An Introduction to Virtual Reality

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Introduction to Virtual Reality

- Brief Background
  - Definition
  - Hardware
  - Applications

Virtual Reality

- No one common definition, but common characteristics
- Trying to mimic real world
- Beyond the flat monitor*
- Immerse in 3-D visual world

*Many applications are using flat monitors
Head Mounted Display (HMD)

- Immersive experience
- Stereo display
  - Two miniature screens
  - Depth perception

Spiffier HMD:
Motion Trackers

- Keep track of position
  - Inertial boxes
  - Sonic Discs
  - Potentiometers

- Head trackers & body trackers
BOOM

- Binocular Omni-Orientation Monitor
- Stereoscopic display
- Guidance of the box by user
- Tracking: Potentiometers on arm
CAVE

- Cave Automatic Virtual Environment
- Illusion of immersion by projecting stereo images on the walls and floor of room
- Stereo glasses and head tracking
- Free to walk anywhere within area
More CAVE pictures
Input Devices

- Data gloves
- Joysticks
- Hand-held wands
- Body sensors
Sensor Glove
Haptic Feedback

- Force-feedback device
- Feel virtual solid objects
Applications

- Entertainment: Games!
- Augmented Reality
  - Superimposing display
- Training
- Remote Robotics
- Distributed Collaboration
- Visualization
Augmented Reality

HUD’s on cars

AR Museums
More Augmented Reality

Information Visualization?

‘Augmented Reality’ can be used for training purposes as well as for assembly and maintenance work. Assembly instructions are displayed on ‘data goggles’, which allow the construction engineer to look at the real component and relevant information at the same time.
Visualization
Distributed Collaboration
Telemedicine

Visualization of medical condition
Research

- NASA VR Mars navigation simulation

- One third gravity
  (negative pressure)
Other... Anything else??

- Education, Teaching, Training
- Therapy: spider, heights
  - http://www.hitl.washington.edu/research/exposure/
- Navy Airplane simulator