

# An Introduction to Virtual Reality

Humans and Automation Seminar

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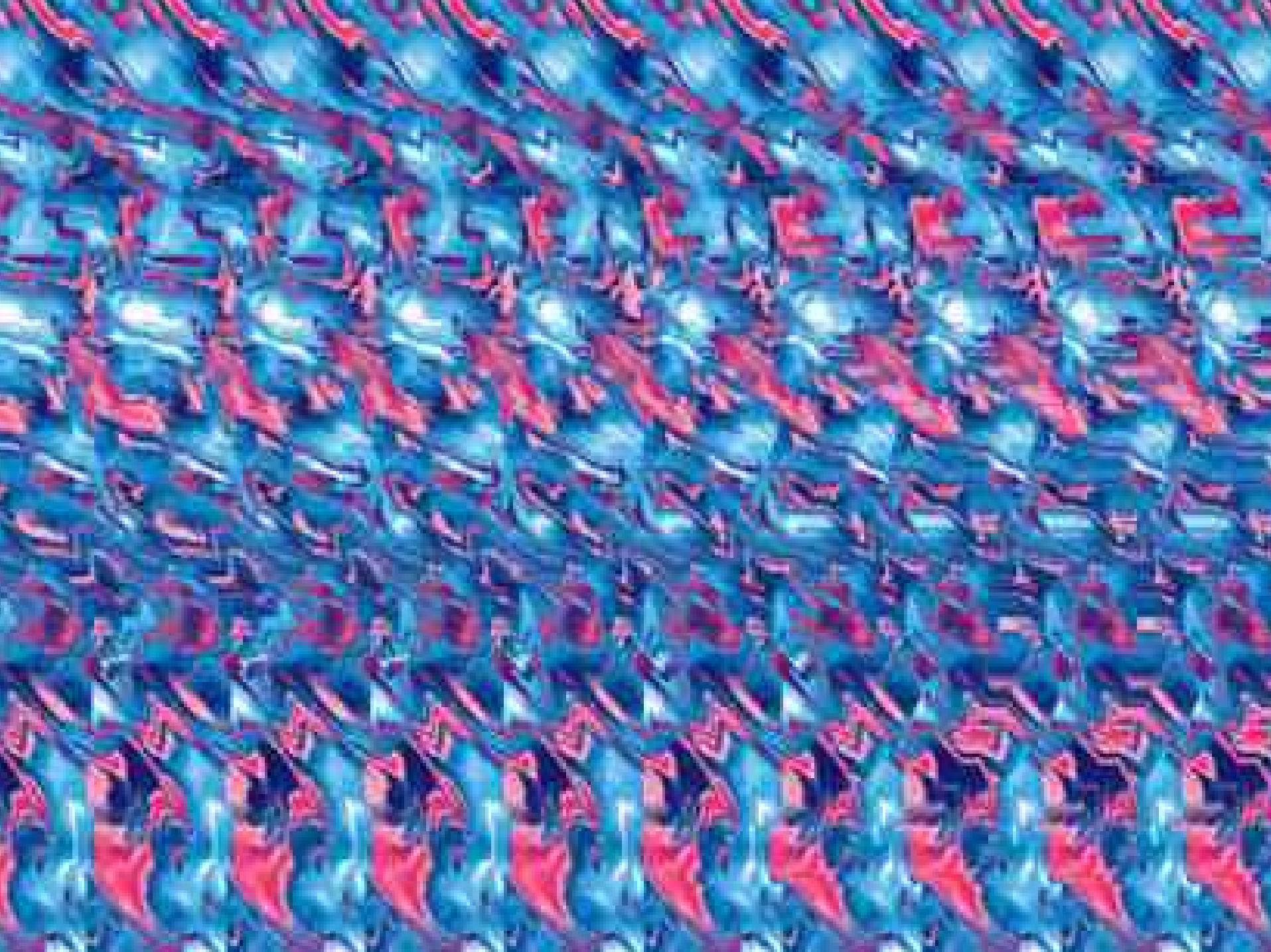
# Introduction to *Virtual Reality*

- Brief Background
  - Definition
  - Hardware
  - Applications
- Reading: “Human Factors Issues in Virtual Environments: A Review of the Literature” Presence, Vol. 7, No. 4, August 1998, 327 - 351



# 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



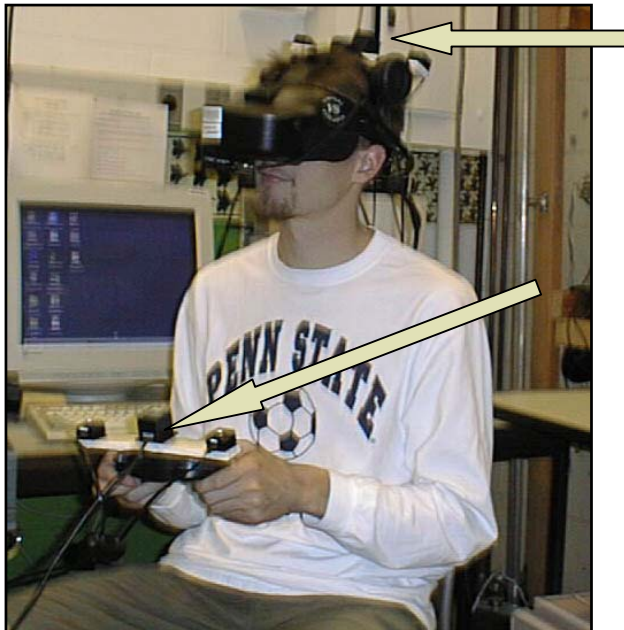
# Head Mounted Display (HMD)

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



*Spiffier HMD :*

# Motion Trackers

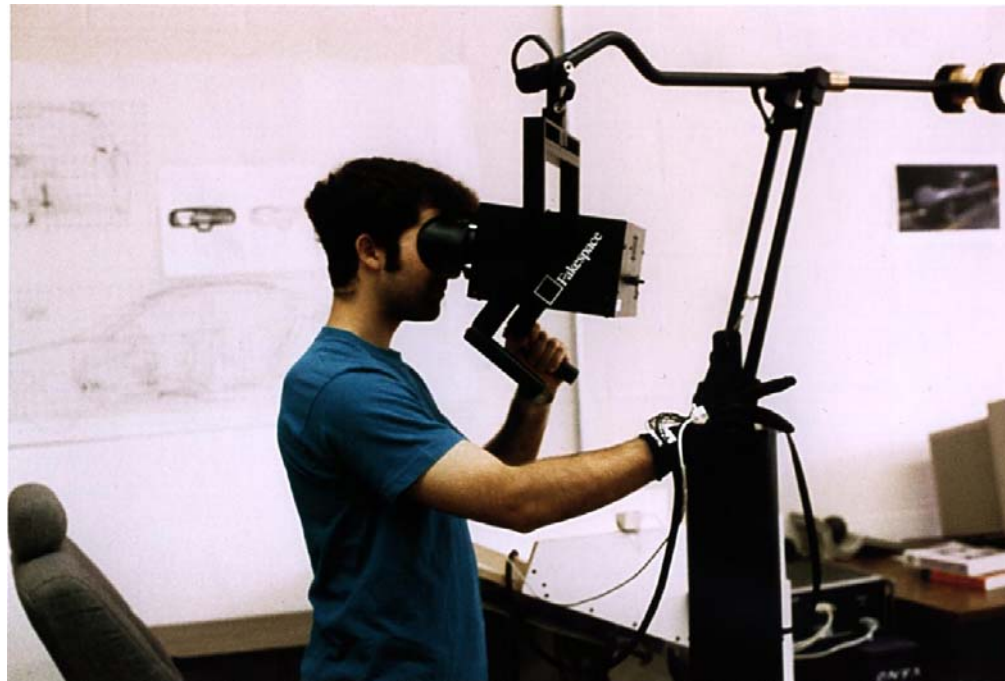


- Keep track of position
  - Inertial boxes
  - Sonic Discs
  - Potentiometers
- Head trackers & body trackers



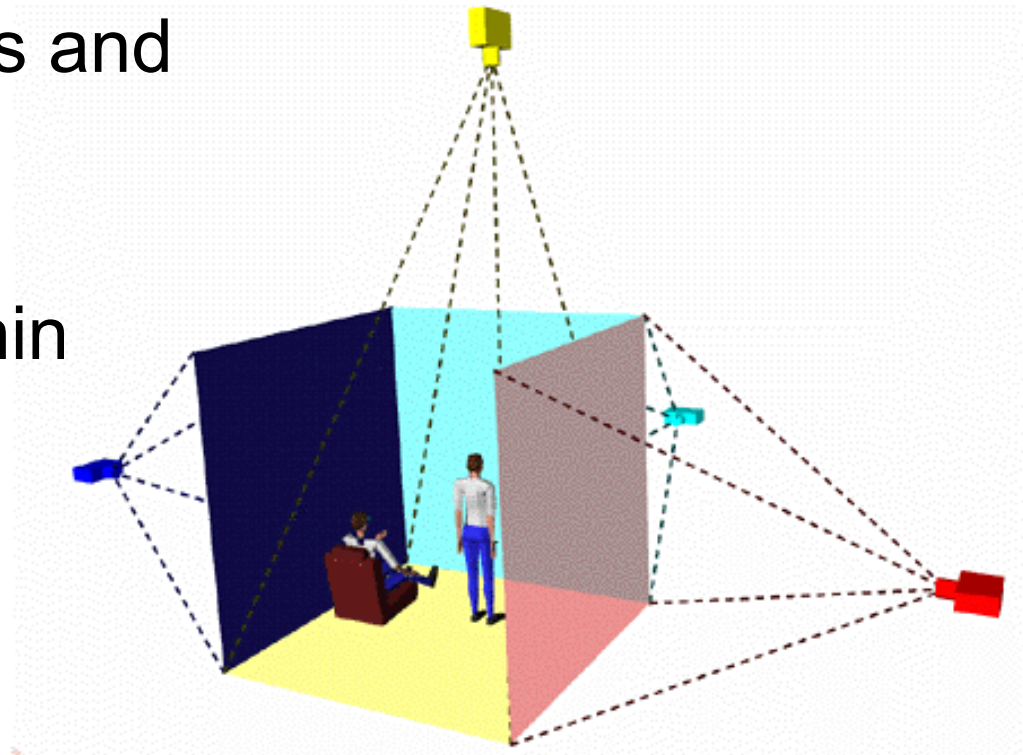
# BOOM

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



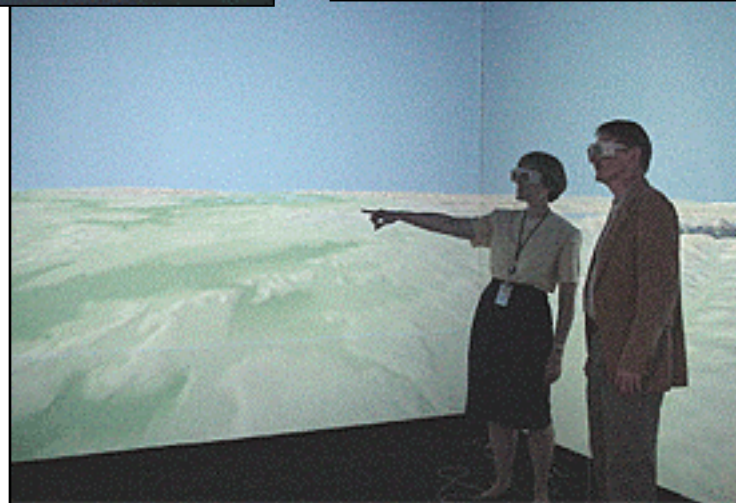
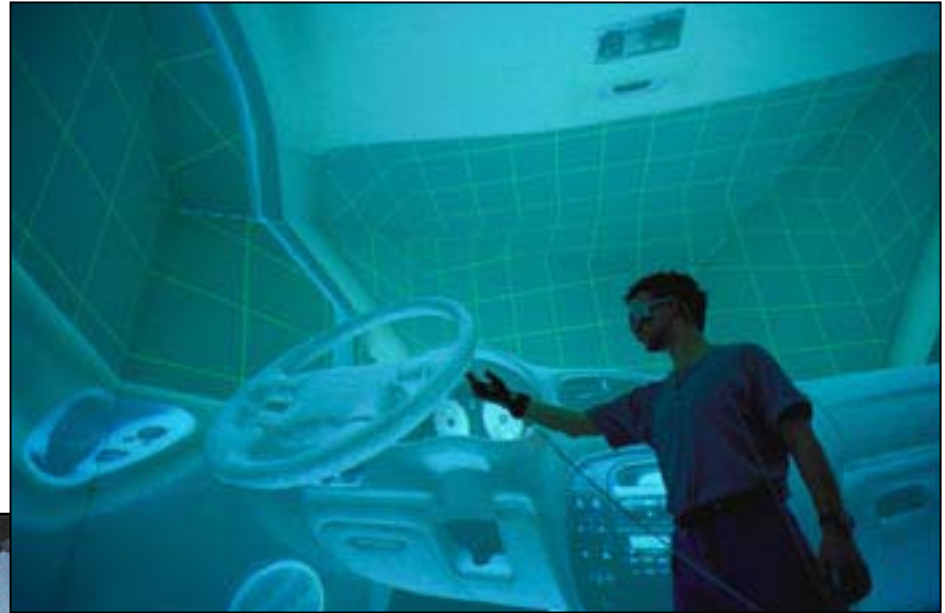
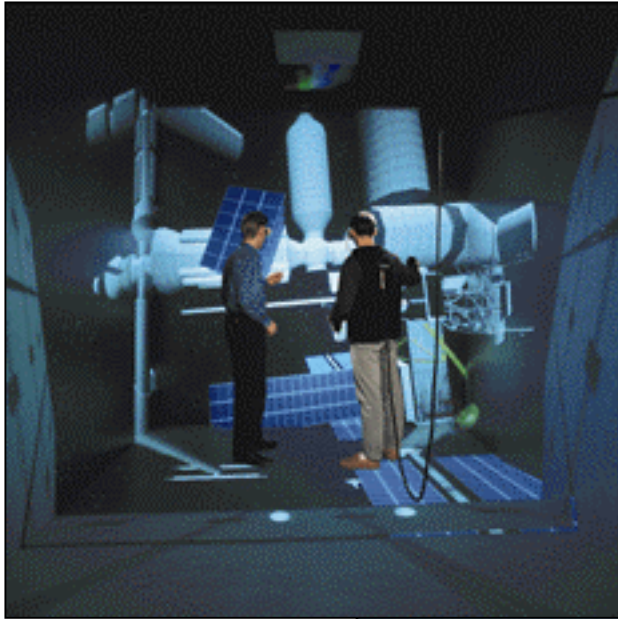
# CAVE

- 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



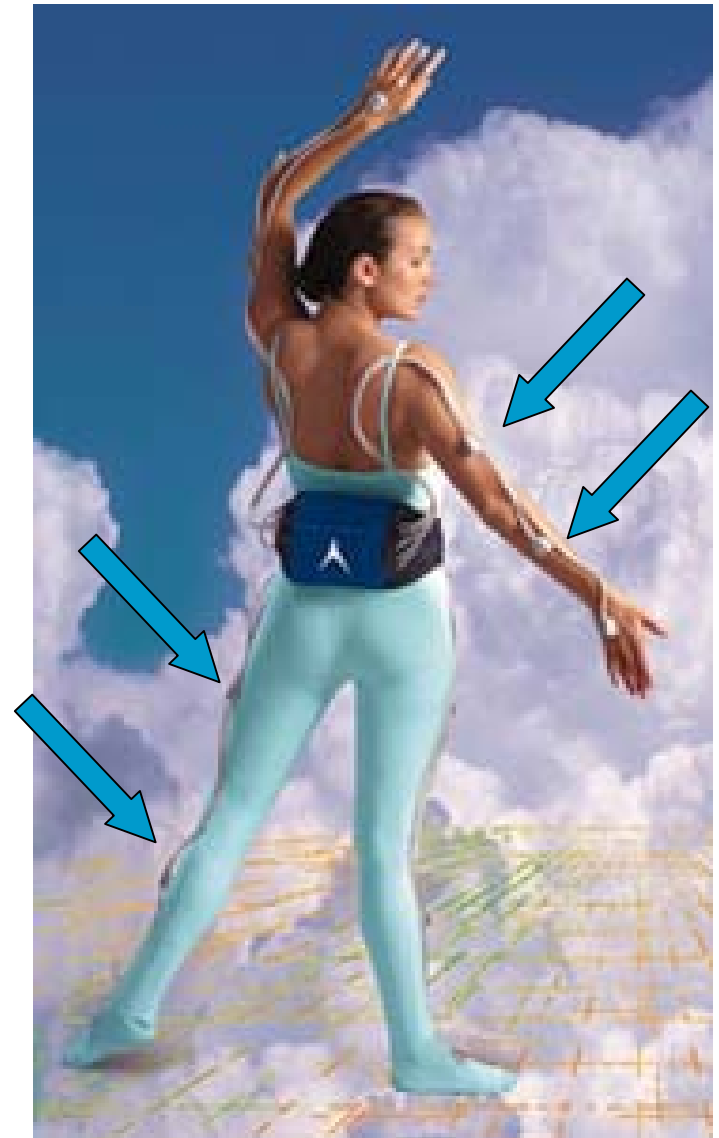


# More CAVE pictures



# 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

©2001 How Stuff Works



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

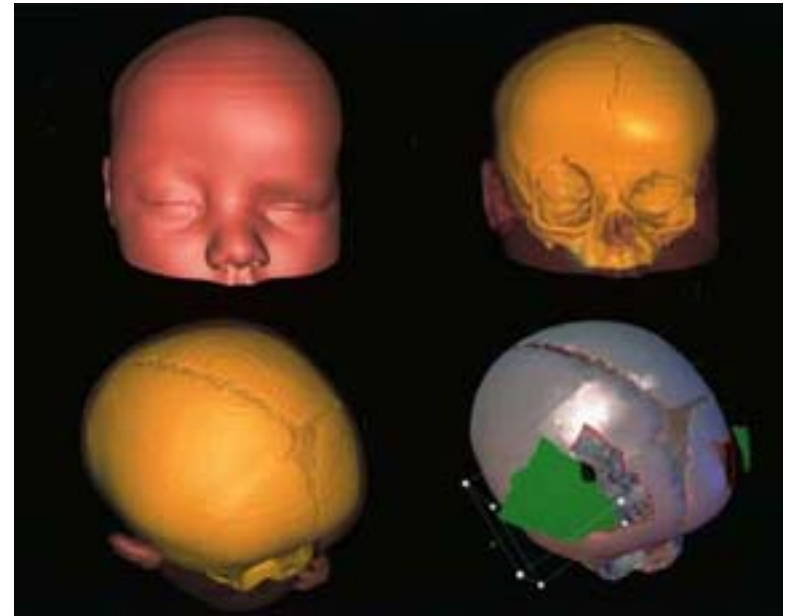
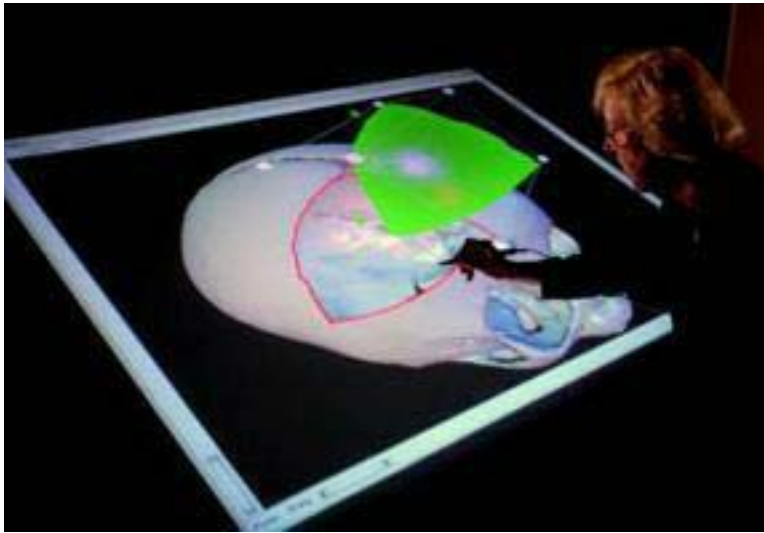




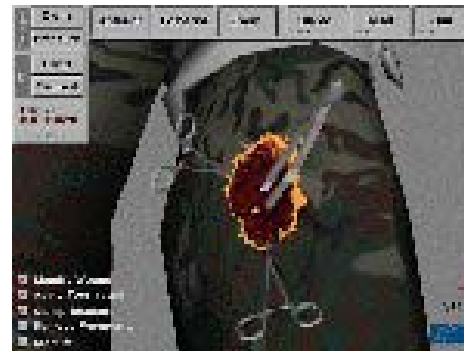
# Distributed Collaboration



# Telemedicine



Visualization of medical condition



# Research

- NASA VR Mars navigation simulation

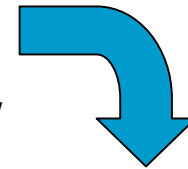


- One third gravity  
(negative pressure)

# Other... Anything else??

- Education, Teaching, Training
- Therapy: spider, heights

– <http://www.hitl.washington.edu/research/exposure/>



- Navy Airplane simulator

