



2006-01 CAD/CAM

Virtual Reality/Augmented Reality

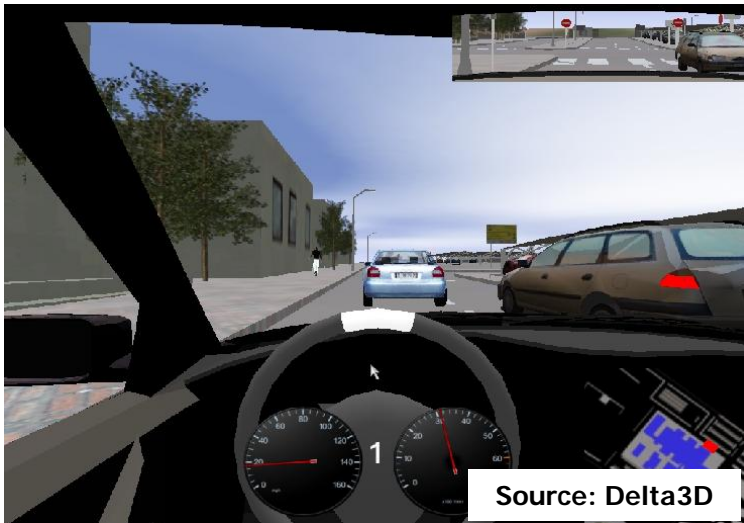
Prof. Sung-Hoon Ahn

2005-12-11

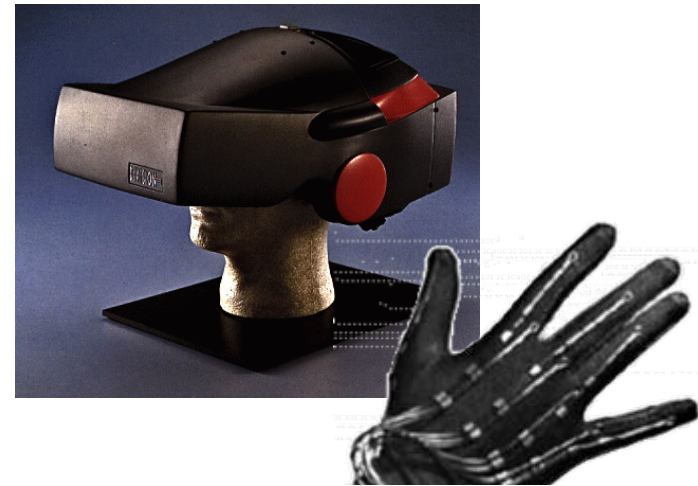
What is VR/AR

- Virtual Reality (VR)

- “The user becomes fully **immersed** into an **artificial, three dimensional environment** that is completely generated by a **computer graphics.**”
- Immersive virtual reality



(a) 3D driving simulation



(b) Hardware: HMD & Data glove

< Example of virtual reality >

What is VR/AR (cont.)

- Augmented Reality (AR)
 - The **virtual objects** display information that the user cannot directly with his own senses.
 - The information conveyed by the virtual objects helps a user perform **real-world task**.

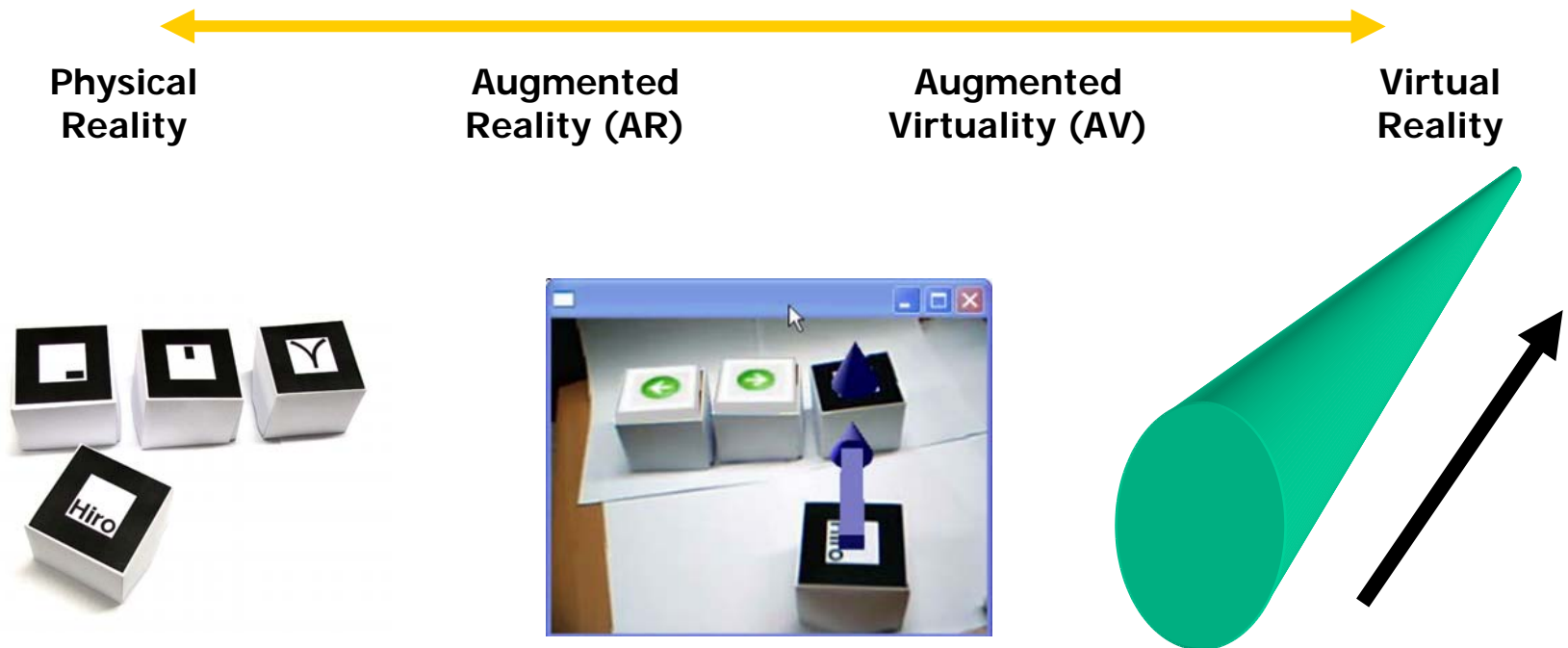


< Example of augmented reality >

What is VR/AR (cont.)

- Range of VR/AR technologies

Mixed Reality (MR)



< Diagram from reality to virtuality >

Interface of VR/AR

- Head Mounted Display (HMD)
 - Viewing tool for 3D virtual models
 - First wearable device
 - Often uncomfortable intrusiveness



Source: Micro Optical

(a) Glasses type



Source: Deocom

(b) Goggle type



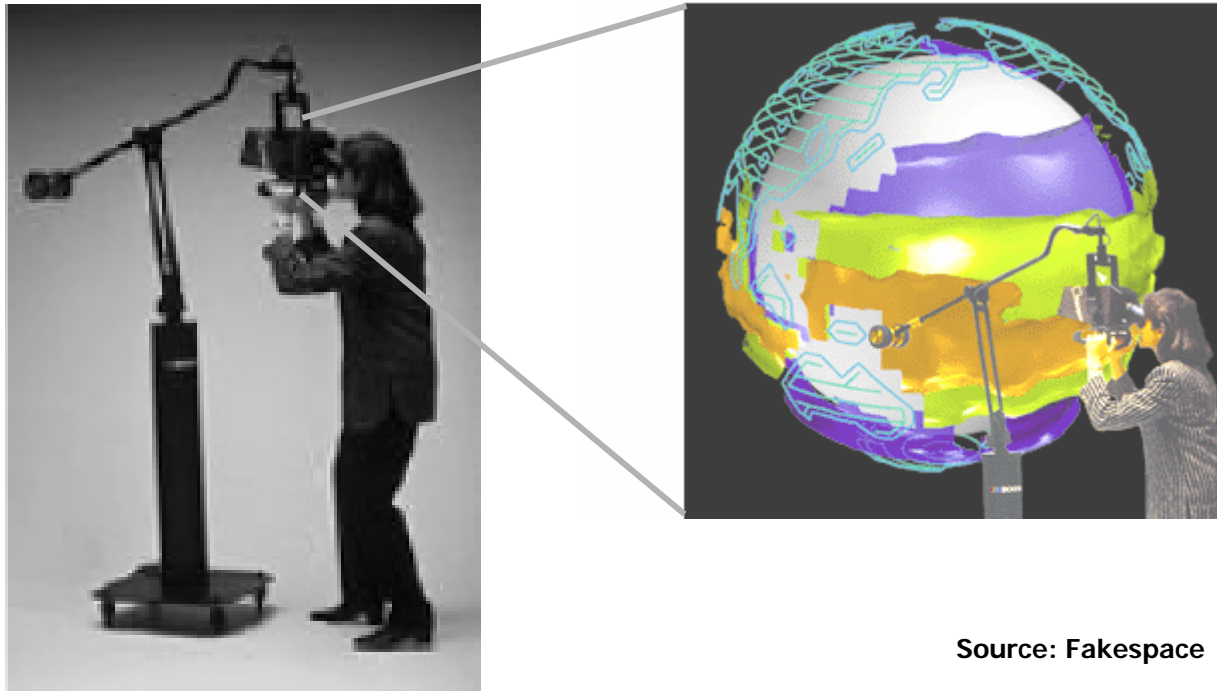
Source: N-vision

(c) Helmet type

< Various type of HMD >

Interface of VR/AR (cont.)

- Binocular Omni-Orientation Monitor (BOOM)
 - Head-coupled stereoscopic display device
 - Display device attached on multi-link system for tracking a head movement.



Source: Fakespace

< Example of BOOM >

Interface of VR/AR (cont.)

- Cave Automatic Virtual Environment (CAVE)
 - Provides the illusion of immersion by projecting stereo images on the walls and floor of a room-sized cube
 - Several persons wearing lightweight stereo glasses can enter and walk freely inside the CAVE



Source: Electronic Visualisation Laboratory at the University of Illinois in Chicago

< Example of CAVE >

Input device of VR/AR (cont.)

- Input devices
 - Allow interact with a virtual world



Source: 5DT

(a) Data glove



Source: 3dconnexion

(b) Space mouse



Source: Fakespace

(c) Projection Desk



Source: Micro Optical

(d) Glasses type

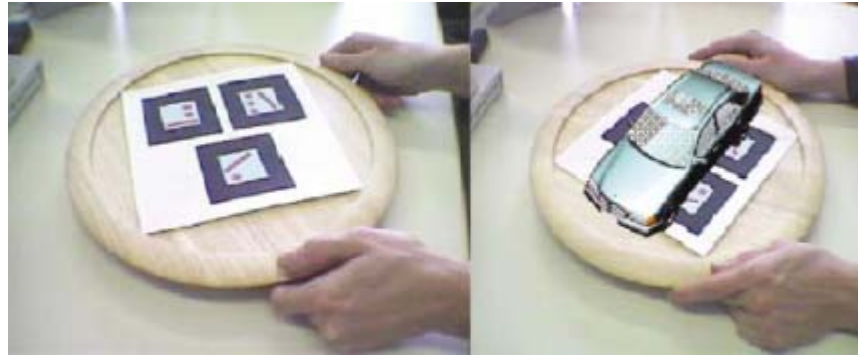


Source: Microsoft

(e) Controller

Application

- AR Desktop Environment (ARToolkit)



(a) AR desktop environment



(b) Remote AR Conferencing



(c) Augmented Surfaces system

Application (cont.)

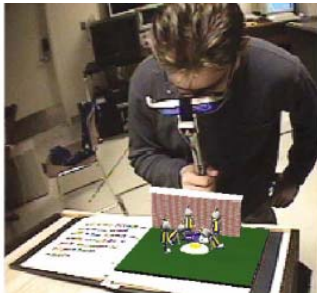
- Education



(a) Geometry education



(b) AR museum



(c) Magic book (real, augmented & virtual reality)



(d) Military Training Simulation

Application (cont.)

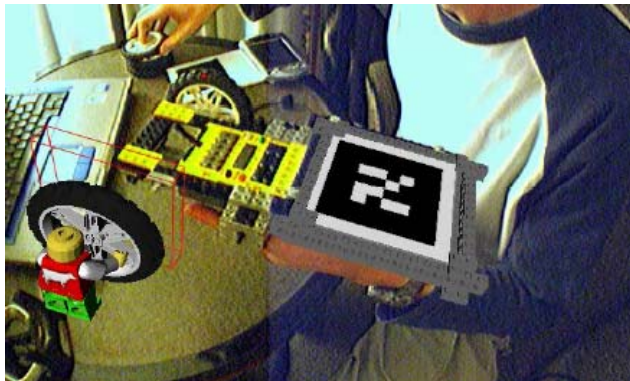
- Entertainment



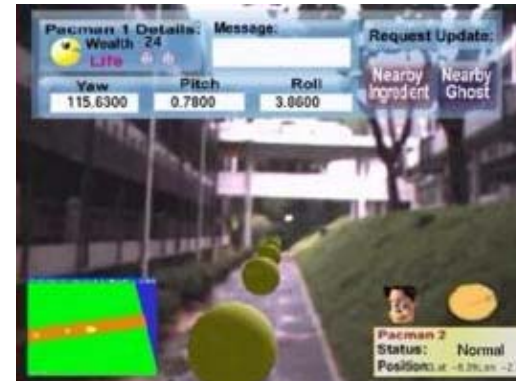
(a) ARQuake



(b) RV-Border Guards game,



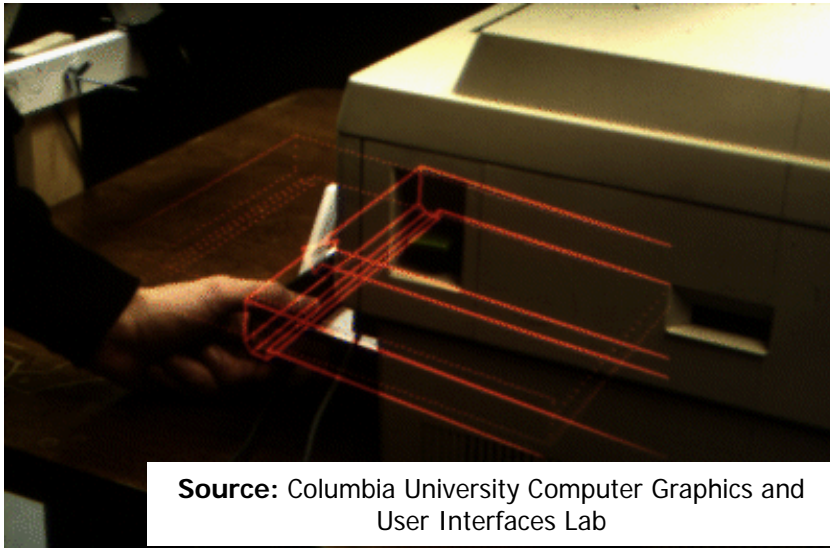
(c) AR Lego



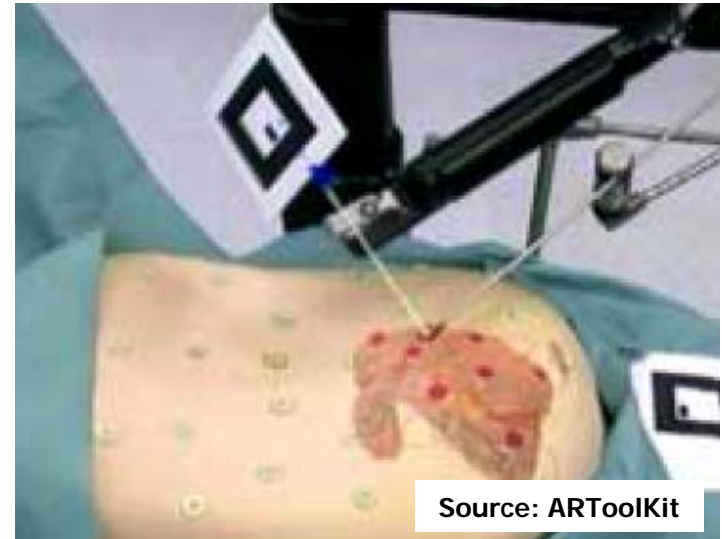
(d) Human Pacman

Application (cont.)

- Other fields



(a) Printer maintenance



(a) Surgery

Demo

- AR Demo Application



< Icons with different marks >



< Demo of sample icons >

- Head-Mounted Display



< Hardware: HMD >