Introduction to Virtual Reality

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Terminology

• “Virtual Reality” coined by Jaron Lanier, founder of VPL Research (1989)
• Artificial Realty (Myron Krueger, 1970s)
• Cyberspace (William Gibson, 1984)
• More recently
  – Virtual worlds
  – Virtual Environments
  – Immersive Environments
Head-Mounted Displays (HMD)

- Creation
  - Sutherland 1965
  - Next system VPL commercially available
    HMD: EyePhone (1989)

- Physical Device
  - Two miniature display screens
  - Optical system presents images

- Intrusive, sometimes uncomfortable

Perception and HMDs

- Interreflections, Shadows, …
Perception and HMDs

**Boom (Binocular Omni-Orientation Monitor)**

- Screen & Optical System attached to a multi-link arm
Cave (Cave Automatic Virtual Environment)

- Developed at University of Illinois at Chicago (http://www.evl.uic.edu/intro.php3)
- Immersion by projecting stereo images on wall, floor of room sized cube
Input Devices

- Position Sensors & Trackers
- Motion Capture
- Input Devices: Data Glove
- Space Mouse

The Ideal…
Example of current tech

- Treadport at University of Utah
**Immersive VR**

- Visual
- Other Senses
  - Haptic, auditory, etc
- Interaction (shared VR)

**Non-immersive VR**

- Fish Tank VR
  - Monitor with stereoscopic 3D image looks like a fishtank

- QuickTime VR
  - [http://www.louvre.or.jp/louvre/QTVR/anglais/index.htm](http://www.louvre.or.jp/louvre/QTVR/anglais/index.htm)
Non Immersive

Applications

• Operations in dangerous environments
• Scientific Visualization
• Medicine
• Rehabilitation & help disabled people
• Psychiatry
• Architectural Visualization
• Design
• Education & Training
• Simulation and ergonomy
• Computer supported cooperative work
• Entertainment
Operations in dangerous environments

- [http://www.5dt.com/products/pivb.html](http://www.5dt.com/products/pivb.html)

Battlefield simulation

High Voltage Line Inspection Training Simulator

Scientific Visualization

- [Flow Visualization](http://www.5dt.com/products/ifloviz08.html)
Medicine

The Sheffield Knee Arthroscopy Training System – http://www.shef.ac.uk/~vrmbg/skats.html

Rehabilitation & help disabled people
Psychiatry

http://www.irexonline.com/irex.htm

Psychiatry

http://www.cc.gatech.edu/gvu/virtual/Phobia/phobia.html
Architectural Visualization

Design & Virtual Prototyping

- Automotive Interiors
- CAD/CAM
Education & Training

- Air Traffic Control (ATC) Training Simulator

Simulation and ergonomy
Computer supported cooperative work

Entertainment
"Falling Over You" Interactive Wall
Dave Pape, Josephine Anstey
University at Buffalo
in conjunction with
Kathy Gaye Shiroki, Rich Cherry
Albright-Knox Art Gallery
Credits

- http://www.faw.uni-linz.ac.at/save/hardware/fishtank2.html
- http://www-vrl.umich.edu/intro/