

SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution



Accredited by NBA – AICTE and Accredited by NAAC – UGC with ‘A+’ Grade
Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai

DEPARTMENT OF INFORMATION TECHNOLOGY

16IT AUGMENTED REALITY AND VIRTUAL REALITY

III YEAR – V SEM

UNIT 4 – INTERACTIVE TECHNIQUES AND TOOLS

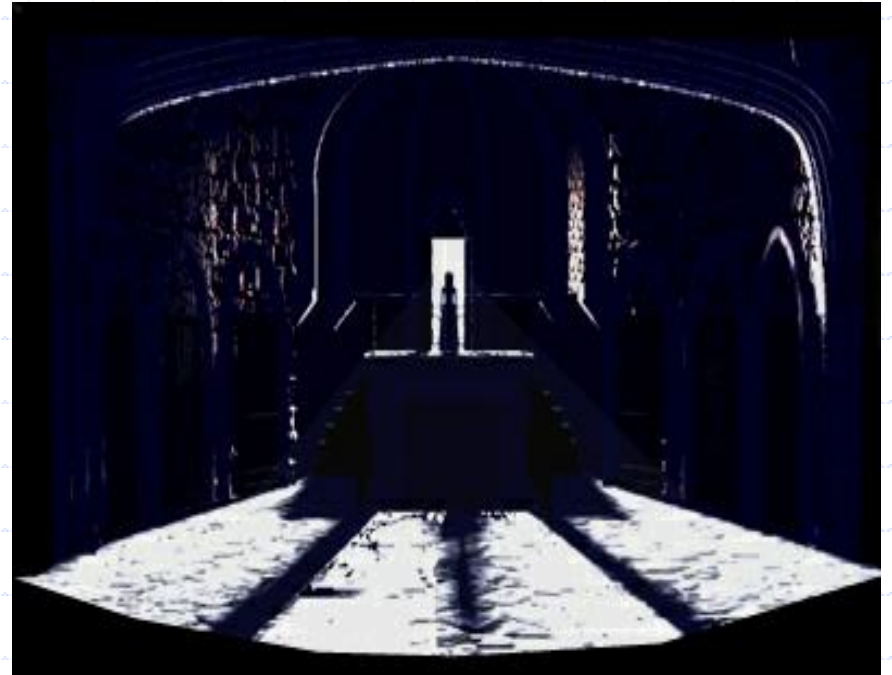
TOPIC 1 – Multiple models of input and output interface

What is virtual reality?

- ◆ a way to **visualise, manipulate, and interact** with a virtual environment
- ◆ **visualise**
 - the computer generates visual, and auditory outputs
- ◆ **manipulate**
 - manipulate objects in this virtual world
- ◆ **interact**
 - real time manipulation, feedback from the environment

The environment could be

- ◆ simulated real world
- ◆ fantasy world
- ◆ data, research



VR applications

- ◆ entertainment
 - games
 - ◆ simulated real world, fantasy
- ◆ architectural planning, modelling
 - business modelling
 - visualising the fluctuations in the stock market
- ◆ tourism & advertising – go where you can't go
- ◆ new statistical software, data representation in 3D
- ◆ telepresence
 - medical, remote operations
- ◆ scientific simulations
 - submarine captains
 - chemistry

Simulators

- ◆ the virtual world
 - long history, as early as 30s
- ◆ aircraft, flight simulators
- ◆ tank simulators
 - cost effective training
- ◆ submarine simulators

VR user interface 1

- ◆ computer interface
 - virtual reality on normal computer monitor
 - can be traced back to 60s
- ◆ immersive interface
 - Head Mounted Display (HMD) - next slide
 - helmet or face mask
 - ◆ visual and auditory output
- ◆ large projection displays
 - picture theatres - wide screen
 - VR glasses - expensive production

HEADMOUNTED DISPLAYS (HMD) and 3D GLASSES



VR4 from Virtual Research



i-glasses! from Virtual i-O



SIMULEYES
from StereoGraphics



VR user interface 2

◆ telepresence

- remote sensors in the real world
 - ◆ video camera
- connected to senses of human in other environment
- control a robot
 - ◆ bomb disposal
 - ◆ radioactive material
 - ◆ fire fighters
 - ◆ surgery
 - ◆ space exploration

Control devices



◆ glove

- fitted with sensor on fingers as well as position and orientation sensors

◆ mouse, joystick

- 3D
- 6D - ball mounted on stick - can twist in addition to normal joystick movement

◆ full body suits

- position and bends sensors all over suit
 - ◆ also used for character animation and sport

Stereo Vision

- ◆ not in all systems
- ◆ create a slightly different image for each eye to give the perception of depth
 - high refresh rates required
 - Australian Army working on holographic projection
- ◆ consumer models (3D glasses) available
- ◆ head mounted displays often used
 - some users have visual problems (blurred vision) after using head mounted displays

Rendering

◆ visual rendering

- 20 to 60 frames per second required
- shading, lighting, surface texture
- computer intensive

◆ auditory rendering

- sounds get louder as get closer
- sounds come from apparent source

◆ haptic rendering

- generating the sensation of touch
 - ◆ chemical reaction simulations
 - ◆ telepresence, robot arms
 - ◆ current research

◆ motion rendering

- simulators

QuickTime VR

- ◆ a cross-platform standard for image-based VR
- ◆ pre-rendered from photographs or computer generated images
- ◆ high level of image quality on low end machines
- ◆ limited environment because it is predefined

QuickTime VR

◆ Panoramas

- wide image, often 360°
- from photographs, or computer generated

◆ Objects

- series of views of an object from different angles

QuickTime VR

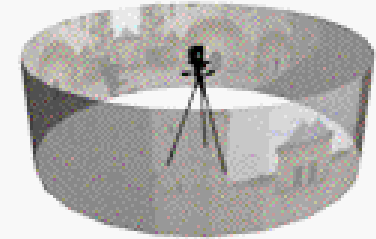
◆ Making panoramas



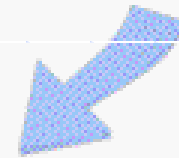
Step Three

The flat images are 'tiled', compressed and saved in the QuickTime VR file format which is viewed through a window provided by the QuickTime VR extension. When the user pans and zooms, the window images different parts of the panorama.

Step One



Photographic panoramas are captured by shooting a series of images with a still camera.



Step Two



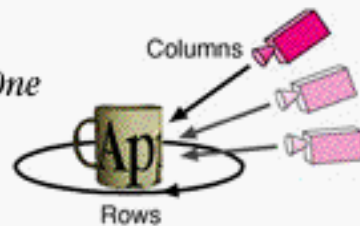
These images are 'stitched' together by the QuickTime VR software into a seamless panorama.

QuickTime VR

QuickTime VR Objects consist of a series of images covering different views of an object. When the user pans and tilts the object, the software displays the appropriate view.

◆ Creating VR objects

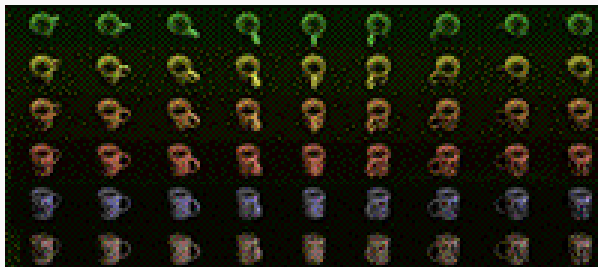
Step One



The images are organized into rows and columns: one row for each horizontal spin of the object, and 1 column for each step of that spin.

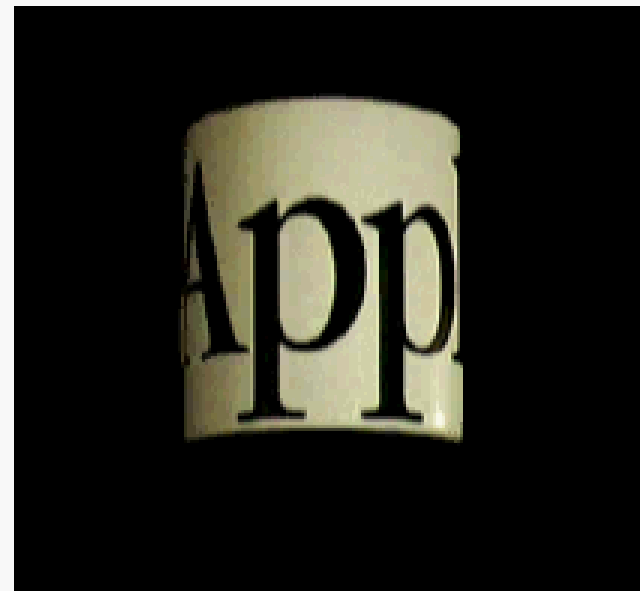


Step Two



Object movies can be captured with a still or video camera, sometimes with a specialized rig. Objects can also be easily created in 3D software.

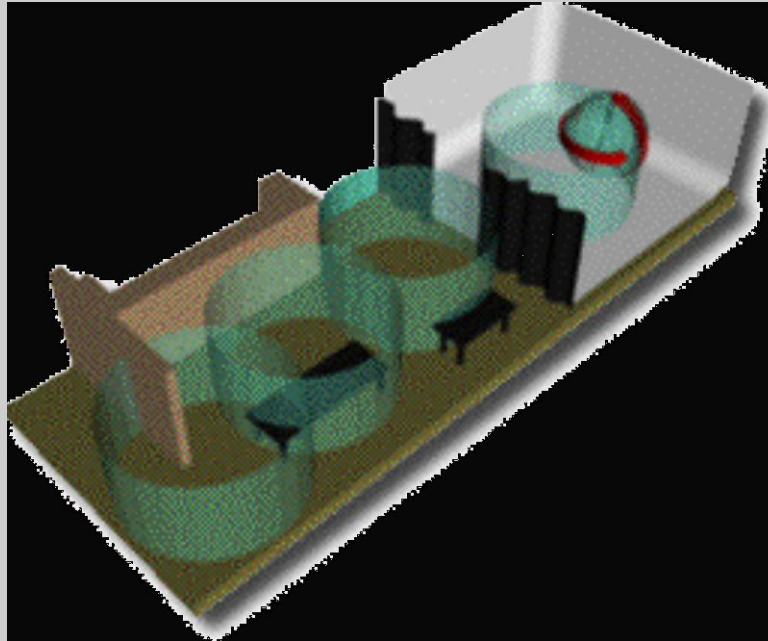
Step Three



The images are stored in a standard QuickTime movie, and then converted to an object movie using the QuickTime VR authoring tools.

QuickTime VR

- ◆ worlds can be linked together





◆ end