IT2002: GRAPHICS & MULTIMEDIA

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Introduction To Multimedia

Module Data

- GPA

- 4 Credits

- Pre-requisites : IT1002

- 30 Hours-Lectures

- 60 Hours-Practical

Aim & Objectives

- Develop skills required in designing and integration of multimedia content in software applications

Learning Outcomes

At the end of the module the student will be able to:

- Demonstrate different concepts of graphics and multimedia and select appropriate content formats for a given application

- Apply different configuration and delivery related parameters in to multimedia content creation and editing

- Use common multimedia and image editing tools to create and edit multimedia contents

- Deploy multimedia content using different types of mediums.

Outline Syllabus

- Introduction to multimedia & Multimedia Concepts.
- Types of Multimedia(Vector ,Raster , linear or Non linear)
- Raster and Vector content
- Audio , Video and animation
- Multimedia delivery standards
- Multimedia editing tools

Assessment & weighting

- Continuous assessment
  - In class discussions, group work, quizzes, assignments & tutorials - 15%
  - Laboratory assignments - 35%
- End Semester Examination
  - Structure Exam Paper- 50 %

References

- **Multimedia Systems Design   by** Prabhat K. Andleigh

   Prentice Hall ISBN: 01-30-8909-52

- **Computer Graphics and Multimedia: Applications, Problems and Solutions, by**

   John Dimarco,

   IGI Global, ISBN:15-91-4026-62

- **Online Resources:**

   Learning materials from popular multimedia editing software vendors

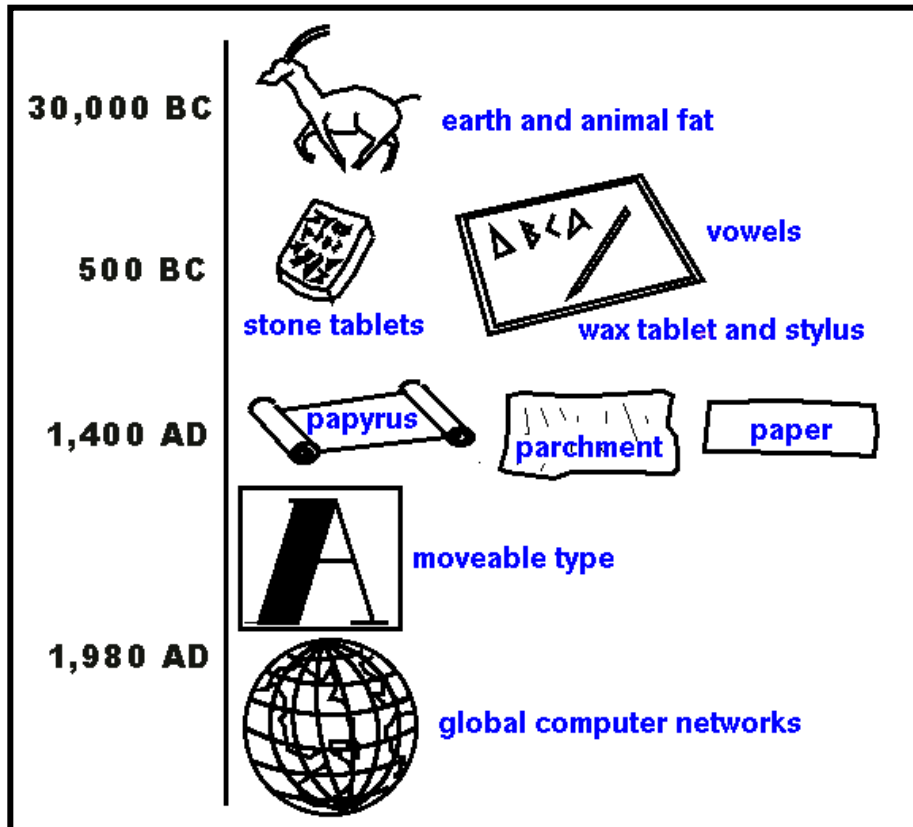# Introduction to Multimedia

Week 1
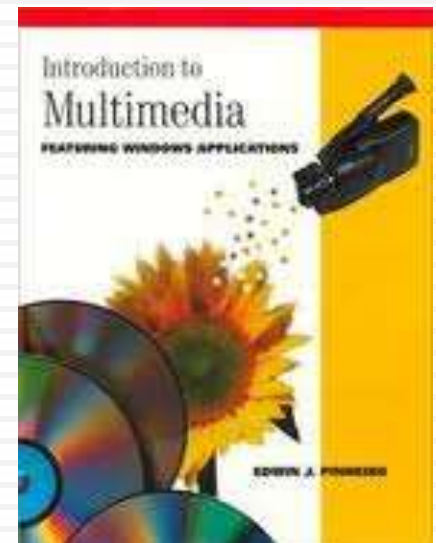
Objectives

At the end of this chapter, students should be able to:

- understand the history and development of media, computer and multimedia systems
- distinguish between hypertext, hypermedia and multimedia
- state and describe the multimedia applications

History & Development Of Multimedia

History Of Multimedia

30,000 BC	earth and animal fat
500 BC	stone tablets / vowels / wax tablet and stylus
1,400 AD	papyrus / parchment / paper
	moveable type
1,980 AD	global computer networks

http://www.december.com/present/mediaev.html

- What can we say about the evolution of media that has taken place for thousands of years?
- Since the dawn of time, people have had the need to communicate with one another.
- This created what we called as communication media.

History Of Multimedia

□ **Newspapers** → (perhaps) the first mass communication medium, which used mostly text, graphics, and images.

□ **1895** → Gugliemo Marconi sent his first **wireless radio** transmission at Pontecchio, Italy.

□ **1901** → he detected radio waves beamed across the Atlantic.

□ Initially invented for telegraph, radio is now a major medium for audio broadcasting.

History Of Multimedia

- **Television** ➔ new media for the 20th century.
- It brought video (+audio) and has since changed the world of mass communication.

Overlapping Technologies

- Different branches of multimedia grow together because of new, upcoming multimedia technology and applications.
- Two challenges lie ahead:
  - Timing requirements (synchronization etc.)
  - Integration requirements (of different media types)

Hypertext, Hypermedia & Multimedia

Hypertext

- A **hypertext(links)** : meant to be read nonlinearly, by following links that point to other parts of the document, or to other documents. (text which contains links to other texts and is usually non-linear)
- Invented by Ted Nelson around 1965

Hypertext is nonlinear

Hypertext

Normal Text

Linear

● "Hot spots"

Nonlinear
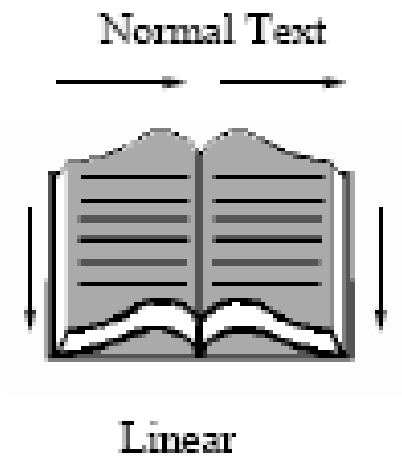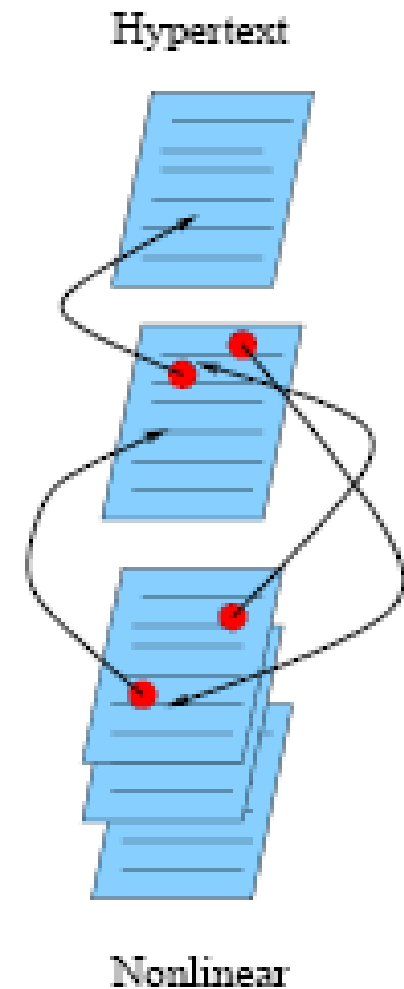
HyperMedia

- *HyperMedia* is not constrained to be text-based.

- It can include other media, e.g., graphics, images, and especially the continuous media - sound and video

- The World Wide Web (WWW) is the best example of hypermedia applications.
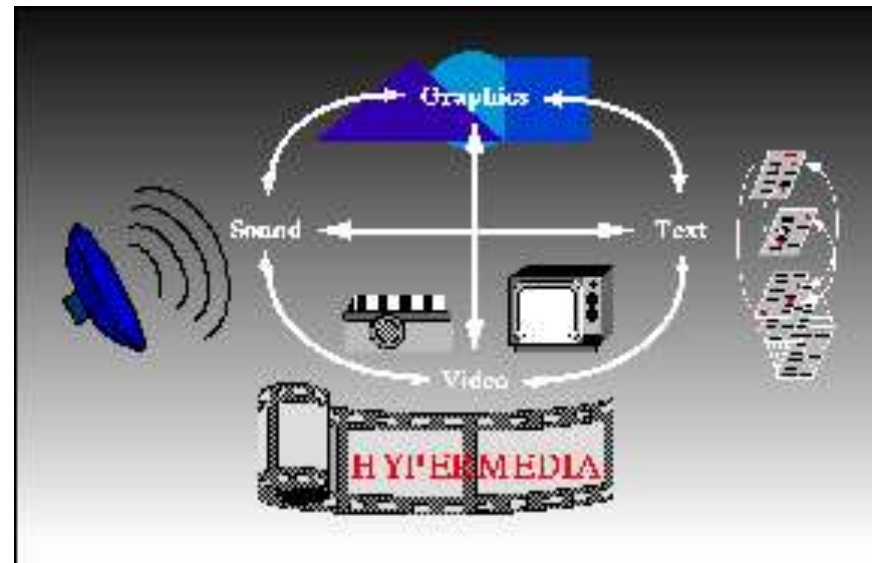
Hypertext and Hypermedia
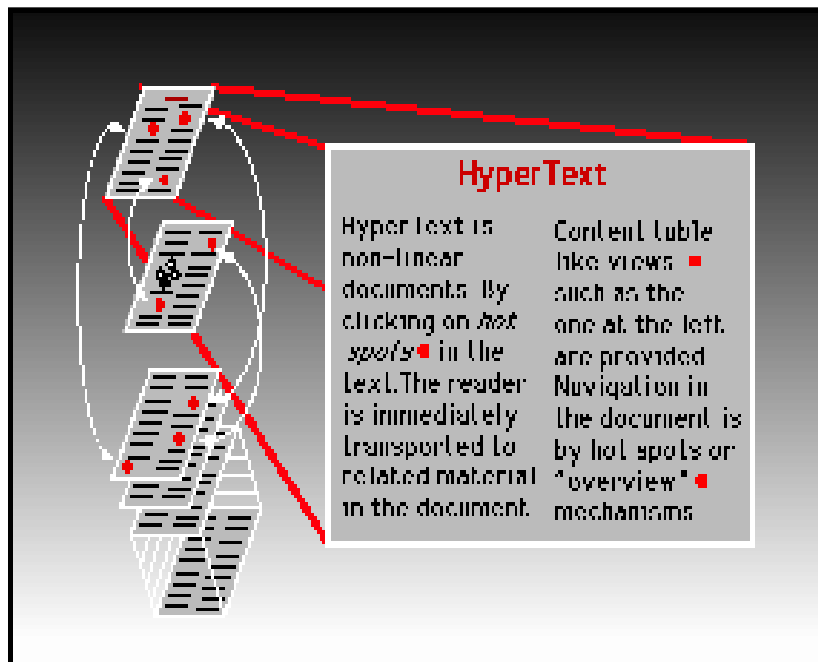
Hypertext
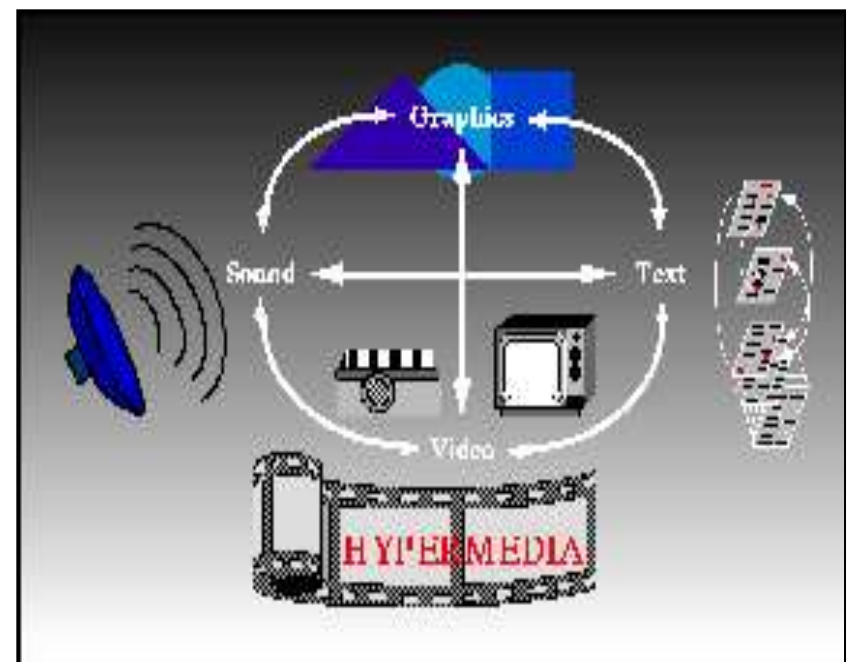
Hypermedia

HTML(Hyper Text Markup Language)

- **HTML**: a language for publishing Hypermedia on the World Wide Web
    1. HTML uses ASCII, it is portable to all different (possibly binary incompatible) computer hardware.
    2. The next generation of HTML is XHTML - a reformulation of HTML using XML.
- HTML uses **tags** to describe document elements

HTML(Hyper Text Markup Language)

- A very simple HTML page is as follows:

  ```
  <HTML> <HEAD>
  <TITLE>
  A sample web page.
  </TITLE>
  <META NAME = "Author" CONTENT = "Cranky Professor">
  </HEAD> <BODY>
  <P>
  We can put any text we like here, since this is
  a paragraph element.
  </P>
  </BODY> </HTML>
  ```

- Naturally, HTML has more complex structures and can be mixed in with other standards.

Multimedia

The notion of Multimedia

Consists of two words:

Multi (Latin)= many; much;

Medium (Latin) = An intervening substance through which something is transmitted or carried on.

Multimedia

What is Multimedia?

- *Multimedia* means a (usually) interactive combination of two or more media elements (multimedia building block), such as text, graphics, audio, video and animation integrated using a computer

- Multimedia is any combination of text, graphics, sound, animation ar delivered by computer

Multimedia

- *Multimedia* is the field concerned with the computer-controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.

Multimedia

- A multimedia project development requires creative, technical, organizational, and business skills.

- When you allow the user to control what and when these elements are delivered, it is **interactive** multimedia

Integration

- The integration of simulation tools with multimedia elements makes it possible to express in a richer way the knowledge we are trying to provide, and gives the audience a better comprehension of the problem, as explanations by means of video, images, texts, etc.

- Integrating Multimedia and Hypermedia into Teaching and Learning

- well-integrated multi-media can only improve the usability and stickiness of your site

Interactive

- Key feature of multimedia
- User determines what content is delivered, when it is delivered and how

Why multimedia?

- Ease of use
- Immersive experience
- interaction and better retention
- Better understanding
- Cost effectiveness
- More fun = Greater efficiency

Multimedia Application

- A *Multimedia Application* is an Application which uses a collection of multiple media sources. e.g. text, graphics, images, sound/audio, animation and/or video.

- Hypermedia can be considered as one of the multimedia applications.

Multimedia Building Block

Elements of Multimedia
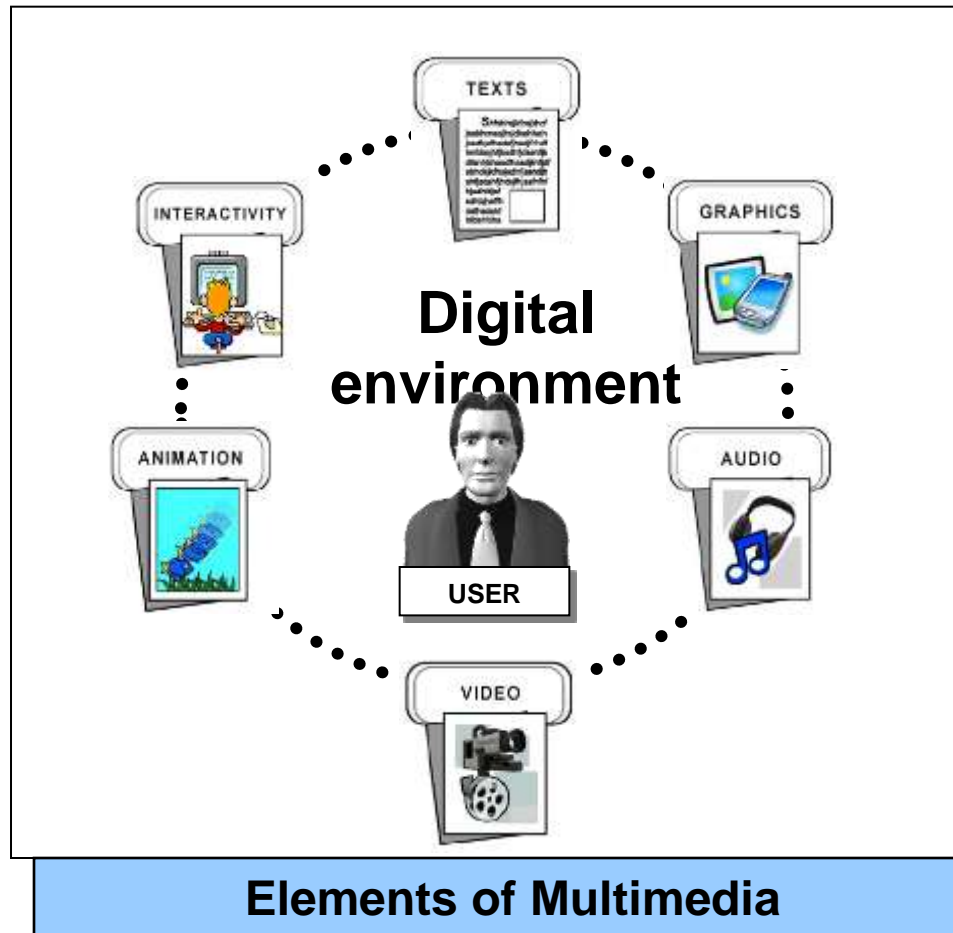
Multimedia

□ Multimedia has a number of distinct and unique features, including:

  ▫ **Based on Edgar Dale (Cone Of Learning), on average, people remember:**
  - **10% of what they read,**
  - **20% of what they hear,**
  - **30% of what they see,**
  - **50% of what they hear and see, → multimedia approach**

  ▫ **multimedia rich elements, multi-sensory delivery system can facilitate greater retention of new knowledge**

Cone of Learning (Edgar Dale)

After 2 weeks
we tend to remember...

Nature of
Involvement

10% of what we READ — READING — Verbal Receiving

20% of what we HEAR — HEARING WORDS

30% of what we SEE — LOOKING AT PICTURES

50% of what we HEAR and SEE — WATCHING A MOVIE / LOOKING AT AN EXHIBIT / WATCHING A DEMONSTRATION / SEEING IT DONE ON LOCATION — Visual Receiving

PASSIVE

70% of what we SAY — PARTICIPATING IN A DISCUSSION / GIVING A TALK — Receiving / Participating

90% of what we both SAY and DO — DOING A DRAMATIC PRESENTATION / SIMULATING THE REAL EXPERIENCE / DOING THE REAL THING — Doing

ACTIVE

Edgar Dale, *Audio-Visual Methods in Technology*, Holt, Rinehart and Winston.

Multimedia Modalities

- Modalities are the sensory systems through which a multimedia activity occurs

- This includes tactile (touch), gustatory (taste), visual (sight), auditory (hearing), olfactory (smell)

- Based on the multimedia elements we have today, only two modalities are regularly used.

Multimedia Channels

- Channels can be understood as existing *within* a modality.

- For example, with the auditory modality, we have different channels for noises, speech and music.

- With the visual modality, we have different channels for words, pictures and movies.

Multimedia Channels

- *Bandwidth* is a concept of how much information can be carried by a certain channel within a certain modality.

- For example, we can read at the rate of 150 words per minute which is the 'printed text' channel within the 'visual' modality.

- Much like your modem, you are unlikely to reach the theoretical maximum bandwidth of your *channel* within any modality, in practice.

Multimedia Channels

- The reason for this discrepancy in practice is because in theory, we assume a perfect encoder and decoder.

- For example, English text 'encoded' on a page and the English language 'decoder' in someone's head is assumed to be perfectly compatible.

- In reality, however, it is highly dependent on the education level of the reader, the nature of the text information presented and many other factors.

Multimedia 'Medium'

□ A **medium** can be understood as a set of co-ordinated channels, spanning one or more modalities, which have come to be referred to as a unitary whole, and which possess a cross-channel language of interpretation.

□ Examples include a television show, which typically uses the auditory and visual *modalities*; and picture, written text, speech and music *channels*.

Multimedia 'Medium'

- What is meant by a 'cross-channel language of interpretation' is that there must be some form of relationship between the channels.
- Take the TV show, for example.
- The moving pictures and sound are closely related.
- In combination, they provide a clearer message than when alone.

Multimedia Systems

- A system that supports more than a single type of media

- A *Multimedia System* is a system capable of processing multimedia data and applications.

- A *Multimedia System* is characterised by the processing, storage, generation, manipulation and rendition of Multimedia information.

Characteristics of a Multimedia System

A Multimedia system has four basic characteristics

1. Multimedia systems must be *computer controlled*.
2. Multimedia systems are *integrated*.
3. The information they handle must be represented *digitally*.
4. The interface to the final presentation of media is usually *interactive*.

Challenges for Multimedia Systems

- Supporting multimedia applications over a computer network renders the application *distributed*.

- Multimedia systems may have to render a variety of media at the same instant -- a distinction from normal applications. There is a temporal relationship between many forms of media (*e.g.* Video and Audio.

There 2 are forms of problems here

- Sequencing within the media -- *playing frames in correct order/time frame in video*

- *Synchronisation* -- inter-media scheduling (*e.g.* Video and Audio). Lip synchronisation is clearly important for humans to watch playback of video and audio and even animation and audio. Ever tried watching an out of (lip) sync film for a long time?

Challenges for Multimedia Systems

The key issues multimedia systems need to deal with here are:

- How to represent and store temporal information.
- How to strictly maintain the temporal relationships on play back/retrieval
- What process are involved in the above.
- Data has to represented *digitally* so many initial source of data needs to be *digitize* -- translated from analog source to digital representation. This will involve scanning (graphics, still images), sampling (audio/video) although digital cameras now exist for direct scene to digital capture of images and video.
- The data is *large* several Mb easily for audio and video -- therefore storage, transfer (bandwidth) and processing overheads are high. Data compression techniques very common.

Desirable Features for a Multimedia System

- **Very High Processing Power** -- needed to deal with large data processing and real time delivery of media. Special hardware commonplace.

- **Multimedia Capable File System** -- needed to deliver real-time media -- e.g. Video/Audio Streaming. Special Hardware/Software needed e.g RAID technology.

- **Data Representations/File Formats that support multimedia** -- Data representations/file formats should be easy to handle yet allow for compression/decompression in real-time.

- **Efficient and High I/O** -- input and output to the file subsystem needs to be efficient and fast. Needs to allow for real-time recording as well as playback of data. e.g. Direct to Disk recording systems.

Desirable Features for a Multimedia System

- **Special Operating System** -- to allow access to file system and process data efficiently and quickly. Needs to support direct transfers to disk, real-time scheduling, fast interrupt processing, I/O streaming *etc.*

- **Storage and Memory** -- large storage units (of the order of 50 -100 Gb or more) and large memory (50 -100 Mb or more). Large Caches also required and frequently of Level 2 and 3 hierarchy for efficient management.

- **Network Support** -- Client-server systems common as distributed systems common.

- **Software Tools** -- user friendly tools needed to handle media, design and develop applications, deliver media.

Components of a Multimedia System

- **Capture devices** -- Video Camera, Video Recorder, Audio Microphone, Keyboards, mice, graphics tablets, 3D input devices, tactile sensors, VR devices. Digitising/Sampling Hardware

- **Storage Devices** -- Hard disks, CD-ROMs, Jaz/Zip drives, DVD, *etc*

- **Communication Networks** -- Ethernet, Token Ring, FDDI, ATM, Intranets, Internets.

- **Computer Systems** -- Multimedia Desktop machines, Workstations, MPEG/VIDEO/DSP Hardware

- **Display Devices** -- CD-quality speakers, HDTV,SVGA, Hi-Res monitors, Colour printers *etc.*

Multimedia Authoring

- creation of multimedia productions, sometimes called "movies" or "presentations".
  - we are interested in **interactive** applications.
  - we also look at still-image editors such as Adobe Photoshop, and simple video editors such as Adobe Premiere.

Multimedia Authoring

- **Macromedia Flash**: allows users to create interactive movies by using the score metaphor, i.e., a timeline arranged in parallel event sequences.
- **Macromedia Director**: uses a movie metaphor to create interactive presentations - very powerful and includes a built-in scripting language
- **Lingo**, that allows creation of complex interactive movies.
- **Authorware**: a mature, well-supported authoring product

Delivering Multimedia

- **Compact disc**

   Inexpensive, easy mass produce and distribute

- **Online**

   Web pages, product advertisement, demos

   Later discuss more …

THE END