



Communication Multimédia

SES 4406 CR

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Multimedia Technologies (cont.)

Information systems for MM technologies

Information systems for multimedia applications 3D vision - holograms

◆ 3D graphics

- 3D view resolution is limited by
 - Software used
 - Screen resolution

- Allow user to interact with the 3D objects

◆ Holograms (<http://www.holoworld.com>)

- have very high resolution for 3D view
- But user cannot interact with the 3D objects
 - unlike other 3-D "pictures", holograms provide "parallax" - allow the viewer to move back and forth, up and down, and see different perspectives - as if the object was actually there
- ◆ Research → to combine the interactivity of computer graphics and the resolution of holograms



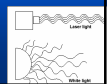
Information systems for multimedia applications 3D vision - holograms

◆ Photography & holography

◆ Photography - just an image of the object

◆ Holography - three-dimensional image

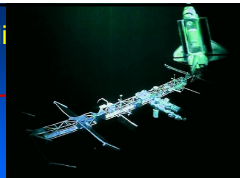
- size, shape, brightness and contrast of the object being recorded
- this information is stored in a very microscopic and complex pattern of interference
- the interference pattern is made possible by the properties of light generated by a laser
- why lasers - high coherency light



Information systems for multimedia applications 3D vision - holograms

◆ Holography – 3D image

- information is stored in a very microscopic and complex pattern of interference
- ◆ When you shine a light on the hologram, the information that is stored as an interference pattern takes the incoming light and re-creates the original optical wavefront that was reflected off the object
- ◆ Your eyes and brain now perceives the object as being in front of you once again



Information systems for multimedia applications 3D vision - holograms

◆ How holograms are made?

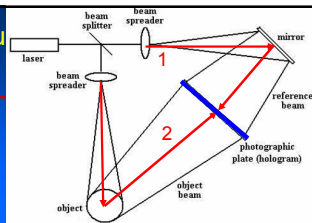
◆ Basic holograms types

- reflection holograms
 - read images by reflecting a beam of light off the surface of the hologram
 - very high quality images & very expensive to create
- transmission holograms
 - read images by transmitting a beam of light through the hologram
 - commonly seen since they can be inexpensively mass-produced
 - Holograms @ credit cards – are transmission holograms with mirrored backing



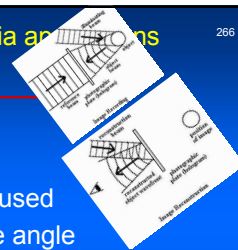
Information systems for multimedia applications 3D vision - holograms

- ◆ Reflection hologram
- ◆ laser beam split into: object + reference beam
- ◆ object beam is reflected off the object and projected onto the photographic plate
- ◆ reference beam is reflected off a mirror and shined on the photographic plate
- ◆ beams meet at the photographic plate and create the interference pattern that records the amplitude and phase of the resultant wave



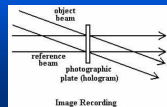
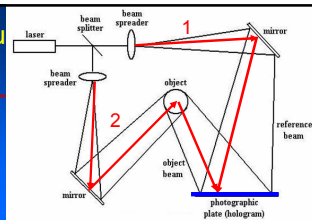
Information systems for multimedia applications 3D vision - holograms

- ◆ Reflection hologram
- ◆ Reconstructing the image
- ◆ reconstruction beam of light is used
- ◆ beam is positioned at the same angle as the object illuminating beam that was used during the recording phase
- ◆ the virtual image appears behind the hologram at the same position as the object



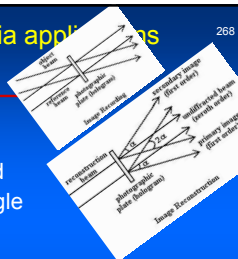
Information systems for multimedia applications 3D vision - holograms

- ◆ Transmission hologram
- ◆ laser beam split into: object + reference beam
- ◆ object beam is reflected off the mirror + the object and projected onto the photographic plate
- ◆ reference beam is reflected off a mirror and shined on the photographic plate
- ◆ beams meet at the photographic plate and create the interference pattern that records the amplitude and phase of the resultant wave



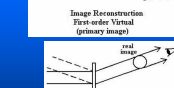
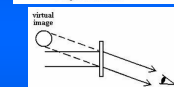
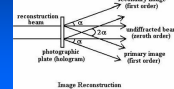
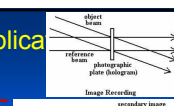
Information systems for multimedia applications 3D vision - holograms

- ◆ Transmission hologram
- ◆ Reconstructing the image
- ◆ reconstruction beam of light is used
- ◆ beam is positioned at the same angle as the reference beam that was used during the recording phase
- ◆ three beams of light will pass through the hologram:
 - undiffracted beam (zeroth order) pass directly through the hologram but will not produce an image
 - second beam forms the primary (virtual) image (first order) that is diffracted at the same angle as the incoming object beam that was used during recording
 - third beam forms the secondary (real) image (first order)



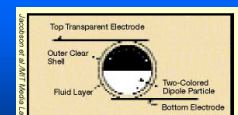
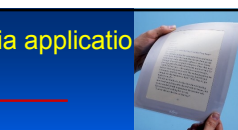
Information systems for multimedia applications 3D vision - holograms

- ◆ Transmission hologram
- ◆ Reconstructing the image
- ◆ If we look at the hologram at the same angle as the primary image beam (= angle as recording object beam), we will see a virtual image of the object located behind the hologram
- ◆ If we look at the hologram at the same angle as the secondary image beam, we will see a real image of the object located in front of the hologram



Information systems for multimedia applications Electronic Paper / Ink

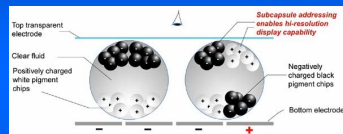
- ◆ <http://www.eink.com/>
- ◆ <http://www.media.mit.edu/micromedia/elecpaper.html>
- ◆ research in Xerox for > 20 years
 - Idea for replacing paper by coloured mini spheres closed between two layers of plastic foil
 - Each sphere possess white/black particles which are electrically charged
 - network of 2 electrodes allow for control each point separately



Schematic diagram of the system used to control an electrically charged particle within a microcapsule.
sphere diameter - human hair

Information systems for multimedia application Electronic Paper / Ink

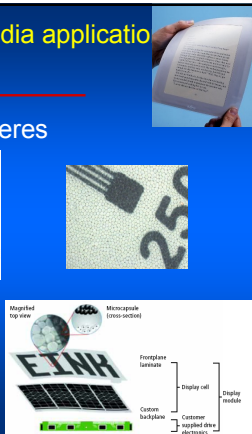
◆ charged particles in mini spheres



◆ Special printer

◆ Pixel =

- 1 container for black / white
- 3 containers for RGB (future!)



Information systems for Electronic Paper / Ink

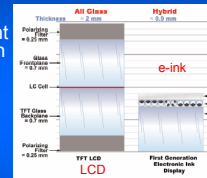
Readable	Mobile	Durable	Flexible
Reflective	Thinnest Electronic Paper	Unbreakable	Cut to any shape or size
Bi-stable Image	Light Weight	Environmental Stability	Rollable
Wide Viewing Angle			

◆ Advantages

- Functions based on reflection of the light and reduction of the power consumption
- flexible support
- rewritable
- Portable
- Change the resolution
- Content may be downloaded
- Thinner than LCD

◆ Disadvantages

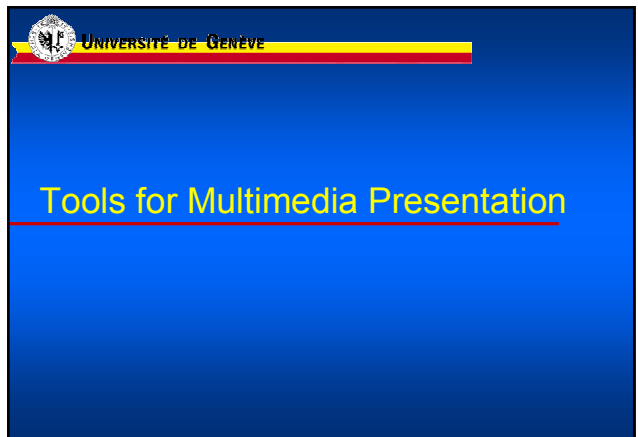
- Colour – change colour under tension
- Still low resolution
- Paper lifetime



Information systems for multimedia application Electronic Paper / Ink

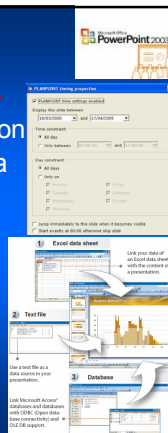
◆ Usage

- Electronic Paper
- Electronic books
- Wall papers
- Erasable table
- billboard
- TV screen
- Mobile!



Tools for Multimedia Presentation Microsoft PowerPoint

- ◆ Tool to create multimedia presentation
- ◆ Allow to insert some multimedia data
- ◆ Advantage
 - Simple to use
 - Add-on – planPoint/dataPoint →
- ◆ Disadvantage
 - MM data – not nicely inserted in PPT
 - Data screen / projector needed
 - low interaction presenter/audience
 - preparation before presentation



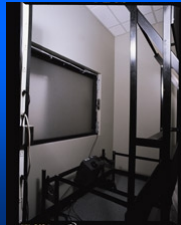
Tools for Multimedia Presentation WhiteBoards

- ◆ Alternative “tables”
- ◆ SmartBoard of Smart Technologies
 - Utilize pen and special effects
 - Sensible for pressing of pen
 - Diagonal 150 cm
 - Expensive
- ◆ SoftBoard of Microfield Graphics
 - Laser scans the surface of the board
 - Laser traces colours and movements of pen
 - Allow for e-conference



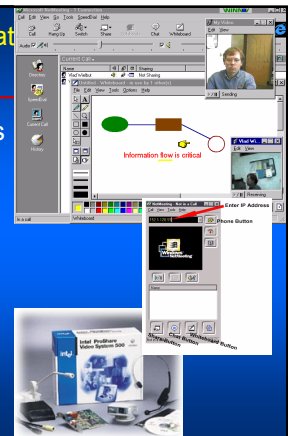
Tools for Multimedia Presentation WhiteBoards

- ◆ Advantage
 - Safe historical data
 - Safe electronically the manual writing
 - High interaction between presenter and the audience
- ◆ Disadvantage
 - Short life
 - Projection system needed



Tools for Multimedia Presentation Desktop solutions

- ◆ NetMeeting / MSN / others
 - Share whiteboard
 - Chat
 - Share application
 - transfer files
 - Audio/video conference point-to-point with systems like ProShare



Tools for Multimedia Presentation Others

- ◆ Tools can be integrated perfectly with the whiteboards
- ◆ Fast connection over the Internet needed
- ◆ Problem
 - Only point-to-point video (usually free)
 - E-meeting tools - number of users is limited, tools are not for free



Tools for Multimedia Presentation Systems for MM Presentation on WEB

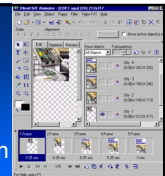
- ◆ Why Web Animation ?
 - Internet - rapidly evolving
 - people want to be able to post more sophisticated content – animation, audio/video, not just a text
 - To reach most users the file size for Web content has to be small enough to transmit quickly over standard Internet connections (e.g. telephone modems)
 - There is a number of clever tricks for delivering complex content over limited connections...

Tools for Multimedia Presentation Systems for MM Presentation on WEB

- ◆ Actual technologies that web designers use to create a 2D WEB animation
 - Animated GIFs
 - Dynamic HTML
 - Java
 - Shockwave and Flash

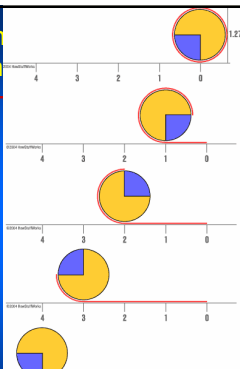
Tools for Multimedia Presentation Systems for MM Presentation on WEB

- ◆ Animated GIFs (named also GIF89)
- ◆ sequence of JPEG/GIF bitmap files shown
- ◆ Oldest technology, still very popular today
- ◆ advantages
 - ☺ incredibly simple to work with and automatically recognizable to most Web browsers
 - ☺ provide the individual bitmap images that make up the frames of your animation to shareware program - *GIF construction* (Windows) / *GifBuilder* (Macintosh)
- ◆ disadvantages
 - only simple animation to keep the file size down
 - each frame = full bitmap image
 - not really possible 25 frames / second for "fluid" animation



Tools for Multimedia Presentation Systems for MM Presentation on

- ◆ Animated GIFs
- ◆ ☺ excellent way of illustrating simple concept, or just adding eye-catching decoration to web
- ◆ ☹ inadequate for communicating more complex ideas or adding a real sense of motion to web
- ◆ ☹ not possible to add sound to a GIF animation



Tools for Multimedia Presentation Systems for MM Presentation on WEB

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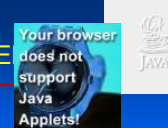
- ◆ Dynamic HTML (dHTML) – use “scripts”
- ◆ Firstly – static HTML – load web once + display
- ◆ Then – dynamic HTML – load web along displaying
- ◆ Not developed for animation, but used for it :
 - dHTML script can tell the browser to keep changing the placement of a particular image on the page + do this with several different images = move a series of graphic elements around each other to make interesting movies

Tools for Multimedia Presentation Systems for MM Presentation on WEB

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- ◆ Dynamic HTML
- ◆ advantages
 - ☺ automatically recognizable to most Web browsers
- ◆ disadvantages
 - use Macromedia's Dreamweaver but still difficult to create dHTML content that works for all browsers
 - all it can really do = move still images on screen
 - more fluid than GIF animation, but still not enough

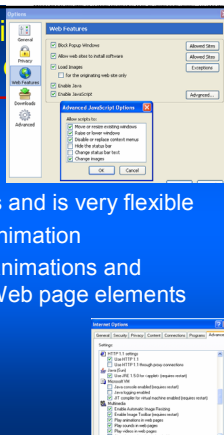
Tools for Multimedia Presentation Systems for MM Presentation on WE



- ◆ JAVA applets
- ◆ Small 'application' - APPLET- users download it while loading a web and executes on his/her machine
- ◆ Applet works only in conjunction with a browser
- ◆ Need for Java Virtual Machine (JVM) – like “plug-in” that translates instructions in applet into the instructions of particular Operating System (windows, UNIX, etc)
- ◆ Web application is just example of applets-usage

Tools for Multimedia Presentation Systems for MM Presentation

- ◆ JAVA applets
- ◆ advantages
 - ☺ works on all operating systems and is very flexible
 - ☺ any shapes may be used for animation
 - ☺ suited for creating interactive animations and combining animation with other Web page elements
- ◆ Disadvantages
 - Applets are blocked by default in Windows, due to the possible insecure applets (harming)



Tools for Multimedia Presentation Systems for MM Presentation on WEB

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- ◆ Web animation & browser plug-ins
 - enhance web without changing the browser source
 - Plug-in = program that work with browser to read and play a certain type of file
 - Web designers can use dHTML scripts to detect if browser has a particular plug-in
 - ☹ have to be installed to be used
 - ☹ Plug-ins are not compatible with all browsers
 - Web-based audio/video streaming possible
 - Example: QucikTime and Windows Media Player – stream = play while downloading, ☹ NOT inside browser

Tools for Multimedia Presentation Systems for MM Presentation on WEB

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- ◆ Flash (.fla,.swf) and Shockwave (.dir,.dcr) (Macromedia)
 - Both are plug-ins
 - Both tailored specifically for modem transmission rate
 - straightforward interface / many automated tasks
 - Easy to generate web animation / include sound
 - Flash - rich animation on the Web
 - Since beginning dedicated for web
 - more popular, cheap, flexible
 - Shockwave - more complex animated content, highly interactive - user input is included
 - developed to create dynamic content for CD-ROMs

Tools for Multimedia Presentation Systems for MM Presentation on WEB

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- ◆ Flash and Shockwave cont.
- ◆ vector-based 2-D animation viewers
 - movies as part of the Web page, not separately (like in QuickTime, Media Player)
 - Work with most browsers
 - Quick download time of vector-based graphics
 - animation is choreographed using one or more sequential timelines in which actions and interactions are defined
 - Immediate streaming after starting video download

Tools for Multimedia Presentation Systems for MM Presentation on WEB

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- ◆ 3D web graphics - the Future of Web Animation !
- ◆ Interact with a 3-D model
- ◆ Flash and Shockwave have already 3D plug-in
 - idea is to make Web more entertaining and informative, very interactive
 - less like a book and more like a video game
 - or more like television, with lots of high quality animation and video ...
 - Future will show ☺