



Introduction to Virtual Reality (VR)

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Intro to VR Overview

What constitutes a "virtual environment"?

What problems demand a virtual environment interface?

What are the important issues in designing and building virtual environment interfaces?

Virtual Environment Definitions



A Computer-Generated, 3D Spatial Environment in Which Users Can Participate in Real-time

Virtual Environments Can Be

- Fully Immersive, Encompassing Worlds
- Augmentations (Overlay) to the Real World
- “Through the Window” Worlds (Non-immersive)

Virtual Environment Definitions



Many names for the same thing

- Artificial reality, Cyberspace, Virtual Reality, Virtual Worlds, Virtual Environments, Synthetic Environments

The origins of the terms for VR ...



Artificial reality

- the first term we encounter historically.
- This is a term coined by Myron Krueger in the mid-1970's.
- Krueger intended the term to mean “full-body participation in computer events that is so compelling that it is accepted as real experience”.

The origins of the terms for VR ...



Cyberspace

- The term cyberspace was coined by William Gibson in 1984 in his science fiction novel Neuromancer.
- Gibson used the term to refer to a single artificial reality that could be experienced simultaneously by thousands of people worldwide.



Cyberspace

- Gibson described huge virtual structures of data in the “consensual hallucination” with millions of people directly connected by “jacking in” their nervous systems.
- These blue pyramids of financial data or red hemispheres of corporate records were protected from eavesdroppers by visible walls of protection Gibson called “ice”.



Cyberspace

- From Gibson, we get the idea of flying through data space, where there are 3D icons in our visual display, with the 3D icons having assigned meaning and operators that can act on the icons...

The origins of the terms for VR ...



Virtual reality (VR)

- Coined by Jaron Lanier, founder/head of VPL Research, to bring all of the virtual projects under a single title.
- His meaning for the term typically refers to three-dimensional realities implemented with a stereo head-mounted display and data gloves for input.
 - The VPL system is driven by an IRIS workstation for each eye...

The origins of the terms for VR ...



Virtual worlds

- Virtual world is defined in terms of the characteristics that indicate such a system:
 - These characteristics are seeing and interacting with distant, expensive, hazardous, or non-existent 3D environments.
 - The technology for “seeing” is real-time, interactive 3D computer graphics and the technology for “interacting” is evolving and varied.

Virtual Worlds



- Virtual worlds (alternate definition): Moving and interacting with a three-dimensional model of a world in real-time such that the experience is almost real or a near-believable simulation of the real.

The origins of the terms for VR ...



Virtual environment

- Virtual environment is a safe alternative to virtual world.
- The University of Washington Human Interface Technology (HIT) Lab people are the first people to use the term virtual environment to describe their work.

The origins of the terms for VR ...



Synthetic Environment

- This is the term DARPA uses to describe its various programs for seeing/interacting with 3D worlds.

The origins of the terms for VR ...



Metaverse and Avatars

- Sometimes the 3D virtual world (Gibson matrix) is called the Metaverse and the 3D icons or appearance of characters (humans) in the Metaverse are called Avatars.
- This terminology is used in the book entitled "Snow Crash" by Neal Stephenson.

Visual Simulation & Virtual Environments



The key differentiator between visual simulation and virtual environments revolves around the term “accessibility”.

- Much of the early work in virtual environments reproduced that previously done for visual simulation because the visual simulation work was not accessible, being locked up in proprietary technical reports.

Telepresence



There are two kinds of telepresence:

Real-time telepresence:

- A visual virtual world that you interact with. - Interactions are reflected in the movement of some real world object. i.e. a DataGlove being moved to control a robot hand that moves at the same time.



Telepresence

Delayed telepresence:

- A visual virtual, world that you interact with while recording the interactions.
- When you are satisfied with the results, play the interactions across your communications delay.



Immersion & Presence

There are two entangled terms in VR - immersion and presence.

- Immersion is best thought of as “from what perspective am I viewing the virtual world?”.
- “Presence” is the notion that the user of the virtual world feels “present in the virtual world” such that the user can perform a task or set of tasks.

Immersion & Presence



Sometimes the phrase “immersed in the virtual world” is taken to mean the same as “present in the virtual world”.

Measuring presence & immersion ...



There are papers that discuss the measurement or quantification of “presence”.

- What is really important though is can human performance be improved through the use of a virtual environment and can that improvement be measured ...



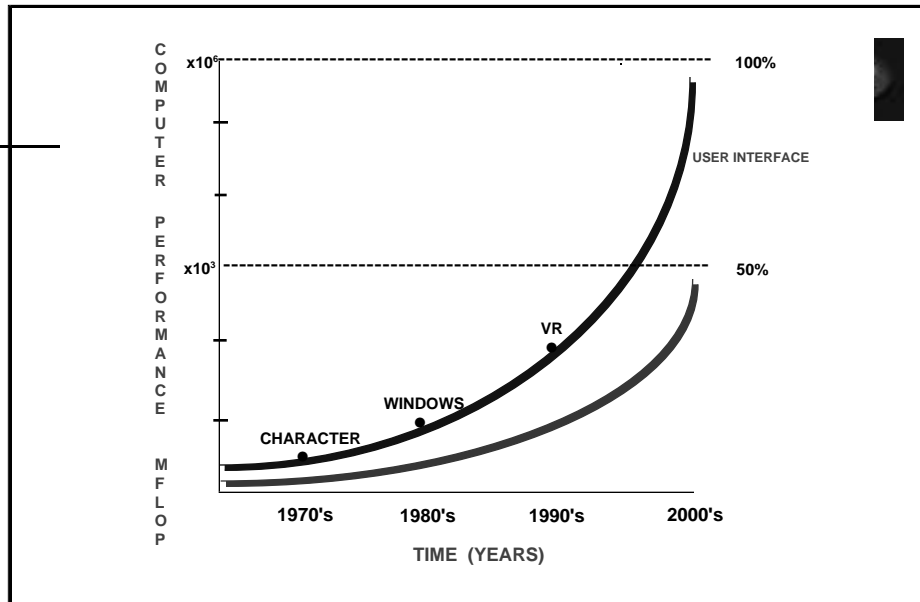
Why an immersive interface?

The environment encompasses large virtual spaces

A large number of parameters are to be manipulated by the operator

Tasks are of a hands-busy nature

Perspective is important



Where did all the hype come from?



Video

Video selections



Show the Tom Defanti tape made for NSF.

Show the Jeff Goldblum episode of FutureQuest.

Show the entertainment VR videotape.