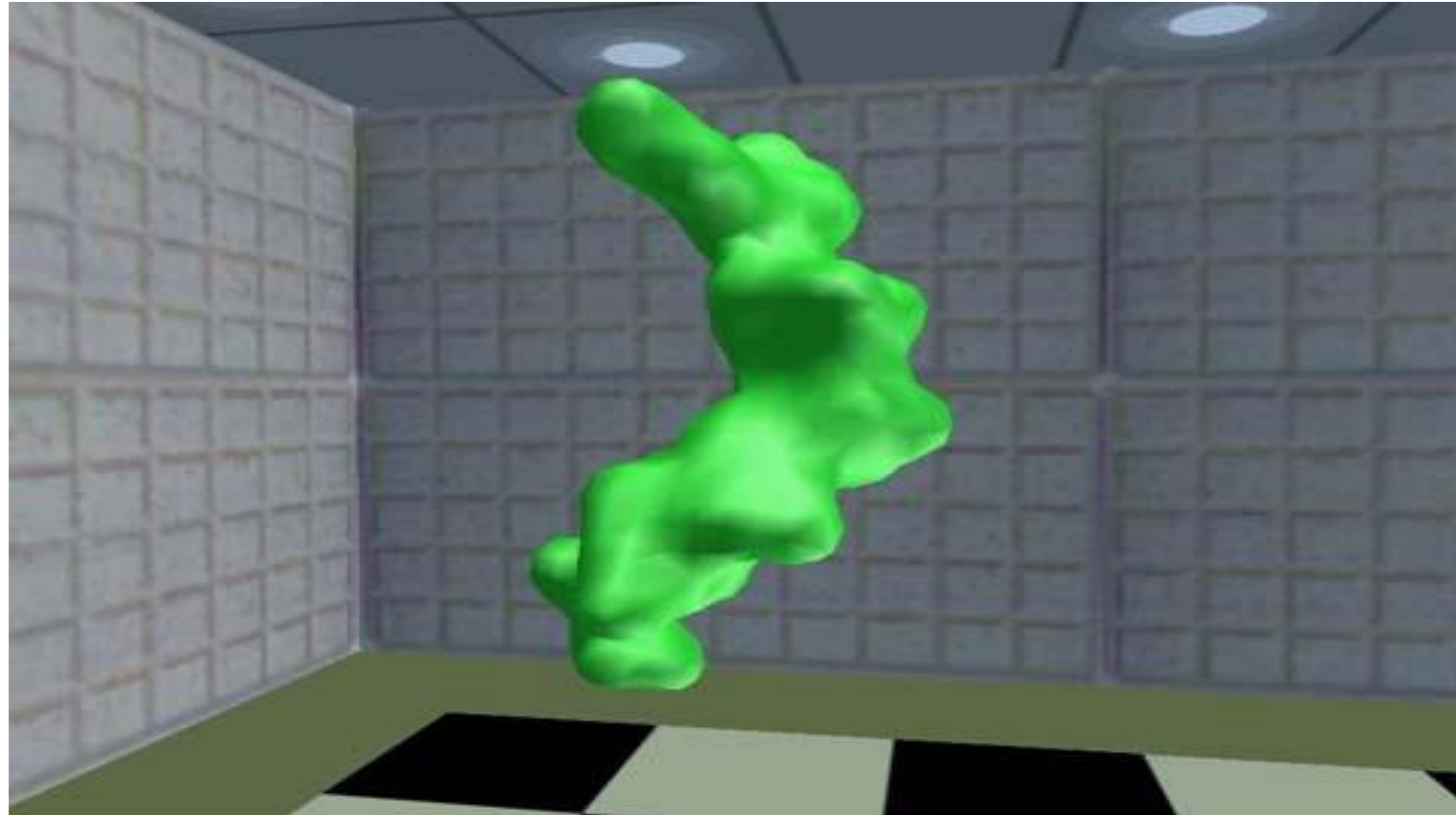
# APPLICATIONS :



- 📌 **Science, Technology & Visualization**
  - **Flight Simulation**
  - **View Complex 3D Molecular Structure**
- 📌 **Medical**
  - **Surgery**
  - **Rehabilitation**
- 📌 **Education & Conferencing**
- 📌 **Business**
- 📌 **Architecture Design & Prototypes**
- 📌 **Entertainment**

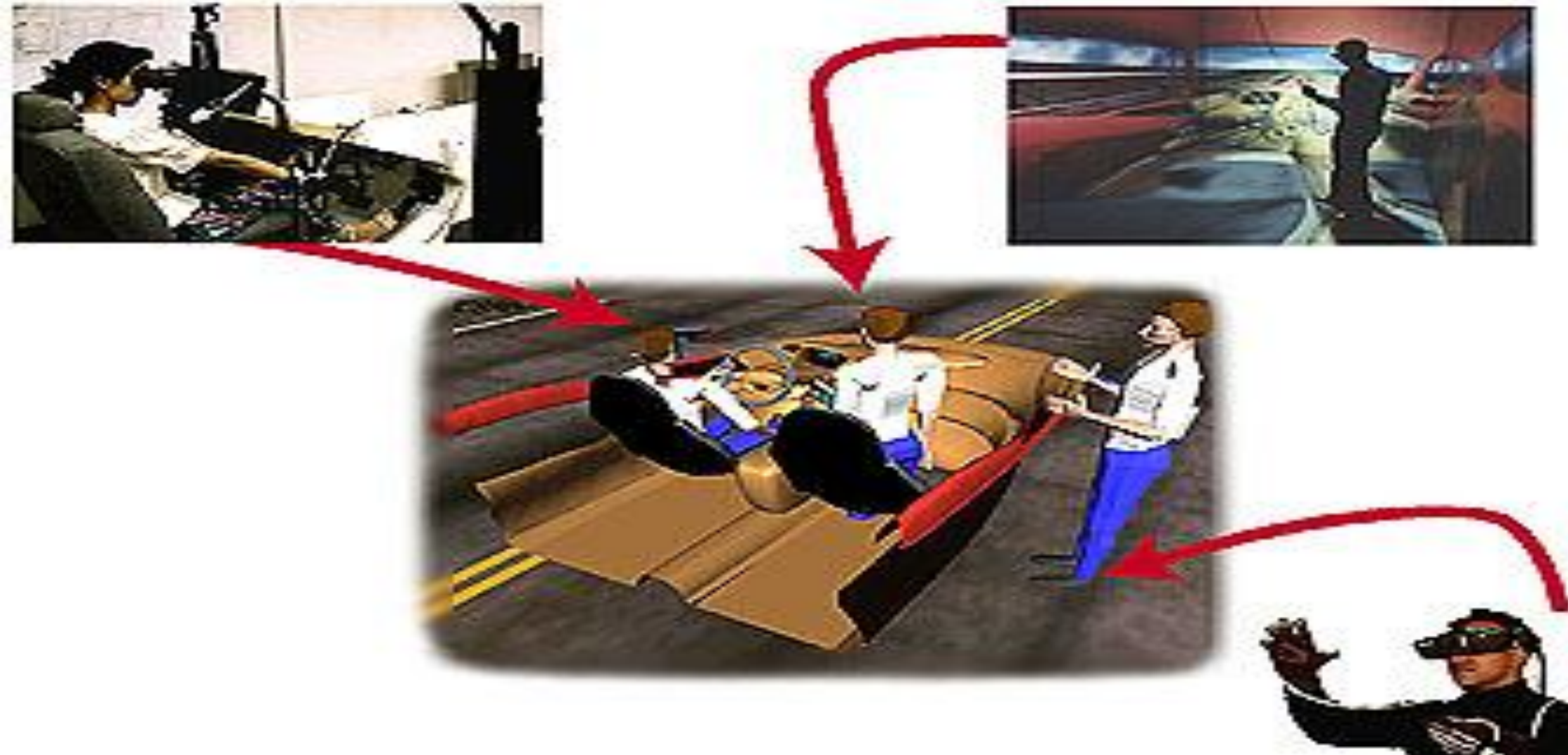


# 3D MOLECULAR STRUCTURE





# SHARED VIRTUAL ENVIRONMENT





# FUTURE ASPECTS



- ✦ Hearing Impairment
- ✦ Distributed virtual Environment
- ✦ User interface design
- ✦ Tele Immersion
- ✦ Virtual Reality Modeling Language (VRML)