Multimedia Computing

أهداف المادة: توضيح مفهوم الوسائط المتعددة مع شرح تطبيقاتها ومكوناتها

Weeks	Syllabus
1st	Introduction to Multimedia.
2nd	Hyper Text and Hyper Media.
3rd	Components of Multimedia.
4th	Multimedia Research Topics and Projects.
5th	Multimedia applications.
6th	Multimedia on the web.
7th	Multimedia Data Basics
8th	Graphics and Image Data Representation (1)
9th	Graphics and Image Data Representation (2)
10th	Image digitization.
11th	Spatial resolution and quantization.
12th	Type of image
13th	Image file formats
14th	Arithmetic operation on image
15th	Logical operation on image
16th	Image histogram
17th	Histogram modification and Histogram equalization.
18th	Image compression techniques (1)
19th	Image compression techniques (2)
20th	Sound and Audio Basics
21th	Digitization of sound
22th	Nyquist theorem

23th	Synthetic sound
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Lesson 1

Introduction to Multimedia

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1.0 Aims and Objectives In this lesson

We will learn the preliminary concepts of Multimedia. We will discuss the various benefits and applications of multimedia. After going through this lecture the reader will be able to:
 i) Define multimedia
ii) List the elements of multimedia
iii) Enumerate the different applications of multimedia
iv) Describe the different stages of multimedia software development

1.1   Introduction:

Multimedia has become an inevitable part of any presentation. It has found a variety of applications right from entertainment to education. The evolution of internet has also increased the demand for multimedia content.

Definition Multimedia is the media that uses multiple forms of information content and information processing (e.g. text, audio, graphics, animation, video) to inform or entertain the user. Multimedia also refers to the use of electronic media to store and experience multimedia content. Multimedia is similar to traditional mixed media in fine art, but with a broader scope. The term "rich media" is synonymous for interactive multimedia.

1.2   Elements of Multimedia :

System Multimedia means that computer information can be represented through audio, graphics, image, video and animation in addition to traditional media (text and graphics). Hypermedia can be considered as one type of particular multimedia application. As illustrated in the following Fig.(1)

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Fig.(1) Elements of Multimedia

1.3 Categories of Multimedia :

Multimedia may be broadly divided into **linear** and **non-linear** categories. **Linear** active content progresses **without any navigation control** for the viewer such as a **cinema** presentation.

Non-linear content offers user interactivity to **control progress** as used with a **computer game** or used in self-paced computer based training. Non-linear content is also known as hypermedia content. Multimedia presentations can be live or recorded. A recorded presentation may allow interactivity via a navigation system. A live multimedia presentation may allow interactivity via interaction with the presenter or performer.

1.4 Features of Multimedia:

Multimedia presentations may be viewed in person on stage, projected, transmitted, or played locally with a media player. A broadcast may be a live or recorded multimedia presentation. Broadcasts and recordings can be either analog or digital electronic media technology. Digital online multimedia may be downloaded or streamed. Streaming multimedia may be live or on-demand. Multimedia games and simulations may be used in a physical environment with special effects, with multiple users in an online network, or locally with an offline computer, game system, or simulator.

1.5 Applications of Multimedia

Multimedia finds its application in various areas including, but not limited to, advertisements, art, education, entertainment, engineering, medicine, mathematics, business, scientific research and spatial, temporal applications
A few application areas of multimedia are listed below:

1. **Creative industries** :
   Creative industries use multimedia for a variety of purposes ranging from fine arts, to entertainment, to commercial art, to journalism, to media and software services provided for any of the industries listed below. An individual multimedia designer may cover the spectrum throughout their career.

2. **Commercial** Much of the electronic old and new media utilized by commercial artists is multimedia. Exciting presentations are used to grab and keep attention in advertising. Industrial, business to business, and interoffice communications are often developed by creative services firms for advanced multimedia presentations beyond simple slide shows to sell ideas or liven-up training. Commercial multimedia developers may be hired to design for governmental services and nonprofit services applications as well.

3. **Entertainment and Fine**:
Arts In addition, multimedia is heavily used in the entertainment industry, especially to develop special effects in movies and animations. Multimedia games are a popular pastime and are software programs available either as CD-ROMs or online. Some video games also use multimedia features. Multimedia applications that allow users to actively participate instead of just sitting by as passive recipients of information are called Interactive Multimedia.

4. **Education**
In Education, multimedia is used to produce computer-based training courses (popularly called CBTs) and reference books like encyclopedia and almanacs. A CBT lets the user go through a series of presentations, text about a particular topic, and associated illustrations in various information formats. Edutainment is an informal term used to describe combining education with entertainment, especially multimedia entertainment.

5. **Engineering**
Software engineers may use multimedia in Computer Simulations for anything from entertainment to training such as military or industrial training. Multimedia for software interfaces are often done as collaboration between creative professionals and software engineers.

6. **Industry**
In the Industrial sector, multimedia is used as a way to help present information to shareholders, superiors and coworkers. Multimedia is also helpful for providing employee training, advertising and selling products all over the world via virtually unlimited web-based technologies.

7. **Mathematical and Scientific Research**
In Mathematical and Scientific Research, multimedia is mainly used for modeling and simulation. For example, a scientist can look at a molecular model of a particular substance and manipulate it to arrive at a new substance. Representative research can be found in journals such as the Journal of Multimedia.

8. **Medicine** In Medicine, doctors can get trained by looking at a virtual surgery or they can simulate how the human body is affected by diseases spread by viruses and bacteria and then develop techniques to prevent it.

9. **Multimedia in Public Places**

   In hotels, railway stations, shopping malls, museums, and grocery stores, multimedia will become available at stand-alone terminals or kiosks to provide information and help. Such installation reduce demand on traditional information booths and personnel, add value, and they can work around the clock, even in the middle of the night, when live help is off duty. A menu screen from a supermarket kiosk that provide services ranging from meal planning to coupons. Hotel kiosk list nearby restaurant, maps of the city, airline schedules, and provide guest services such as automated checkout. Printers are often attached so users can walk away with a printed copy of the information. Museum kiosk are not only used to guide patrons through the exhibits, but when installed at each exhibit, provide great added depth, allowing visitors to browser though richly detailed information specific to that display.

1.6 Stages of Multimedia Application Development

A Multimedia application is developed in stages as all other software are being developed. In multimedia application development a few stages have to complete before other stages being, and some stages may be skipped or combined with other stages.

Following are the four basic stages of multimedia project development:

1. **Planning and Costing**: This stage of multimedia application is the first stage which begins with an idea or need. This idea can be further refined by outlining its messages and objectives. Before starting to develop the multimedia project, it is necessary to plan what writing skills, graphic art, music, video and other multimedia expertise will be required. It is also necessary to estimate the time needed to prepare all elements of multimedia and prepare a budget accordingly. After preparing a budget, a prototype or proof of concept can be developed.

2. **Designing and Producing**: The next stage is to execute each of the planned tasks and create a finished product.

3. **Testing**: Testing a project ensures the product to be free from bugs. Apart from bug elimination another aspect of testing is to ensure that the multimedia. Application meets the objectives of the project. It is also necessary to test whether the multimedia project works properly on the intended deliver platforms and they meet the needs of the clients.

4. **Delivering**: The final stage of the multimedia application development is to pack the project and deliver the completed project to the end user. This stage has several steps such as implementation, maintenance, shipping and marketing the product.

1.7   Let us sum up

In this lesson we have discussed the following points

i)   Multimedia is a woven combination of text, audio, video, images and animation.

ii)   Multimedia systems finds a wide variety of applications in different areas such as education, entertainment etc.

iii) The categories of multimedia are linear and non-linear.

iv)   The stages for multimedia application development are Planning and costing, designing and producing, testing and delivery.

1.8   References

1. "Multimedia Making it work" By Tay Vaughan