Department of Collegiate and Technical Education

UNIT 1

SESSION 1

MULTIMEDIA AND ANIMATION – 20CS21P

UNIT 1

INTRODUCTION TO MULTIMEDIA SYSTEMS

1.1 Introduction

1.1.1 Significant Features

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. Enhanced levels of interactivity are made possible by combining multiple forms of media content But depending on what multimedia content you have it may vary. Online multimedia is increasingly becoming object-oriented and data-driven, enabling applications with collaborative end-user innovation and personalization on multiple forms of content over time. Examples of these range from multiple forms of content on web sites like photo galleries with both images (pictures) and title (text) user-updated, to simulations whose co-efficient, events, illustrations, animations or videos are modifiable, allowing the multimedia "experience" to be altered without reprogramming.

1.1.2 Classifications

Multimedia may be broadly divided into following categories:

i) ***Linear***

Linear active content progresses without any navigation control for the viewer such as a cinema presentation.

ii) ***Non-linear***

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.

1.1.3 Applications

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:

i) Multimedia in 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. Request for their skills range from technical, to analytical and to creative.

ii) Multimedia in 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.

iii) Multimedia in 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*.

iv) Multimedia in Education

In Education, multimedia is used to produce computer-based training courses (popularly called CBTs) and reference books like encyclopaedia 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. Many computer games with focus on education are now available. Consider an example of an educational game which plays various rhymes for kids. The child can paint the pictures, increase reduce size of various objects etc apart from just playing the rhymes. Several other multimedia packages are available in the market which provide a lot of detailed information and playing capabilities to kids.

v) Multimedia in 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.

vi) Multimedia in 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.

vii) Multimedia in 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.

viii) Multimedia in 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.

ix) 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.

x) Multimedia in Business

Multimedia can be used in many applications in a business. The multimedia technology along with communication technology has opened the door for information of global wok groups. Today the team members may be working anywhere and can work for various companies. Thus the work place will become global. The multimedia network should support the following facilities:

a. Voice Mail
b. Electronic Mail
c. Multimedia based FAX
d. Office Needs
e. Employee Training
f. Sales and Other types of Group Presentation
g. Records Management

xi) Multimedia in Marketing and Advertising

By using multimedia marketing of new products can be greatly enhanced. Multimedia boost communication on an affordable cost opened the way for the marketing and advertising personnel. Presentation that have flying banners, video transitions, animations, and sound effects are some of the elements used in composing a multimedia based advertisement to appeal to the consumer in a way never used before and promote the sale of the products.

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xiii) Multimedia in Bank

Bank is another public place where multimedia is finding more and more application in recent times. People go to bank to open saving/current accounts, deposit funds, withdraw money, know various financial schemes of the bank, obtain loans etc. Every bank has a lot of information which it wants to impart to in customers. For this purpose, it can use multimedia in many ways. Bank also displays information about its various schemes on a PC monitor placed in the rest area for customers. Today on-line and internet banking have become very popular. These use multimedia extensively. Multimedia is thus helping banks give service to their customers and also in educating them about banks attractive finance schemes.

xiv) Multimedia in Hospital

Multimedia best use in hospitals is for real time monitoring of conditions of patients in critical illness or accident. The conditions are displayed continuously on a computer screen and can alert the doctor/nurse on duty if any changes are observed on the screen. Multimedia makes it possible to consult a surgeon or an expert who can watch an ongoing surgery line on his PC monitor and give online advice at any crucial juncture.

In hospitals multimedia can also be used to diagnose an illness with CD-ROMs/ Cassettes/ DVDs full of multimedia based information about various diseases and their treatment. Some hospitals extensively use multimedia presentations in training their junior staff of doctors and nurses. Multimedia displays are now extensively used during critical surgeries.

xv) Multimedia Pedagogues

Pedagogues are useful teaching aids only if they stimulate and motivate the students. The audio-visual support to a pedagogue can actually help in doing so. A multimedia tutor can provide multiple numbers of challenges to the student to stimulate his interest in a topic. The instruction provided by pedagogue have moved beyond providing only button level control to intelligent simulations, dynamic creation of links, composition and collaboration and system testing of the user interactions.

xvi) Communication Technology and Multimedia Services

The advancement of high computing abilities, communication ways and relevant standards has started the beginning of an era where you will be provided with multimedia facilities at home. These services may include:

a. Basic Television Services

b. Interactive entertainment

c. Digital Audio

d. Video on demand

e. Home shopping

f. Financial Transactions

g. Interactive multiplayer or single player games

h. Digital multimedia libraries

i. E-Newspapers, e-magazines

1.2 Multimedia Building Blocks

Any multimedia application consists any or all of the following components :

1. ***Text :***

Text and symbols are very important for communication in any medium. With the recent explosion of the Internet and World Wide Web, text has become more important than ever. Web is HTML (Hyper text Markup language) originally designed to display simple text documents on computer screens, with occasional graphic images thrown in as illustrations.

2. ***Audio :***

Sound is perhaps the most element of multimedia. It can provide the listening pleasure of music, the startling accent of special effects or the ambience of a mood-setting background.

3. ***Images :***

Images whether represented analog or digital plays a vital role in a multimedia. It is expressed in the form of still picture, painting or a photograph taken through a digital camera.

4. ***Animation :***

Animation is the rapid display of a sequence of images of 2-D artwork or model positions in order to create an illusion of movement. It is an optical illusion of motion due to the phenomenon of persistence of vision, and can be created and demonstrated in a number of ways.

5. ***Video :***

Digital video has supplanted analog video as the method of choice for making video for multimedia use. Video in multimedia are used to portray realtime moving pictures in a multimedia project.

6. ***Image Data Types :***

An image consists of a rectangular array of dots called pixels. The size of the image is specified in terms of width X height, in numbers of the pixels. The physical size of the image, in inches or centimeters, depends on the resolution of the device on which the image is displayed. The resolution is usually measured in DPI (Dots Per Inch). An image will appear smaller on a device with a higher resolution than on one with a lower resolution. For color images, one needs enough bits per pixel to represent all the colors in the image. The number of the bits per pixel is called the depth of the image.

Images can be created by using different techniques of representation of data called data type like monochrome and colored images. Monochrome image is created by using single color whereas colored image is created by using multiple colors.

Some important data types of images are following:

- **1-bit images**- An image is a set of pixels. Note that a pixel is a picture element in digital image. In 1-bit images, each pixel is stored as a single bit (0 or 1). A bit has only two states either on or off, white or black, true or false. Therefore, such an image is also referred to as a binary image, since only two states are available. 1-bit image is also known as 1-bit monochrome images because it contains one color that is black for off state and white for on state.

  A 1-bit image with resolution 640*480 needs a storage space of 640*480 bits.

  640 x 480 bits. = (640 x 480) / 8 bytes = (640 x 480) / (8 x 1024) KB= 37.5KB.

  The clarity or quality of 1-bit image is very low.

- **8-bit Gray level images**- Each pixel of 8-bit gray level image is represented by a single byte (8 bits). Therefore each pixel of such image can hold 2^8=256 values between 0 and 255. Therefore each pixel has a brightness value on a scale from black (0 for no brightness or intensity) to white (255 for full brightness or intensity). For example, a dark pixel might have a value of 15 and a bright one might be 240.

  A grayscale digital image is an image in which the value of each pixel is a single sample, which carries intensity information. Images are composed exclusively of gray shades, which vary from black being at the weakest intensity to white being at the strongest. Grayscale images carry many shades of gray from black to white. Grayscale images are also called monochromatic, denoting the presence of only one (mono) color (chrome). An image is represented by bitmap. A bitmap is a simple matrix of the tiny dots (pixels) that form an image and are displayed on a computer screen or printed.

  A 8-bit image with resolution 640 x 480 needs a storage space of 640 x 480 bytes=(640 x 480)/1024 KB= 300KB. Therefore an 8-bit image needs 8 times more storage space than 1-bit image.

- **24-bit color images** - In 24-bit color image, each pixel is represented by three bytes, usually representing RGB (Red, Green and Blue). Usually true color is defined to mean 256 shades of RGB (Red, Green and Blue) for a total of 16777216 color variations. It provides a method of representing and storing graphical image information an RGB color space such that a colors, shades and hues in large number of variations can be displayed in an image such as in high quality photo graphic images or complex graphics.

  Many 24-bit color images are stored as 32-bit images, and an extra byte for each pixel used to store an alpha value representing special effect information.

  A 24-bit color image with resolution 640 x 480 needs a storage space of 640 x 480 x 3 bytes = (640 x 480 x 3) / 1024=900KB without any compression. Also 32-bit color image with resolution 640 x 480 needs a storage space of 640 x 480 x 4 bytes= 1200KB without any compression.

  Disadvantages

  - Require large storage space
  - Many monitors can display only 256 different colors at any one time. Therefore, in this case it is wasteful to store more than 256 different colors in an image.

- **8-bit color images** - 8-bit color graphics is a method of storing image information in a computer's memory or in an image file, where one byte (8 bits) represents each pixel. The maximum number of colors that can be displayed at once is 256. 8-bit color graphics are of two forms. The first form is where the image stores not color but an 8-bit index into the color map for each pixel, instead of storing the full 24-bit color value. Therefore, 8-bit image formats consists of two parts: a color map describing what colors are present in the image and the array of index values for each pixel in the image. In most color maps each color is usually chosen from a palette of 16,777,216 colors (24 bits: 8 red, 8green, 8 blue).

  The other form is where the 8-bits use 3 bits for red, 3 bits for green and 2 bits for blue. This second form is often called 8-bit true color as it does not use a palette at all. When a

24-bit full color image is turned into an 8-bit image, some of the colors have to be eliminated, known as color quantization process.

A 8-bit color image with resolution 640 x 480 needs a storage space of 640 x 480 bytes=(640 x 480) / 1024KB= 300KB without any compression.