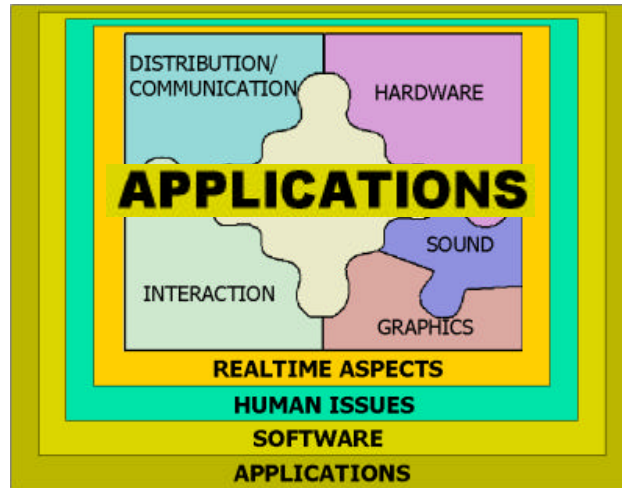


VR - Applications



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1

Applications

- 70s computer first started to make impact.
- We could see their application.
- The world would never be the same again.
 - Information systems, mathematical computation, graphic design, aerospace, architecture, ...
- VR - Mini revolution
- Takes time to mature
- People need to push the development
- But VR also need to be pulled by the sectors that will eventually benefit from its use.

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Application

- What makes VR a usable tool?
 - User-centered
 - Emotionally strong experience
 - Size/distance is of no matter
 - Natural rules and laws makes no difference
 - An error wont kill anyone
 - More “natural” interaction with the computer
 - Dangerous/unreachable environments can be simulated
 - Shared experience
 - Can control time, scale and physics

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Applications

- All kinds of categories of people can benefit from and contribute to VR!
 - Psychology
 - Medical
 - Physics
 - Chemistry
 - Teaching
 - Computing/computer science
 - Cognition science
 - Engineering
 - ...

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Applications

- With a great risk of being too general:
 - The best VR applications have been developed by applied scientists, not pure Computer Scientists!
 - They know what they want.
 - The best way of doing it: A project team with the previous list represented in personnel
- VR - Mostly prototypes and demonstrators
 - The area has now matured and more and more usable products exist.

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Maturity

- By Frederic Brooks Jr. University of Chapel Hill, CA.
 - (Have done VR research since 1967.)
- He defines 3 stages of application maturity
 - Demonstration
 - Pilot production
 - Real users, but still under development & testing
 - Production
 - Real users doing real work
 - Development complete
- VE applications in "production stage"
 - Vehicle simulation
 - Entertainment
 - Vehicle design
 - Architectural design
 - Training (NASA)
 - Psychiatric treatment
 - Probe microscopy

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VE Medical Applications

- Visualization
 - Doctor
 - Surgery planning
 - Surgery assist
 - Patient
 - Exposure therapy
 - Pain management
 - Decision tool, information
 - Training

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Medical - Visualization

- Example: Ultrasound visualization in Augmented Reality
 - UNC project,



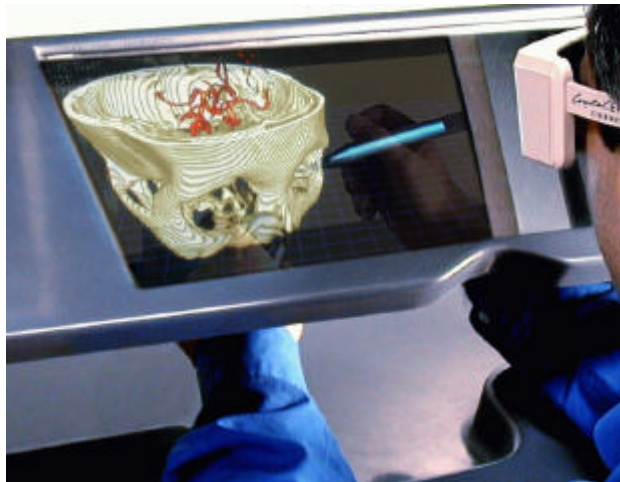
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Medical - Visualization

- Dextroscope, KRDL, Singapore



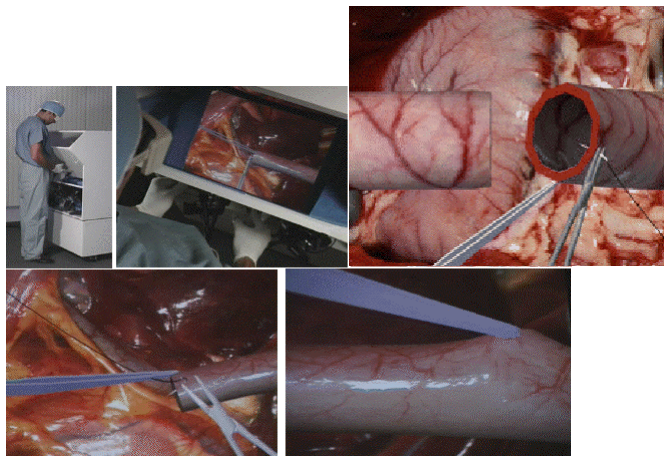
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Medical - Training

- Boston Dynamics, Suture Trainer



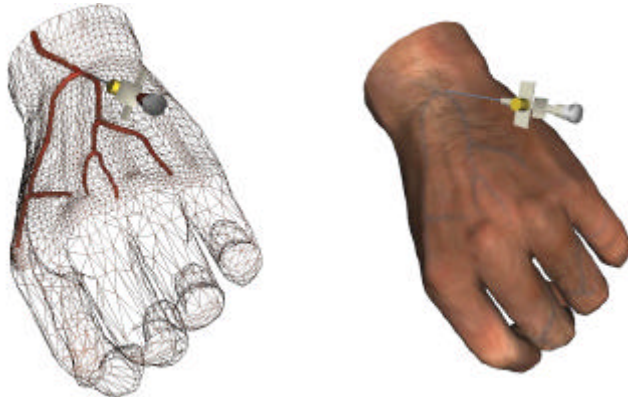
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Medical - Training

- Intubation simulator
 - Training in making an intubation using force-feedback in a Reach-In Terminal.
 - Oryx Simulation AB, Umeå.



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Medical – Exposure Therapy

- A common therapy for phobias involves *graded exposure and desensitization*
- Get over your fears by confronting them
- Current applications:
 - Acrophobia (fear of heights)
 - Agoraphobia (fear of embarrassing or constraining situations)
 - Fear of flying
- Does exposure to a virtual environment effect response to a real environment?

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Medical – Exposure Therapy

- In a study on VEs to treat acrophobia (Hodges et al., 1995)
 - 10 acrophobics got VE treatment
 - 8 acrophobics in control group
 - Measure of fear by standard self- assessment
 - Treated group made significant improvements (similar to clinical treatment)
 - A few reported months later that they had voluntarily gone to places they feared before

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Medical – Exposure Therapy

- Post-Traumatic Stress Disorder (Virtual Vietnam)
 - The Virtual Environments Group at Georgia Tech Graphics.



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Medical – Exposure Therapy

- Dr. Larry Hodges, Rob Kooper, Brian Wills, and Kevin Hamilton At Georgia Tech.
- This low cost system is currently being sold and marketed to practicing psychotherapists through a start up company.



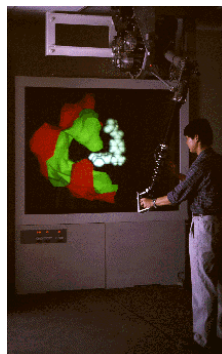
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Molecular Visualization

- Using VR for studies of Molecules structure and function
University of North Chapel Hill, *Russell M. Taylor II* , 1995



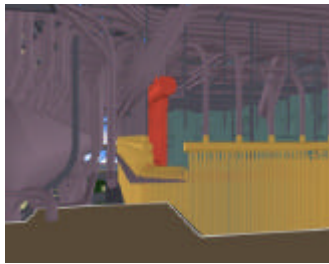
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Architectural design

- Real Time Walkthrough of Massive Models
 - 13 Million polygons interactively
 - Collision detection, ...



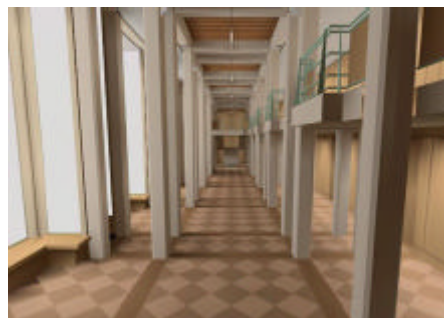
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Architectural design

- Using Radiosity for the lightning calculation.



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Industrial

- Visualizing engineering concepts
- Training personnel
- Ergonomic evaluation
- Simulating interaction of assemblies
- Stress analysis
- Distributed product development management
- Simulating manufacturing processes
- Visualization of complicated, large data

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Design, Marketing

- Daimler Benz (ART+COM)



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Marketing



- allows perspective buyers to virtually sit inside the automobile, customize interior options and styles, change exterior paint colors, and experience the roominess and comfort of the interior before the automobile is commercially available on showroom floors
- 60 installations, 30 in France.
- runs on a Intergraph TDZ Wildcat 2000 NT
- WTKR9

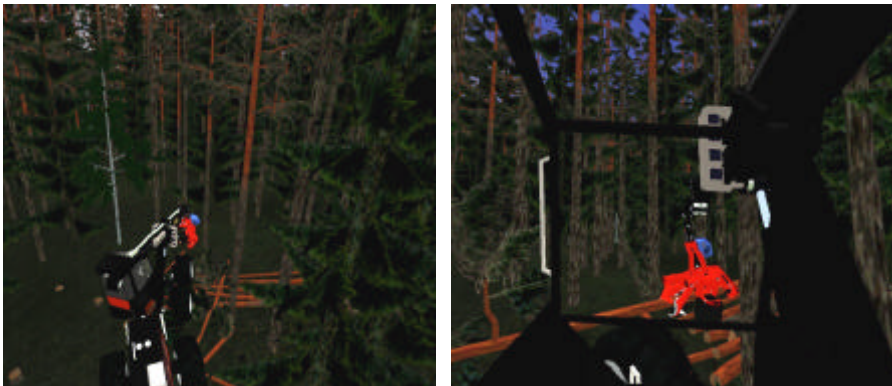
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Vehicle Simulators

- Valmet 911 Harvester Simulator ([VIDEO](#))
 - Oryx Simulation AB, Umeå.
 - Accurate physics simulation, in real time. (Physics engine from MathEngine).



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Application - Military

- M1 Abrams tank and M2 Bradley Fighting Vehicle

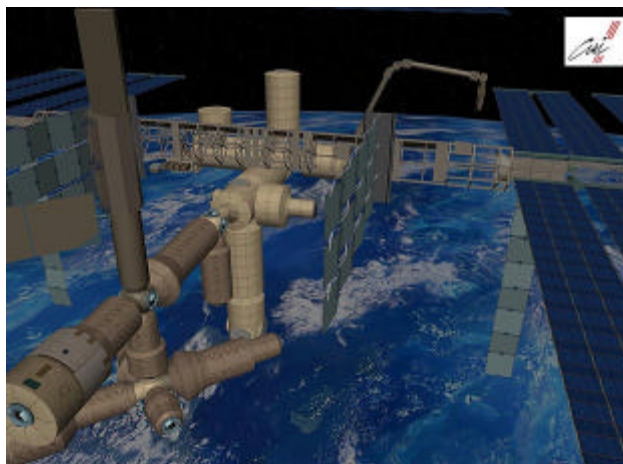


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Application - Military



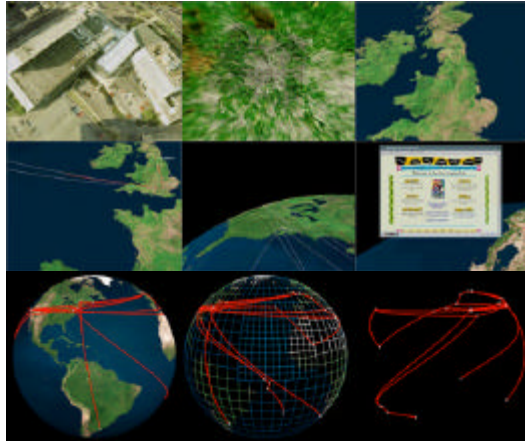
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Education

- Ride The Byte (ART+COM)
 - An interactive installation to experience and understand the Internet



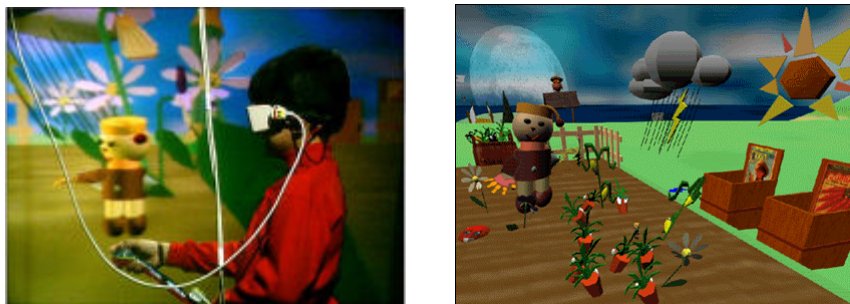
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Education

- NICE - Learning together in an collaborative distributed environment



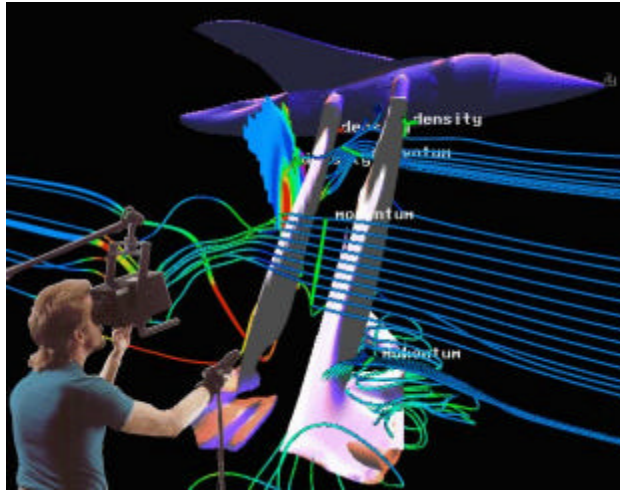
Electronic Visualization Lab, Chicago

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Virtual Wind-tunnel



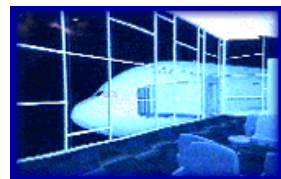
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Applications - Industry

- Airbus

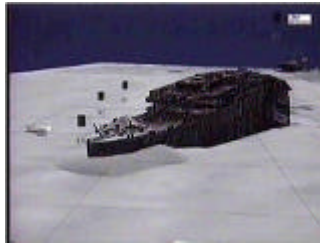


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Applications - Industry



The IFremer Titanic simulation

Caterpillar



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Application - Industry

- Virtual World of Bathrooms, Logicom



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Application - Industry

- Virtual Showroom



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Application - Medicine



Wheelchair simulator



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Applications

- Education
 - Cost limitation. Cant afford high-end graphics
 - Architecture
 - History
 - Physics
- Training
 - Flight simulators
 - Why have they worked for so long?

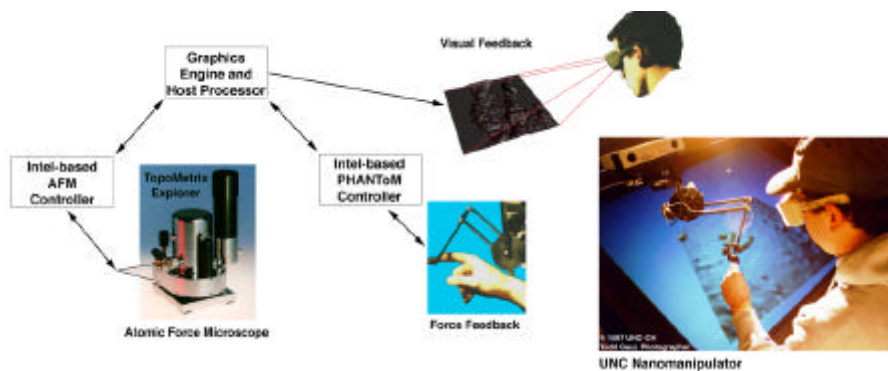
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Applications - Research

- Nano manipulator

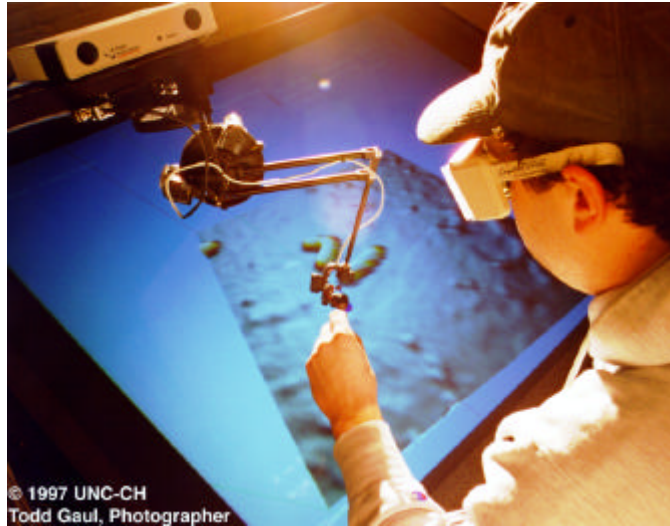


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Applications - Research



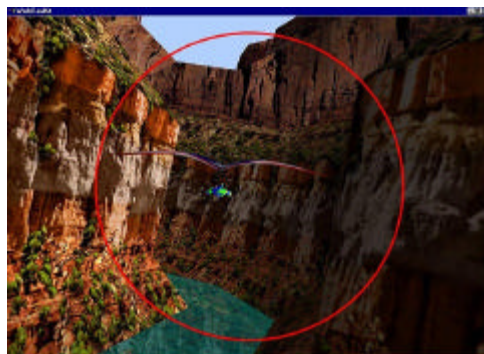
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Applications - Entertainment

- DisneyQuest family entertainment center in a 10,000m2 facility in Orlando, Chicago
- Virtual Hang-glider

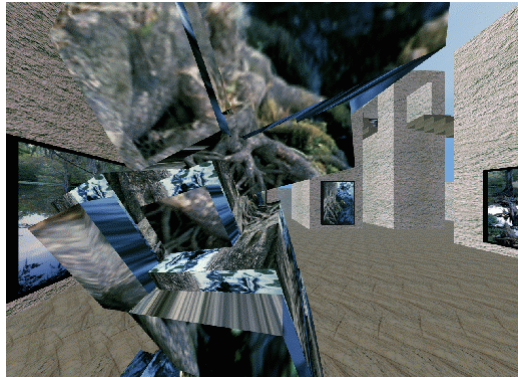


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Applications - Art



liquid meditation
A reflective voyage of introspection
The Master of Fine Arts Thesis of Margaret Watson

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