#### 446.326A CAD/CAM

### **Virtual Reality/Augmented Reality**

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#### 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







(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 >

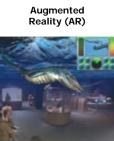
#### What is VR/AR (cont.)

Range of VR/AR technologies

#### Mixed Reality (MR)



**Physical** 





Augmented Virtuality (AV)



Virtual

Reality

< 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



(a) Glasses type







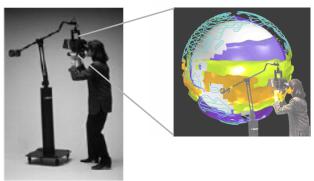
(b) Goggle type

(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.



< 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







< Example of CAVE >

#### Input device of VR/AR (cont.)

- Input devices
  - Allow interact with a virtual world







(b) Glasses type



(c) Projection Desk







(e) Space mouse

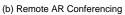
## **Application**

AR Desktop Environment



(a) AR desktop environment







(c) Augmented Surfaces system

# **Application (cont.)**

Education



(a) Geometry education





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





(d) Military Training Simulation



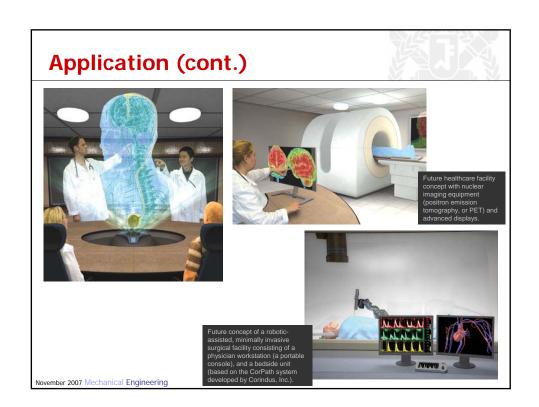


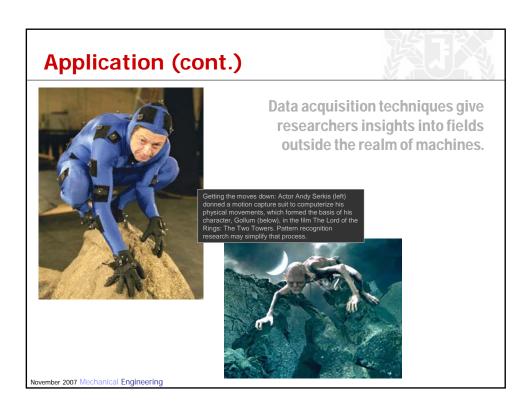
## **Application (cont.)**

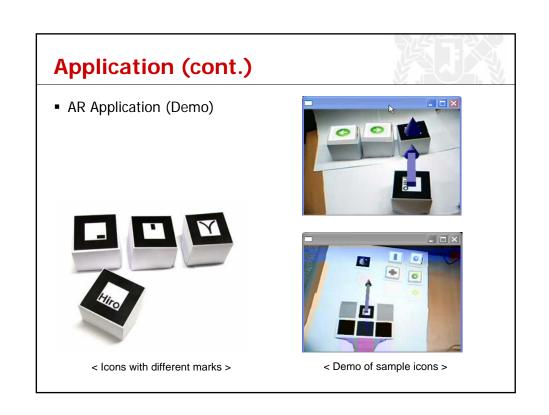


You know the feeling. You try on a shirt at the store and think you look pretty fly, but you need a second opinion. With Social Retailing, developed by IconNicholson and shown at Bloomingdale's in March, you can send a video to your friends' cell phones and instantly get their vote. You can also try on outfits virtually using a mirror that shows how fab they might look - or not. **Available** 2008

 $http://www.time.com/time/specials/2007/article/0,28804,1677329\_1678102\_1678096,00.html \\$ 

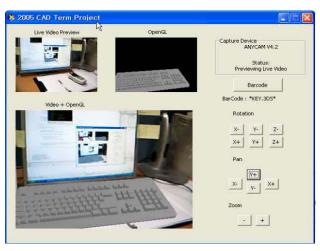






# **Application (cont.)**

Product viewer in AR using Bar Code System based on PC Cam

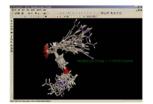


### **Application**

Head-Mounted Display







< Hardware: HMD >

< Demo of sample image >